

The shortfall in European investment

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Since Robert Solow's early work, we have known that long-term economic growth does not come from a larger capital stock or increased employment, but from technical progress, identified as the unobserved part of growth. This unobserved element – the Solow residual – explained 87% of US growth in the first half of the 20th century. Since then, theories of endogenous growth have shown that it is above all intangible investment, particularly investment in R&D or human capital, which, as a source of positive externalities, ensures long-term growth.

Information and communication technologies (ICT) have focused the attention of researchers and statisticians since the late 1990s. Although they have not always lived up to their promise of productivity gains – the Solow paradox – they are undeniably the lifeblood of all the technologies of the 21st century, and are the weapons of competitiveness for all sectors, especially digital services. Taking an interest in investment in these technologies is an essential part of any discussion of growth and living standards.

In this post, we focus on three types of investment, one tangible, and the other two intangible, which may be at the root of the European economic backwardness relative to the United States analysed in greater detail in our Policy brief "[Documenting the widening transatlantic gap](#)". We are looking at investment in ICT equipment (servers, routers, computers, etc.), investment in research and development (R&D), and

investment in ICT services such as software, programs and databases.[\[1\]](#) These three types of investment stand out from other tangible investments (in transport equipment, machinery, buildings, farmland) and intangible investments (in training, intellectual property, organisation) because of their particular dynamics, revealing a growing and sometimes spectacular lag between the eurozone and the United States.

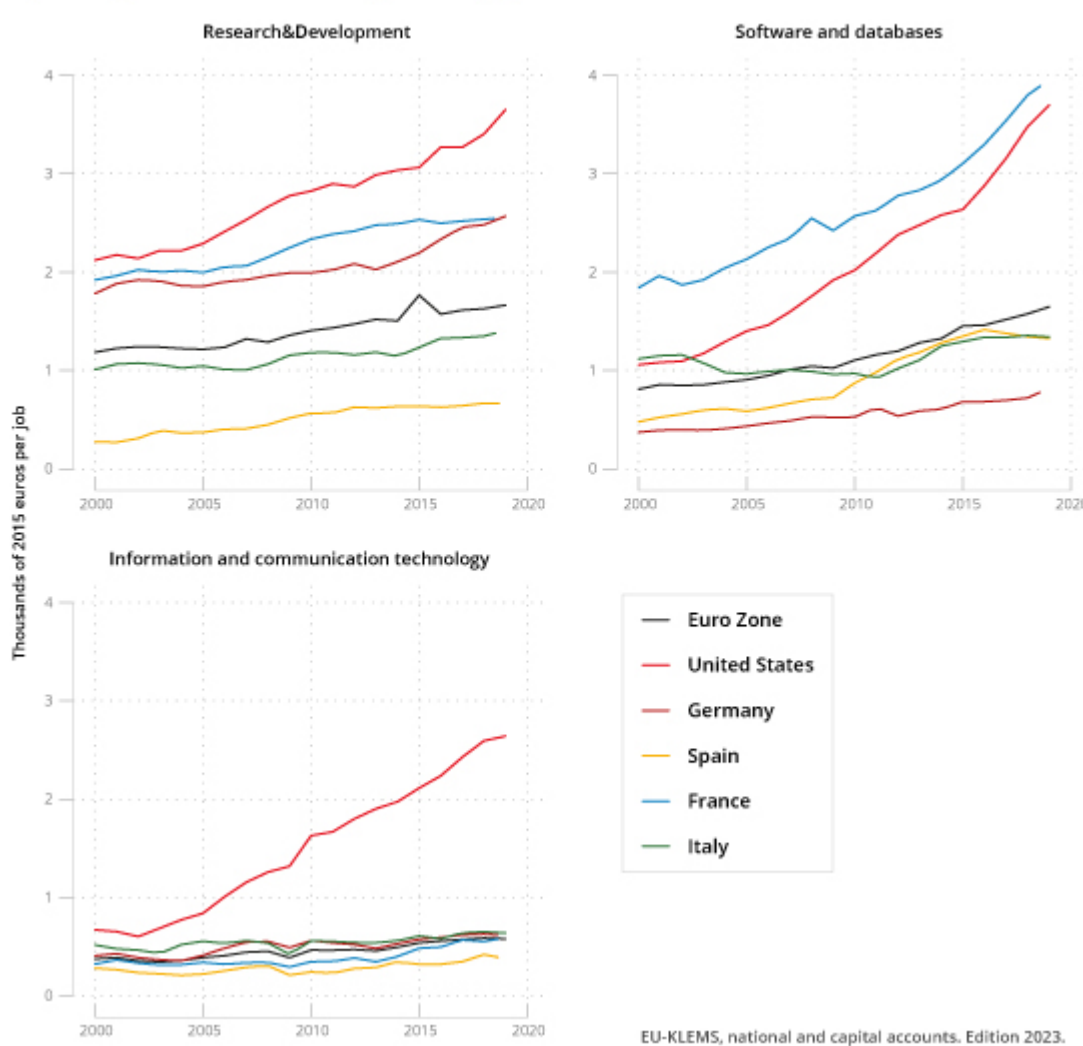
Let's first look at the dynamics of investment.

Figure 1 shows investment per job for these three types of investment in the United States, the eurozone and the four major eurozone countries from 2000 and 2019. It appears that the investment effort in the United States is greater for each of them.

- In terms of R&D investment, the gap between the United States and the eurozone, which was already wide in the early 2000s, is widening in absolute terms (from €1,000 to €2,000 per job over the period) to represent more than twice the European effort in 2019. What we find most worrying is that this widening gap is the result of uniform behaviour on the part of the main European economies. For both Germany and France, this gap, which was rather small until 2005, is multiplied by 10 for France and by 5 for Germany at the end of the period.
- Concerning investment in software and databases, and leaving aside the French case[\[2\]](#), there is no reason to be optimistic. The US-EZ gap in investment per job in software and databases has increased 12-fold, from €200 to €2,400 over the two decades. France stands out in terms of volume, but the trend is for French investment to double while US investment triples.
- Concerning investment in ICT equipment, the American singular achievement is even more impressive. Initially close to European levels, this investment is growing steadily in the United States, while remaining constant

in the eurozone. The comparison is eloquent here, since investment per job remains at between 500 and 700 euros per year over the entire period in the eurozone, whereas it reaches 2,500 euros in the United States, a nearly five-fold increase over the period in question.

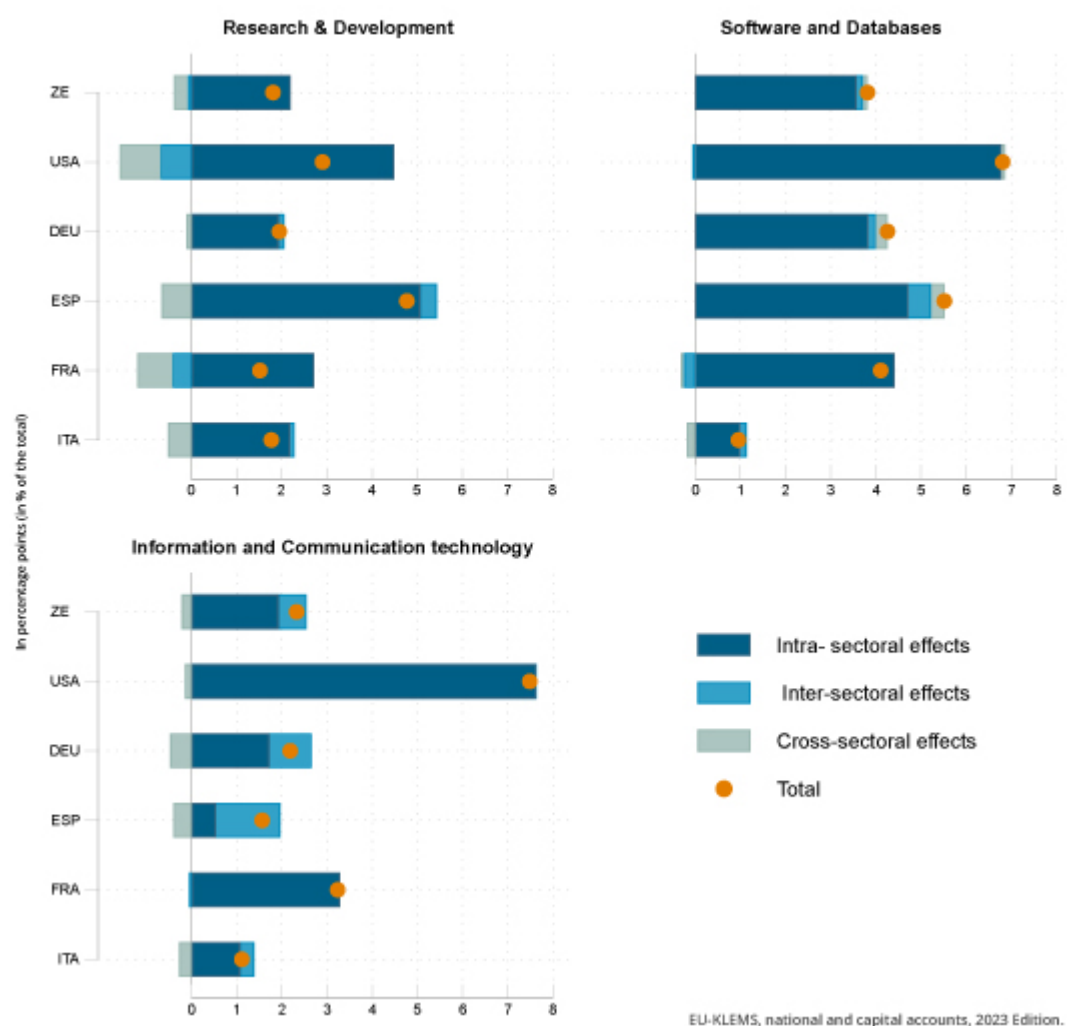
Figure 1. Dynamics of investment by job and by type of investment



Overall, the private investment gap between the eurozone and the United States stood at around 150 billion euros in 2000, rising to over 600 billion euros in 2019. Where does this US vigour come from, and above all, how can we explain Europe's apathy? The first question we might ask is the role of the productive specialisation of economies. After all, if the sectors that are growing in the US are those that invest the most in R&D, software and ICT equipment, we should see greater composition effects in the US than in the eurozone. This would imply that the growth observed is not the result of American

behaviour that is increasingly inclined towards investment but is above all the result of an advantageous sectoral positioning for the United States. Let's now decompose investment growth by distinguishing between intra- and inter-sectoral effects.

Figure 2. Intra- and inter-sectoral contributions to the average annual growth rate of investment per job (by type of investment, 2000-2019) (in % of the total)



By positing aggregate investment per job as the sum of investment per job in each sector weighted by the share of employment in those sectors, the growth rate of aggregate investment per job can be decomposed as the sum of intra-sectoral effects, inter-sectoral effects and cross-sectoral effects over the period.

The first effect captures the source of change linked to the increase in investment (per job) taking place within each sector. This internal effect may be the result of companies

increasing their investment between 2000 and 2019, market share reallocations within sectors, or firms entering and leaving the market. The second effect, the cross-sectoral effect, is the result of structural change in economies, understood as changes in the sectoral structure of economies. The cross-sectoral effect is the combination of the first two effects.

Figure 2 presents the results of this decomposition, distinguishing between the effects within each sector and those between sectors. We can immediately see that it is the intra-sectoral effect that explains the growth in per capita investment, and this applies across all economies and all types of investment. In other words, the explanation that structural change is taking place in such a way as to favour growth in investment per job in the United States and not in Europe can be rejected. Not only are the sectoral structures of the economies not that far apart, but above all the investment growth is clearly the result of an investment intensification within sectors. We therefore need to understand the origin of the US-EZ investment gap as the result of investment behaviour that changes over time.

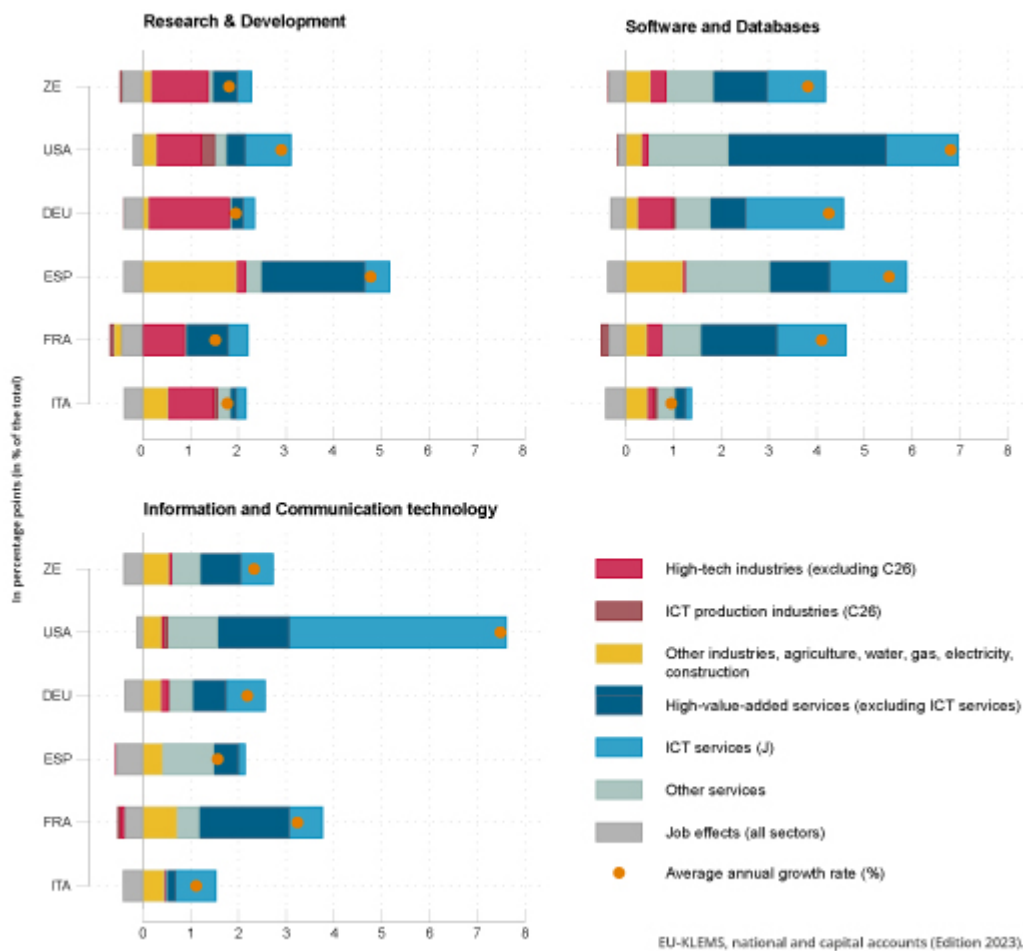
To reveal them, we use another decomposition, where the growth rate of investment per job is the result of the growth rate of investment minus the growth rate of employment. Next, we decompose the investment growth rate as the sum of the sectoral growth rates, weighted by each sector's share of total investment, at the start of the period. We classify all the sectors that make up the market economy by type of sector as follows: (i) high-tech industries (excluding ICT production); (ii) ICT production industries; (iii) other industries, agriculture, water, gas, electricity, construction; (iv) high-value-added services (excluding ICT services); (v) ICT services; (vi) other services. This classification seems relevant to us because it distinguishes ICT production activities (whether manufactured or services)

from other sectors that use ICTs as inputs in their production.

Figure 3 shows the results by type of investment. Let's look first at R&D investment. The case of Spain may seem surprising in terms of the growth observed, but this is above all the result of a catch-up effect. Indeed, as figure 1 shows, it is in Spain that investment per job is the lowest throughout the period under consideration. This growth is essentially driven by high value-added services and 'low-tech' industries. In the other countries, growth in investment per job is mainly driven by high-tech industries. This is particularly true of the eurozone in general, and Germany and Italy in particular. The differential between the US and European growth rates (excluding Spain) is mainly the result of major investment by the ICT services sectors. Here we see above all the famous GAFAMs.[\[3\]](#) The exploitation of gigantic databases combined with the rise of artificial intelligence – and the impressive possibilities it offers – are prompting the GAFAMs to invest massively in R&D in order to make the most of these new technologies.

Growth in investment in databases and software is mainly due to the services sector in general, whatever the country. What distinguishes the US from other countries is the significant contribution made by high value-added services. This suggests that ICTs are spreading more rapidly throughout the economic activities in the United States than in Europe. Italy stands out for its low growth rate, with services making virtually no contribution to the growth of this investment. The case of Spain is, once again, the expression of a catch-up effect, as shown in Figure 1.

Figure 3. Sectoral contribution to the average annual growth rate of investment per job (by type of investment, 2000-2019)



Finally, the US-EZ comparison of the sources of growth in investment in ICT equipment is particularly enlightening. Over and above the difference in growth rates, we note that the contribution of the sectors is relatively similar between the two regions of the world, except for ICT services. In the eurozone, the contribution of ICT services to growth in investment in ICT equipment remains low, whereas in the United States it is 4.5 percentage points, which alone explains the difference observed. Our interpretation is that the specific dynamics of investment in ICT equipment observed in Figure 1 is the result of massive investment by ICT services, i.e. essentially by GAFAMs and sisters (Intel, Nvidia...). In other words, intangible investment in R&D and software/databases is evolving in tandem with tangible investment in ICTs, which complements it and makes it operational or even productive.

Three results to remember :

1. The investment effort in the United States is greater than in the eurozone for the three types of investment considered: R&D, ICT equipment and ICT services (software and databases).
 - a. The gap between the United States and the eurozone is widening for all types of investment.
 - b. In 2019, investment in ICT equipment per job will be five times higher in the United States than in the eurozone.

2. It is the intra-sectoral effect that explains the growth in investment per job, in all economies, and for all types of investment.
 - a. The gap between the United States and the eurozone is therefore not because of changes in specialisation (over the last 20 years), but rather to changes within sectors.
 - b. The origin of the investment gap the contribution of ICT services to growth in investment in ICT equipment is the result of investment behaviour that changes over time.

3. There are significant differences between countries in terms of sectoral contributions to growth in investment per job.
 - a. In the eurozone, growth in R&D investment is being driven mainly by high-tech industries. In the United States, it is mainly ICT services that are driving this growth;
 - b. What distinguishes the United States from other countries is the significant contribution of high value-added services to the growth in investment in databases and software;
 - c. The difference in investment in ICT equipment is

mainly due to investment by the services sector.

It is as if, in the United States, the ICT services sector – including the five American giants – was responsible for the observed differential, with its heavy investment in R&D and digital equipment. The other service sectors (essentially high value-added services) are integrating these innovations into their production processes by investing in software and databases. The US case thus offers a high degree of coherence through the complementarity between sectors that produce and sectors that use ICT services. The overall impression is one of rapid digitisation of the economy, driven by GAFAMs and spreading to the entire US production base.

The European case does not offer the same picture, and is worrying for two reasons. Firstly, the lack of investment in ICT services means that the economy is digitised more slowly. Secondly, the absence of a leading company in the field of digital services limits investment in R&D and digital equipment. With the future promises of artificial intelligence and quantum computing, there is every reason to believe that, without the combination of upstream sectors supplying ICT services and equipment and downstream sectors adopting these innovations, Europe will find it more difficult to capture the fruits of the announced digitisation of the economy.

The challenge is therefore immense. Catching up would mean increasing private investment [\[4\]](#) in Europe by €630 billion a year (or more than 5% of the eurozone's GDP), for the assets considered here alone (ICTs, R&D, software and databases), and assuming that US investment remains constant. This is equivalent to an increase in investment of €61 billion for France, €57 billion for Germany, €28 billion for Italy and €16 billion for Spain. But this is not just a quantitative problem, far from it. Without a radical change in the investment behaviour of public and private players, and

institutional innovation in European governance^[5] , this paradox is likely to persist in Europe, which, by remaining anchored in the productions of the 20th century, is clearly at risk of technological decline.

[1] It should be remembered that these investments may result from in-house production or be purchased from external suppliers.

[2] Guillou and Mini have highlighted the enigmatic French peculiarity in software and databases, which persists despite the differences in accounting between countries. See "[A la recherche de l'immatériel : comprendre l'investissement de l'industrie française](#)", La Fabrique de l'industrie (2019).

[3] As a reminder, the GAFAMs are : Google (now Alphabet), Amazon, Facebook (Meta), Apple and Microsoft.

[4] The private sector corresponds to sectors with NACE codes from A to N.

[5] On this point, see the recent report by Fuest, D. Gros, P.-L. Mengel, G. Presidente and J. Tirole, "[EU Innovation Policy: How to escape the middle technology trap](#)", April 2024, A Report by the European Policy Analysis group.

**Why – and how – to make Next
Generation EU (NGEU)**

sustainable

[Frédéric Allemand](#), [Jérôme Creel](#), [Nicolas Leron](#), [Sandrine Levasseur](#) and [Francesco Saraceno](#)

The Next Generation EU (NGEU) instrument was created during the pandemic to finance the recovery and, above all, to ensure the resilience of the European Union (EU). Since then, with the war in Ukraine and its various consequences, the shocks hitting the EU continue to accumulate, in a context where it is also necessary to accelerate the ecological transition and the digitalization of the economy. Russia's invasion of Ukraine has put defence matters back on the front burner, while inflation is giving rise to heterogeneous reactions from member states, which is not conducive to economic convergence, not to mention the monetary tightening that is destabilizing some banks. The Biden administration's subsidies to US industry have all the hallmarks of a new episode in the trade war, to which the European Commission has responded by temporarily relaxing the rules on state aid. In this uncertain environment, where one shock is following another, the idea of making the NGEU instrument permanent instead of temporary has gained ground. European Commissioner [P. Gentiloni](#), for example, mentioned the idea as early as 2021; it was raised at a conference of the [Official Monetary and Financial Institutions Forum](#) in 2022; it appeared at the conclusion of an article by [Schramm](#) and de Witte, published in the [Journal of Common Market Studies](#) in 2022; and it was mentioned publicly by [Christine Lagarde](#) in 2022. There is, however, little consensus on this issue, especially in Germany, where, after the Constitutional Court's decision in favour of the NGEU on 6 December 2022, the Minister of Finance, Christian Lindner, reminded us that the issuance of common debt (at the heart of the NGEU) must remain an "[exception](#)". As the debate remains open, in a [recent study](#) for the Foundation for European Progressive Studies (FEPS), we assessed the economic

and political relevance that the implementation of a permanent NGEU-type instrument would entail, as well as the technical and legal difficulties involved.

The implementation of the NGEU has already raised delicate questions of coordination between member states regarding the allocation of funds to the Commission's various structural priorities (how much to the ecological transition? how much to digitalization?) and between the countries themselves, since the question of a "fair return" never fails to resurface in the course of negotiations. Adding to these coordination difficulties, the first part of our study raises the question of the *democratic legitimacy* of EU policies when supranational priorities limit the autonomy of national parliaments, starting with fiscal policy, the "material heart" of democracy. The problem of democratic accountability is not new if one considers that supranational rules, such as the Stability and Growth Pact, impose limits on the power of parliaments to "tax and spend". In fact, the intrinsic logic of coordination is to force political power to conform to functional (macroeconomic) imperatives, which inevitably leads to a form of depoliticization of fiscal and budget policy. The perpetuation of the NGEU must therefore be seen as an opportunity to remedy the depoliticization of EU policies and to move towards a "political Europe" by establishing a supranational level for the implementation of a European fiscal policy.

This part of the study also reminds us that while the implementation of the NGEU has been of paramount importance in stimulating a post-pandemic recovery, the economic results are still uncertain since the funds were allocated only relatively recently^[1]. It also reveals a change in the mindset of EU policymakers. For the first time, joint borrowing and some risk-sharing have become features of a European fiscal plan.

It would be wrong, however, at this stage to see the NGEU as a “Hamiltonian” moment or as the founding act of a federal Europe: the NGEU is limited in scope and duration; it does not take over the past debts of the member states; and it has not created a common spending (investment) capacity. And this is perhaps both its main weakness and its main area for improvement. The pandemic and the strong economic response to it by European states have indicated that they can share common, crucial goals: recovery, resilience, the ecological transition and digitalization. What is missing, however, is a central fiscal capacity to better link the long-term challenges with an instrument adapted to this kind of horizon. Hence the idea of making the NGEU permanent.

As a preamble to a possible long-term establishment of the NGEU, another part of the study raises the issue of determining the main task of a permanent central budgetary instrument. One obvious answer is the provision and financing of European public goods (broadly defined to include the areas of security and environmental protection) that member states may not provide in sufficient quantity, due to a lack of resources and/or externalities. Regarding the provision of public goods, it should be recalled that the preferences of EU citizens are fairly homogeneous within the Union, and that there is a growing demand for some needs to be met at the EU level. For example, [86% of EU citizens are in favour of making investments in renewable energy at the EU level](#). Even the production of military equipment by the EU is increasingly supported by citizens, with 69% “agreeing or strongly agreeing”. The provision of public goods at the EU rather than the national level would also allow for very tangible economies of scale, for example in the field of infrastructure. Last but not least, this would be justified by the instrument’s capacity to “make Europe” through concrete actions and strengthen the feeling of being European. Any debate on a central budgetary capacity would of course have to be conducted in parallel with that on the reform of the

Stability and Growth Pact in order to guarantee the creation of a fiscal space (or additional margins of manoeuvre) in the EU.

The study then points out that there are few options for creating a central budgetary capacity within the current institutional framework. The treaties define a budgetary framework (centred on the multi-annual financial framework, the MFF) for the EU that ties spending to the ability to raise funds, thus severely limiting the ability to raise debt in normal times. The creation of special financial instruments and the decision to spend beyond the MFF ceilings are explicitly linked to exceptional circumstances and cannot be a solution for the recurrent provision of public goods. The 0.6 percentage point increase in the own resources ceiling to 2 percent of GNI [2] ensured that the unprecedented level of borrowing respected the constitutional principle of a balanced budget.

However, this increase was approved only because of its exceptional and temporary nature, as the ceiling on own resources for payments is to be reduced to 1.40 percent of GNI once the funds are repaid and the commitments cease to exist. Even if permanent funding were to be allocated to the NGEU instrument, its capacity to intervene would remain limited. In accordance with its legal basis (Article 122 TFEU), the NGEU is a tool for crisis management whose activation is linked to the occurrence or risk of exceptional circumstances. As a matter of principle, European legislation prohibits the EU from using funds borrowed on the capital markets to finance operational expenditure.

The study examines other legal arrangements that could contribute to the financing of public goods, but whatever legal basis is chosen, (a) the EU does not have a general multi-purpose financial instrument that it could activate, in addition to the general budget, to finance actions and projects over the long term; and (b) the EU cannot grant funds

to finance actions outside its area of competence, i.e., it cannot substitute itself for member states in areas where the latter retain competence for their policies. Therefore, if a central budgetary capacity is to be created, it would be necessary to revise the treaties or establish new intergovernmental arrangements (along the lines of the European Stability Mechanism).

Based on the second option, the study proposes that a European public investment agency be created as a first step towards the creation of a central budgetary capacity. This agency would have the function of planning and implementing investment projects, in cooperation with the member states. Under EU legislation, the agency would not have full control over policy choices but would act mainly within the limits set by the roadmaps of the EU institutions. Nevertheless, it would have the administrative capacity to design public investment projects that the Commission currently lacks, and it could be given control over allocating grants, developing technical guidelines, monitoring cross-compliance, etc.

The last part of the study reminds us, nonetheless, that even substantial progress in developing a central budget capacity should not obscure the need for national budget policies to be implemented as well, and that close coordination between them is needed. While increasing powers are being transferred to the European level in the area of public goods, as can be seen for example with the European Green Pact and with the targeting of NGEU spending towards greening and digitalization, there is still a need to coordinate national governments' policies with each other and with the policies implemented at the central level. Policy coordination, which necessarily limits the autonomy of national parliaments, raises the question of the democratic legitimacy of EU policies and may lead to a form of depoliticization of fiscal policy. This would become even more problematic if the EU were to transfer to the supranational level some of the decisions

about which public goods to provide and from whom to finance them. To avoid delinking the strengthening of European macroeconomic policy on public goods with the democratic dimension of this orientation, nothing less than a quantum leap in the creation of a political Europe, with two democratic levels, is probably needed, with genuine *European democracy* -- because it would be based on a real European parliamentary fiscal power, which would in turn be linked to the preferences of the European electorate -- but fully *articulated with the national democracies* with their recovered fiscal margins.

[1] The inconsistency between the need to revive the European economy after the pandemic and a very gradual disbursement of funds is discussed by [Creel \(2020\)](#).

[2] GNI: Gross national income, defined as GDP plus net income received from abroad for the compensation of employees, property, and net taxes and subsidies on production.

Germany on the slippery slope of the research tax credit

by [Evens Salies](#) and [Sarah Guillou](#)

After years of hesitation, the German parliament has just introduced a tax scheme to promote investment in R&D. The decision precedes the Covid-19 crisis, but it may well be heaven-sent for German business.

What factors motivated

Germany to take such a decision, four decades after the United States and

France, when it is among the world's leading investors, in terms of both R&D

and innovation? Is this yet another instrument to boost its competitiveness?

And what will be the repercussions on R&D spending in France?

The German tax

incentive, which came into force in January 2020, offers companies a tax credit

equal to 25% of the declared R&D expenditure. The base is narrower than for

France's research tax credit (CIR), since in Germany only wages are taken into

account (including employer social security contributions).[\[1\]](#)

The 25% rate is, however, close to the French rate

(30%). A company's eligible expenses are capped at two million euros; and the

tax credit for each firm will be limited to 500,000 euros (subcontracting is

subject to slightly different treatment). When a group has several subsidiaries

benefiting from the system, as part of a joint research programme, the total eligible

expenses are capped at 15 million euros (for a tax credit of 3.75

million).

By way of comparison,

among French companies who carry out R&D, SMEs receive an average of

131,000 euros for the CIR credit, mid-caps [fewer than 5,000 employees] 742,000

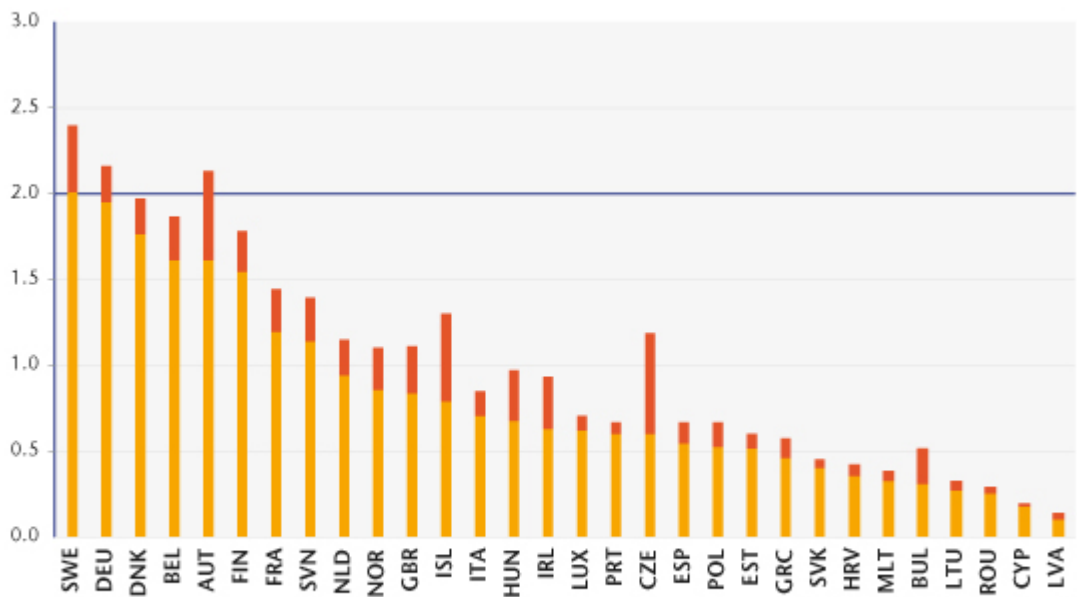
euros, and large corporations 5.6 million, according to the

[MESRI's](#)

figures. The highest amounts exceed 30 million euros (with few companies in this category), but do not go much higher, because the CIR rate falls from 30% to 5% of eligible R&D expenditure beyond the base threshold of 100 million euros. Estimates of the annual loss in taxation for Germany (before taking into account the macroeconomic effects) could amount to as much as five billion euros. This is 80% of the French CIR credit, and on the same level as the R&D tax incentives in the United Kingdom. Without the cap, the scheme would cost the German federal government around 9 billion euros.[\[2\]](#)

The characteristics of the scheme and the high level of German private R&D raise questions about the Parliament's real motivations. Indeed, one could wonder why it did not opt for an "incremental" system, that is, base itself on the increase in eligible R&D expenditure, as in the United States, or in France until 2003. Admittedly, an incremental system would not support firms whose R&D is stagnating or falling (in which case direct aid is more effective), but it avoids the windfall effects of France's CIR credit ([Salies, 2017](#)). The cap limits, but does not eliminate, these effects.

Figure 1. R&D effort (% of GDP), EU-28 and Iceland, Norway, 2018



Note : The lower rectangle is the R&D effort, after having excluded direct aid. The upper rectangle only includes direct aid. The values are for 2018 or the nearest year.
Sources : EU open data portal.

The level of private R&D spending is significantly higher in Germany than in any other EU Member State (62.2 billion euros, excluding direct grants). France is far behind (27.5 billion euros), followed by Italy and Sweden (respectively 12.8 and 9.6 billion). A comparable ranking is obtained, for Germany, France and Italy, if we measure the R&D effort (expenditure relative to GDP; Figure 1). Germany is at almost the same level as Sweden (resp. 1.92 and 2.01 points). Next come Denmark, Belgium, Austria and Finland. France is in 7th position with 1.44 points and Italy 13th with 0.71 point. Private research in Germany (excluding subsidies) is only 0.08 GDP points below the 2% threshold set at the Barcelona European Council in 2002 (the “Lisbon strategy”), which Sweden alone has achieved. If subsidies are included, the private sector

exceeds this threshold.

Since 2017, Germany's domestic expenditure on R&D (private and public) has

also exceeded the 3% threshold. The argument advanced in 2009 by [Spengel and Grittmann from ZEW](#) that a tax incentive would allow German companies

to overcome private underinvestment in R&D is therefore not convincing, at

least from a European perspective.

At the global level,

three countries are of course doing better than Germany: the United States,

China and Japan, where the private sector spends 1.6 euros for every euro spent

by Germany. However, if the motivation of Germany's Parliament for introducing

a tax incentive was to catch up with these countries, it would not have done so

only 40 years after the United States!

The introduction of a

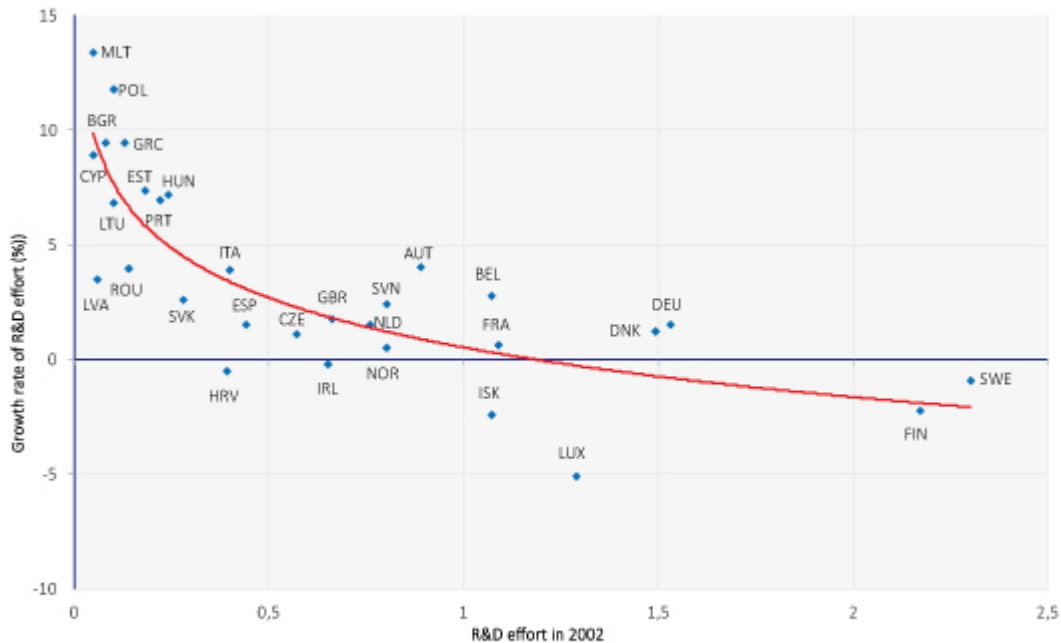
tax incentive for R&D is less surprising if we consider changes in the

R&D effort. We have calculated the average growth rate of the R&D

effort for the 27 current Member States plus the United Kingdom, Norway and

Iceland over the period 2002-2017 (Figure 2).

Figure 2. Rate of change in the R&D effort (%) versus effort, in 2002, EU-28 and Iceland, Norway, 2002-2017



Note : The R&D activities are net of direct aid. For certain countries, the starting year is 2003, due to the availability of data. The concluding year is 2017, except for the UK (2016).
Sources : EU open data portal.

The curve through the cloud (logarithmic adjustment) reveals an almost inverse relationship between the rate and the effort in 2002, suggesting a convergence of R&D efforts.

Obviously, many countries are in a period of catch-up with respect to investing in research. Most of them are small, but the whole is significant. For example, in 2017 countries where the R&D effort grew at a rate at least equal to Germany's (1.52%) spent 82.8 billion euros (subsidies included), or 1.2 times Germany's expenditure (68.7 billion).[\[3\]](#) The R&D effort of these countries amounted to 0.8 point of GDP in 2017.[\[4\]](#)

Could the German CIR credit thus be a response to the slowdown in the country's spending on R&D?

R&D expenditure behaves like other capital expenditure, i.e.

it slows as the level rises. Furthermore, the more countries have a high level of domestic spending on R&D, the more they invest in R&D abroad. This results from the fact that R&D expenditure is mainly by large corporations and multinationals; we could cite, for example, Alphabet, Volkswagen and Sanofi, which in 2019 spent, respectively, 18.3 billion, 13.6 billion and 5.9 billion euros on R&D according to figures from the [EU Industrial R&D Scoreboard](#). It is notable that the big multinationals open R&D centres abroad to get closer to their export markets, as well as for the bargaining power that these investments provide vis-à-vis local governments (see the report by UNCTAD [WIR, 2005](#)). All the major pharmaceutical firms (Pfizer, GlaxoSmithKline, AstraZeneca, Sanofi-Aventis, Novartis, Eli Lilly) have established clinical research laboratories in India. Even France's power supply firm EDF has an R&D centre in Beijing, dedicated to networks, renewable energies and the sustainable city. While this does not necessarily amount to substitution with domestic R&D, it does indicate that there is a kind of plateau in a given country for a company's R&D expenditure. The German measure is probably motivated by global competition to attract new R&D centres. This is also the stated objective of France's CIR credit.

Does the enactment of

a “German CIR” credit in favour of R&D bode well for France’s competitiveness? Germany has a comparative advantage in the manufacturing sector, which invests heavily in R&D. The new German tax scheme will reinforce this advantage, without any risk of European litigation, since R&D support falls under the exemptions to the European Commission’s control system on state aid. France’s comparative advantage tends to be situated in services. France’s R&D effort in services is more intense than in Germany: 0.28% of GDP in Germany and 0.67% in France. However, France stands out for providing less public support for R&D investment by service companies. In 2015, public funding’s share of private research in services was 4% in France, compared to 11% in Germany, according to an [INSEE study](#). The “German CIR” will only increase the relative price of French private research in services in comparison with German research. However, the R&D content of services determines the price, since it determines their technological content. The German tax advantage will therefore accentuate the cost advantage of the technological services which are themselves incorporated into manufacturing value added. So this will in turn increase the cost advantage of German manufacturers.

In addition, the price of R&D is increasingly determined by personnel costs, whose share in

R&D has tended to rise in Italy and France and slightly too in Germany.

This share was roughly equal in the latter two countries in 2017: 61.8% in

Germany, and 59.7% in France.[\[5\]](#) Relative changes in researchers' salaries will

have an impact on the difference in the amount of the tax credit between France

and Germany. As noted, the new scheme introduced across the Rhine is based only

on the costs of personnel. It could thus be conceptualized as a credit like

France's Competitiveness and Employment Tax Credit (CICE) targeted at high-skilled

workers in the research sector (referring to the CICE credit before it transforms

into a reduction in employer social security contributions).

This is the reason

why we think that Germany has rather wanted to pursue its policy of lowering

corporate taxes. This was one of the motivations for France's CIR reform in

2008, which "[can] be viewed as [fiscal] compensation for lower corporate

tax rates in other countries" ([Lentile and Mairesse, 2009](#)).

The median tax rate in the OECD applied to large corporations has fallen

continuously since 1995 (13 points over the period 1995-2018), from 35% to 22%.

However, the German rate, which has fluctuated between 29 and 30% since 2008,

is close to the French rate (around 32% in 2020; [EC, 2020](#)).

The opposition that could exist in the realm of "tax philosophy",

between a French system based on a high rate and numerous provisions for

exemptions, and a German system based on a broad base and low rates, is not as strong now that Germany has set up its own “CIR” credit.

This new incentive is expected to enhance Germany’s attractiveness for R&D activities, which has deteriorated somewhat ([EY, 2020](#); see also [CNEPI, 2019](#)).

Since 2011, the top three countries welcoming the most R&D centre projects were the United Kingdom, followed by Germany and France. Since 2018, France has

hosted more projects than Germany (1197 against 971 in 2019), relegating

Germany to third place (this had already transpired in 2009, during the

financial crisis). The new tax credit should influence the trade-off of foreign

companies that are hesitating between France and Germany about where to set up.

It should also attract French companies to Germany, in the same way that a

significant share of private R&D activities carried out in France come from

foreign companies: 21% in 2015, for the percentage of expenditure as well as

the percentage of employed researchers (see [Salies, 2020](#)).

In accordance with European law, French companies established across the Rhine,

and liable for the “Körperschaftsteuer” (German corporate tax),

should be able to benefit from this niche.

Finally, private and

public R&D entities located in France should be able to benefit from the

tax incentive introduced in Germany, via subcontracting. But this will be only of marginal benefit, for two reasons: the tradition of the German "Mittelstand" has a culture favouring local networks, and the base for outsourced activities is capped (as with France's CIR credit). French subcontractors will probably be able to benefit from authorizations, in the same way as France's research ministry, the [MESRI, issues authorizations](#) in Germany. Since 2009, Germany has recovered 6% of the subcontracting approvals granted by the MESRI, the United Kingdom 4%, etc. The majority of authorizations are granted to companies located in France (75%).

Whatever the reasons that motivated the German Parliament to introduce a tax incentive in favour of R&D expenditure, it is certain that France has no interest in retiring its own scheme. This does not mean France shouldn't reform the CIR credit, as the leverage effects are not as strong as expected; aid (direct and indirect), in GDP points, has increased on average by 5.7% per year since 2000, whereas R&D, also in GDP points, has increased only by 0.73% per year. The weak leverage effect may have been *the* factor that for a long time discouraged Germany from introducing a tax break to boost R&D.

In this period of searching for ways to support business, it goes without saying

that the research tax credit will remain unchanged in France and could see the base for the scheme expanded in Germany (in particular to help car manufacturers who have been refused a plan for direct support).

It is nonetheless regrettable that one of the reasons for Germany's new scheme is probably to be found in the inability of the Member States to advance the European Common Corporate Consolidated Tax Base (CCCTB) directive, which provides for harmonized R&D taxation for large firms by deducting R&D expenditure from the tax base on corporate profits. The German CIR may well be in competition with the French CIR, leading to transfers of R&D (by multinationals) from one State to another. The net increase in R&D spending by European companies remains to be estimated. Unless this spending increases, German policy could be viewed as yet one more uncooperative tax policy coming at a time when Europe is looking for common tax revenue.

[1]. The [French CIR credit](#) includes, in addition to personnel costs, costs for the acquisition of patents, standardization, allocations relating to the depreciation of buildings used for research, etc.

[2]. Based on a private R&D expenditure of 62

billion euros in 2017 (direct aid excluded), we find 0.25 (the rate of the tax credit), 0.6 (the share of salaries in R&D), yielding a credit of 9.3 billion euros.

[3]. The Netherlands, the United Kingdom, Slovenia, Slovakia, Belgium, Latvia, Italy, Romania, Austria, Lithuania, Portugal, Hungary, Estonia, Cyprus, Greece, Bulgaria, Poland and Malta.

[4]. The GDP of these countries (at market prices in 2017) is 2.5 times that of Germany.

[5] The increase in France and in Italy was +7 and +20 points respectively over the period 2000-2017.

How to spend it: A proposal for a European Covid-19 recovery programme

[Jérôme Creel](#), [Mario Holzner](#), [Francesco Saraceno](#), [Andrew Watt](#) and [Jérôme Wittwer^{\[1\]}](#)

The Recovery Fund recently proposed by the EU Commission marks a sea-change in European integration. Yet it will not be enough to meet the challenges Europe faces. There has been much public debate about financing, but little about the sort of concrete projects that the EU should be putting public money into. We propose in

Policy

Brief n°72 a 10-year, €2tn investment programme focusing on public health, transport infrastructure and energy/decarbonisation.

The investment programme consists of two pillars. In a national pillar Member States – broadly as in the Commission proposal – would be allocated €500bn. Resources should be focused on the hardest-hit countries and front-loaded: we suggest over a three-year horizon.

The bulk of the money – €1.5tn – would be devoted to finance genuinely European projects, where there is an EU value added. We describe a series of flagship initiatives that the EU could launch in the fields of public health, transport infrastructure and energy/decarbonisation.

We call for a strengthened EU public health agency that invests in health-staff skills and then facilitates their flexible deployment in emergencies, and is tasked with ensuring supplies of vital medicines (Health4EU).

We present costed proposals for two ambitious transport initiatives: a dedicated European high-speed rail network, the Ultra-Rapid-Train, with four-routes cutting travel times between EU capitals and regions, and,

alternatively, an integrated European Silk Road initiative that combines transport modes on the Chinese model.

In the area of energy/decarbonisation we seek to “electrify” the Green Deal. We call for funding to accelerate the realisation of a smart and integrated electricity grid for 100%-renewable energy transmission (e-highway), support for complementary battery and green-hydrogen projects, and a programme, modelled on the SURE initiative, to co-finance member-state decarbonisation and Just Transition policies.

The crisis induced by the pandemic, coming as it does on top of the financial and euro crises, poses a huge challenge. The response needs to take account of the longer-run structural challenges, and above all that of climate change. The European Union should rise to these challenges in the reform of an ambitious medium-run recovery programme, appropriately financed. An outline of such a programme is set out here by way of illustration, but many permutations and options are available to policymakers.

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On French corporate immaterial investment

By [Sarah Guillou](#)

A note on the [immaterial singularity of business investment in France](#) from 26 October 2018 highlighted the significant scale of investment in intangible assets by companies in France. In comparison with its partners, who are similar in terms of productive specialization, the French economy invests relatively more in Research and Development, software, databases and other types of intellectual property. Looking at gross fixed capital formation (GFCF) excluding construction, the share of intangible investment reached 53% in 2015, compared to 45% in the United Kingdom, 41% in the United States, 32% in Germany and 29% in Italy and Spain.

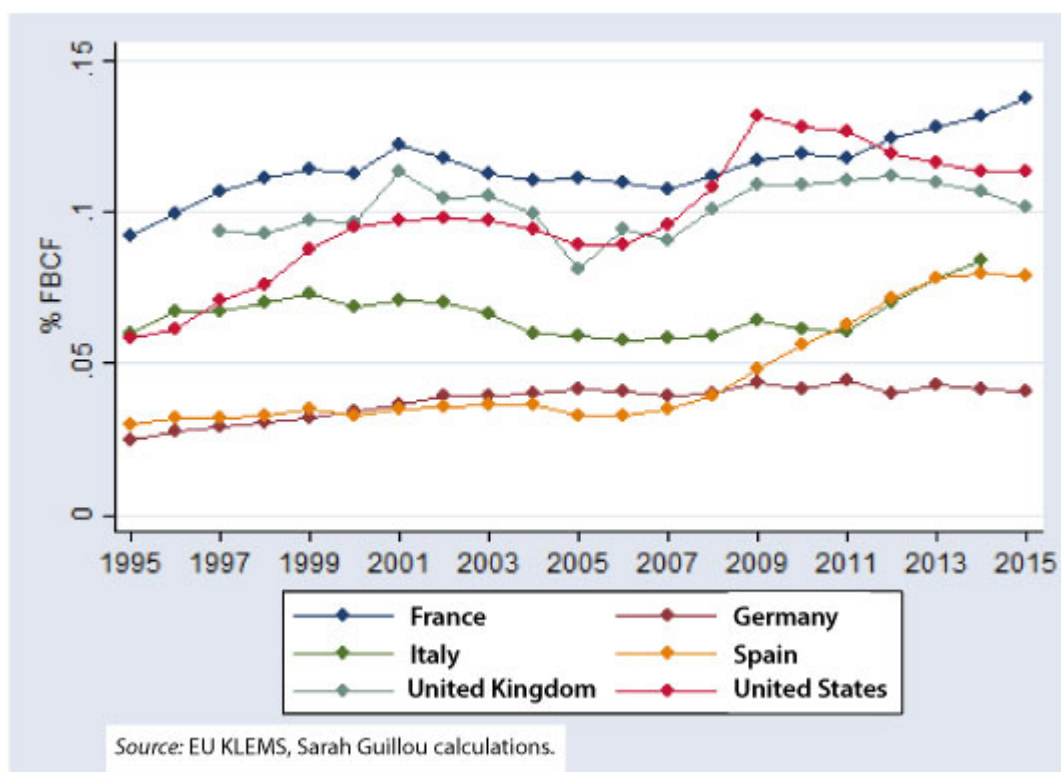
These results are corroborated by statistics that evaluate other dimensions (INTAN basis), outside the national accounts, of intangible investments, such as those in organization, training and marketing. France is not lagging behind its partners in this type of asset either (see Guillou, Lallement and Mini, 2018).

As for the national accounts, these include two main intangible assets: R&D expenditure and expenditure on software and databases. In terms of R&D, French investment performance is consistent with the technological level and structure of its production specialization. If the French economy had a larger manufacturing sector, its spending on R&D would be much larger. What is less coherent is the extent and intensity of

investment in software and databases, to such an extent that one cannot help but wonder whether this immaterial dimension of investment is almost unreal.

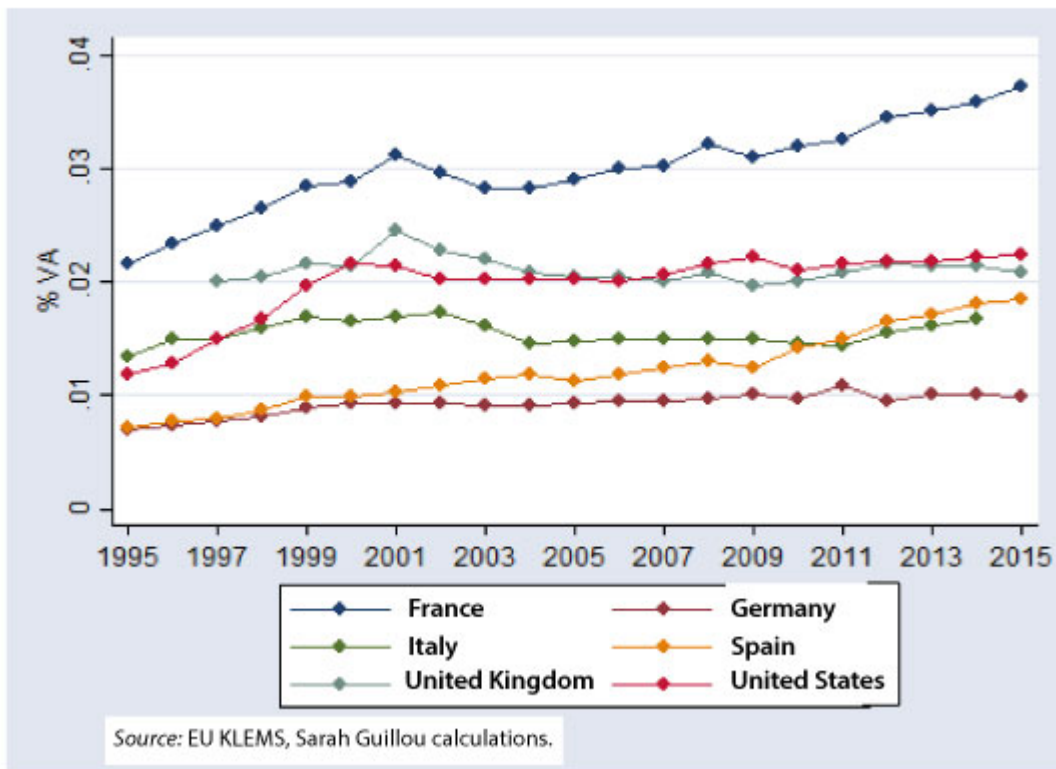
Figure 1 illustrates that “Software and databases” investment is larger in France than in the rest of the European countries. The share is, however, close to the levels observed in the United Kingdom and the United States. Of course, this share reflects the weakness of other targets for investment such as machinery and equipment specific to the manufacturing sector (see the earlier note on investment).

Figure 1. Share of GFCF in software and databases in total market sector GFCF



In terms of the rate of investment, that is to say, investment expenditure as a ratio of value added of the market economy, the dynamism of the French economy in terms of software and databases is confirmed: France clearly outdistances its partners.

**Figure 2. Rate of investment in software and databases
in the market sector**



This also raises questions because it reveals a gap of 2 percentage points of the VA relative to the United States and 3 points relative to Germany. French companies invested 33 billion euros more in software and database than did German companies in 2015. Note that in 2015 total GFCF excluding construction was 285 billion euros in Germany and 197 billion in France. Moreover, the gap in the investment rate across all types of assets in France was 4 percentage points vis-à-vis Germany ([see Guillou, 2018, page 20](#)).

This gap can be explained only under the conditions, 1) that the production function of the French economy uses more software and databases than its partners, or 2) that the GFCF software and databases item is either artificially valued in relation to the current practices of France's partners, which may be the case, or because the value of the software asset is more important in France (companies may choose to put spending on software in current spending), either because the asset value is greater (which is possible because part of this

value, that of software produced in-house, is up to the discretion of the companies).

Understanding this gap is of considerable importance, because it is decisive for making a diagnosis of the state of French corporate investment and the state of its digitization (see Gaglio and Guillou, 2018). The aggregate macroeconomic value of GFCF includes GFCF in software; if this is overestimated, it has implications for the macroeconomic balance and the contribution of GFCF to growth. The measurement of total factor productivity would also be affected, as the overestimation of capital (fuelled by investment) would lead to underestimating residual technical progress. So not only would the investment effort of French companies be overestimated, but the diagnosis of the nature of growth would also be off.

But there are reasons to question how real this gap is. In other words, shouldn't the immateriality of GFCF be viewed as a flaw in reality?

On the one hand, it is not clear that France's productive specialization justifies such overinvestment in software and databases. For example, the comparison with Germany, the United Kingdom, Italy, the United States and Spain shows specialization that is relatively close, with the exception of the manufacturing sector, which has a much greater presence in Germany. The share of the "Information and Communication" sector in which digital services are located correlates well with GFCF in software, but this sector is not significantly more present in France. It represents 6.5% of the value added of the market economy, compared to 6% in Germany and 8% in the United Kingdom ([see Guillou, 2018, page 30](#)).

On the other hand, the data from the input-output tables on consumption by branch of goods and services coming from the digital publishing sector (58) – a sector that concentrates the production of software – do not corroborate French

superiority. The following graphs show that, whether considering domestic consumption (Figure 3) or imported (Figure 4), intermediaries' consumption of digital services in France does not confirm the French domination recorded for GFCF in software and databases. On the contrary, these two graphs show that the French economy's consumption of inputs from the digital publishing sector is not especially high and even that domestic consumption has fallen.

While the overlap between "software and databases" on the one hand and "digital publishing services" on the other is not perfect, there should not be a contradiction between the trends or the hierarchies between countries – unless software expenditure consists mainly of software produced in-house, in which case it will be recorded as assets rather than as consumption of inputs from other sectors.

Figure 3. Consumption of digital publishing companies of domestic services (per 1000 of value added)

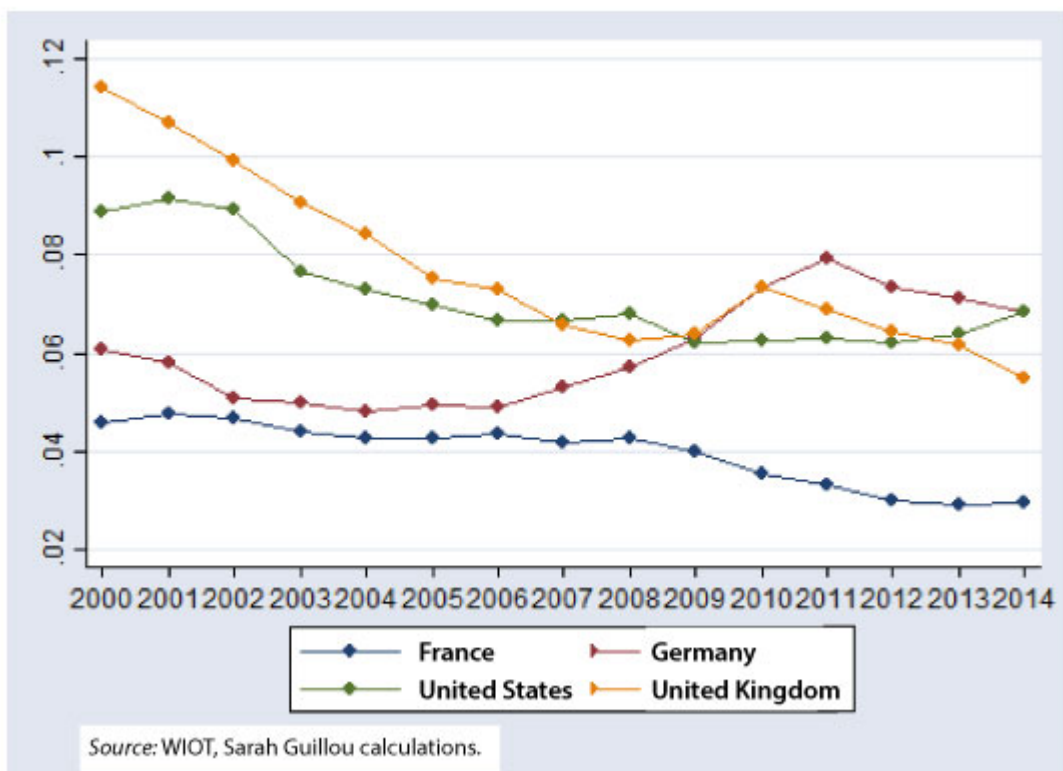
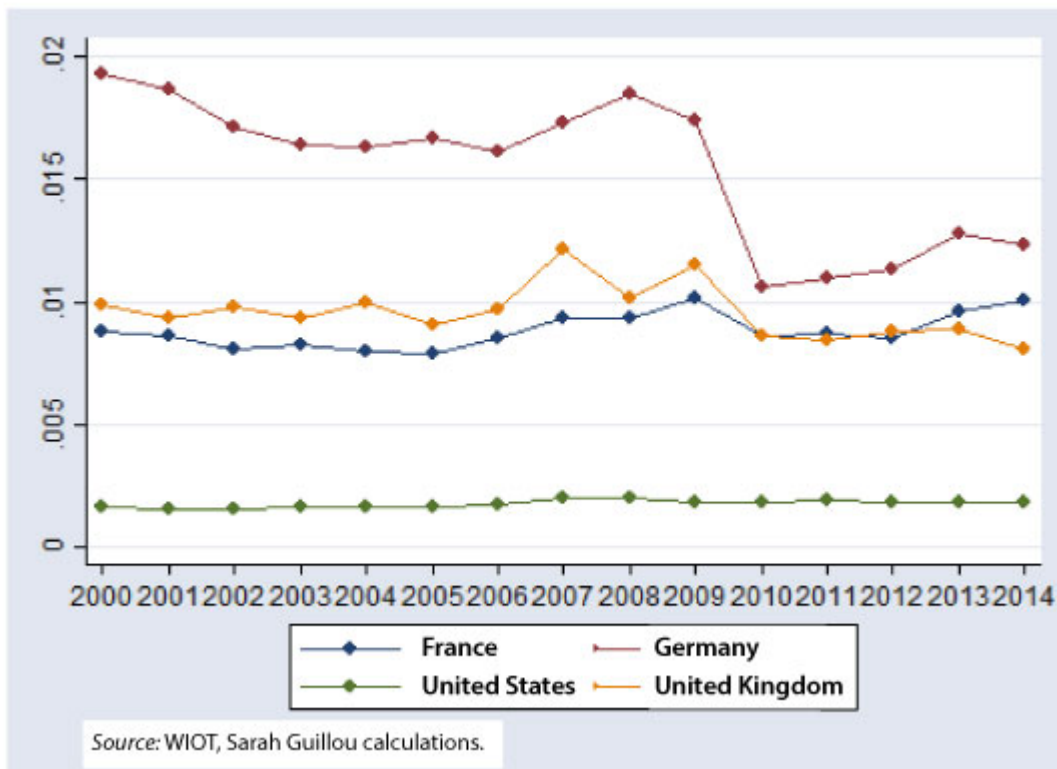


Figure 4. Consumption of digital publishing intermediaries of imported services (per 1000 of value added)



As a result, investment in software and databases would be mainly the result of in-house production, whose capital asset value (recorded as GFCF) is determined by the companies themselves. Should we conclude that GFCF is overvalued? This is a legitimate question. It calls for more specific investigation by investor and consumer sectors in order to assess the extent of overvaluation relative to economies comparable to France.

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The dilemmas of immaterial capitalism

By [Sarah Guillou](#)

A review of: Jonathan Haskel and Stian Westlake, *Capitalism Without Capital. The Rise of the Intangible Economy*, Princeton University Press, 2017, 288 pp.

This book is at the crossroads of the debate about the nature of current and future growth. The increasing role of intangible assets is indeed at the heart of questions about productivity gains, the jobs of tomorrow, rising inequality, corporate taxation and the source of future incomes.

This is not simply the umpteenth book on the new economy or on future technological breakthroughs, but more fundamentally a book on the rupture being made by modes of production that are less and less based on fixed, or material, capital and increasingly on intangible assets. The digressions on an immaterial society are not new; rather, the value of the book is that it gives this real economic content and synthesizes all the research showing the economic upheavals arising from the increasing role of this type of capital.

Jonathan Haskel and Stian Westlake describe the changes brought about by the growth in the share of immaterial assets

in the 21st century economy, including in terms of the measurement of growth, the dynamics of inequality, and the ways in which companies are run, the economy is financed and public growth policies are set. While the authors do not set themselves the goal of building a new theory of value, they nevertheless provide evidence that it does need to be reconstructed. This is based in particular on the construction of a database – INTAN-invest – as part of a programme financed by the European Commission and initiated by the American studies of Corrado, Hulten and Sichel (2005, 2009).

By immaterial assets is meant the immaterial elements of an economic activity that generate value over more than one period: a trademark, a patent, a copyright, a design, a mode of organization or production, a manufacturing process, a computer program or algorithm that creates information, but also a reputation or a marketing innovation, or even the quality and / or the specific features of staff training. These are assets that must positively increase a company's balance sheet; they can depreciate with time; and they result from the consumption of resources and therefore from immaterial or intangible investment. There is a broad consensus on the importance of these assets in explaining the prices of the goods and services we consume and in determining the non-price competitiveness of products. These assets are determining elements of "added value".

However, despite this consensus, the measurement of intangible assets is far from commensurate with their importance. Yet measuring assets improperly leads to many statistical distortions, with respect to: first, the measurement of growth – because investments increase GDP – second, the measurement of productivity – because capital and added value are poorly measured – and finally, to profits and perhaps also the distribution of added value if intangible capital is included in expenditure and not in investment. The authors show in particular that the increasing importance of intangible assets

can explain the four arguments underpinning secular stagnation. First, the slowdown in productivity could be the result of an incorrect valuation of intangible added value. Furthermore, the gap between the profits of companies and their book value could be explained by an incomplete accounting of intangible assets that underestimates capital, in addition to the slowdown in investment despite very low interest rates. Finally, the increase in the inequalities in productivity and profits between firms is the result of the characteristics of intangible assets, which polarize profits and are associated with significant returns to scale.

Awareness of the measurement problem is not recent. The authors recall the major events that brought the experts together to deal with the measurement of intangible assets. They cover up to the latest reform of the systems of national accounts that enriches the GFCF of R&D, including the SNA, 2008, in particular the writing of the *Frascati Manual* (1963, 2015), which lays the foundations for the accounting of R&D activity. But even today it is not possible to account for all intangible assets. This is due in part to the fact that there is still some reluctance in corporate accounting with respect to integrating intangible capital insofar as it has no market price. So while it is simple to book the purchase of a patent as an asset, it is much more difficult to value the development of an algorithm within a company or to give a value to the way it is organized or to innovative manufacturing processes, or to its internal training efforts. Only when something is traded on a market does it acquire an external value that can be recorded, unhesitatingly, on the asset side of the balance sheet.

Nevertheless, the challenge in measuring this is fundamental if we believe the rest of the book. Indeed, the increasing immateriality of capital has consequences for inequalities (Chapter 6), for institutions and infrastructure (Chapter 7), for financing the economy (Chapter 8), for private governance

(Chapter 9) and for public governance (Chapter 10).

The stakes here are critical because of the specific characteristics of these immaterial assets, which are summarized in the “four S’s” (Chapter 2): “scalable, sunkedness, spillovers and synergies”. This means, first, that immaterial assets have the particularity of being able to be deployed on a large production scale without depreciating (“scalable”). Second, they are associated with irrecoverable expenses, that is, once the investment has been made it is difficult for the company to consider selling the asset on a secondary market, so there is no turning back (“sunkedness”). Next, these assets have “spillovers”, or in other words, they spread beyond their owners. Finally, they combine easily by creating “synergies” that increase profitability.

These characteristics imply a modification of the functioning of capitalism, which we are all already witnessing: they give a premium to the winners, they exacerbate the differences between the holders of certain intangible assets and those who are engaged in more traditional activities, they polarize economic activity in large urban centres, and they overvalue the talents of managers capable of orchestrating synergies between immaterial assets. At the same time, the prevalence of these assets requires modified public policies. This concerns first, the protection of the property rights of these intangible assets, which are intellectual in nature and difficult to fully appropriate due to their volatility. Even though intellectual property rights have long been established, they now face two challenges: their universal character (many countries apply them only sparingly) and achieving a balance (they should not lead to creating complex barriers that render it impossible for new innovators to enter, while they should be sufficiently protective to allow the fruits of investments to be harvested). Moreover, spillover effects need to be promoted by ensuring a balance in the development of cities and the interactions between

individuals, while also creating incentives to the financing of intangible investments. Bank financing, which is based on tangible guarantees, is not well suited to the new intangible economy, especially as it benefits from tax advantages by deducting interest from taxable income. It is therefore important to develop financing based on issuing shares and developing public co-financing. More generally, the public policy best suited to the intangible economy involves creating certainty, stability and confidence, in order to deal with the intrinsic uncertainty of risky intangible investments.

What emerges from this reading is a clear awareness of the need to promote the development of investment in immaterial assets, but also a demonstration that the growing immateriality of capital is giving rise to forces driving inequality. This duality can prove problematic.

More specifically, three dilemmas are identified. The first concerns the way intangible investments are financed. The highly risky nature of intangible investments – because they are irrecoverable, collateral-free and with an uncertain return – calls for investors to take advantage of diversification and dispersal. And yet, as the authors show, what companies in this new economy need are investors who hold large, stable blocks of shares so as to be engaged in the company's project. The second dilemma concerns state support. It is justified because these have a social return that goes beyond their private return and, in the face of shortfalls in private financing, public financing is necessary. However, corporate taxation has not yet adapted to this new sources of wealth creation, and states face growing difficulties in raising taxes and identifying the taxable base. Furthermore, states are competing to attract businesses into the new economy through fiscal expenditures and subsidies. The third dilemma is undoubtedly the most fundamental. This involves the contradiction between inequalities, whether in the labour market (job polarization [\[1\]](#)), in the goods market

(concentration) or geographically (geographical polarization), which are caused by the rise of intangible capital, on the one hand, and on the other hand the need for strong social cohesion, trustworthiness and human urban centres that provide favourable terrain for the development of the synergies and exchanges that nourish intangible assets. In other words, the inequalities created affect the social capital, which is detrimental to the future development of intangible assets.

It is in the resolution of these dilemmas that this new capitalism will be able to be in accord with our democracies.

[1] See Gregory Verdugo: [“The new labour inequalities. Why jobs are polarizing”](#), *OFCE blog*.

No love lost for Chinese investors!

By [Sarah Guillou](#)

In his [speech of 15 January 2017](#), France’s Minister of Economy and Finance, Bruno Le Maire, speaks of “plundering investments”, suspecting Chinese investors of wanting to “loot” French technology. These statements inscribe the Minister of the French Economy in line with economic patriotism from Colbert to Montebourg, but this time, they are part of a broader movement of distrust and resistance to investment from China that is hitting all the Western countries. And while the French government is planning to

expand the scope of decrees controlling foreign investment, many other countries are doing the same.

France is not the only country to want to modify its legislation to reinforce the grounds for controlling foreign investors. The inflow of foreign capital was primarily viewed as a contribution of financial resources and a sign of a territory's attractiveness. France has always been well placed in international rankings in these terms. In 2015, France ranked eleventh in the world in terms of foreign direct investment inflows, with USD 43 billion, mainly from developed countries (compared with USD 31 billion for Germany and 20 billion for Italy). And since French resident investors have invested USD 38 billion abroad (Germany and Italy, USD 14 and 25 billion respectively), the balance is in favor of productive capital inflows, which exceed capital outflows.

However, France has always distinguished itself by its greater political mistrust of foreign equity, especially when it comes to its "flagship" industries. But now this mistrust is being echoed in Western countries with regard to Chinese investors, and not only across the Atlantic where all the political actors have had to sing in tune with the economic patriotism of the Trump administration. Chinese investors are also perceived as predators by the Germans, the British, the Australians, and the Italians, to name just a few.

It must be said that China's industrial strategy is very proactive, and the external growth strategies of Chinese business is being supported by a policy aimed at moving upmarket and acquiring technology by any means. Moreover, the presence of the State behind the investors – it is characteristic of China to have private and public interests tightly interwoven as well as a strong State presence in the economy because of its communist past – creates potential conflicts of sovereignty. Finally, China is threatening more and more sectors in which Western countries believed they had technological advantages, which is worrying governments (see

the *Policy Brief de l'OFCE* by S. Guillou (no. 31, 2018), "Faut-il s'inquiéter de la stratégie industrielle de la Chine?" [Should we worry about China's industrial strategy]). Finally, China is not exactly exemplary in terms of taking in foreign investment, as it erects barriers and constraints often associated with technology transfer.

Western countries are reacting by increasing the scale of their controls: issues touching on national security and public order are being supplemented by strategic technologies and the ownership of databases on citizens. In France, the Minister of the Economy, Bruno Le Maire, announced that he wanted to extend this to the storage of digital data and to artificial intelligence. In Germany, the acquisition of Kuka, the manufacturer of industrial robots by the Chinese firm Midea, has led to strengthening German controls, and in particular the refusal of the purchase of the Aixtron semiconductor maker.

In the United States, it is on the grounds of the acquisition of banking data that the acquisition of MoneyGram by Ant Financial – an offshoot of Alibaba – led the Committee on Foreign Investment of the United States (CFIUS) to issue a negative opinion very recently. The European project to create a committee identical to the CFIUS has not yet been concluded, and it has not attracted the support of all EU members as some look kindly on Chinese investors.

This policy, while not coordinated, is at least common among the main recipients of Chinese investment. France is not the only one to hold this position. This kind of unanimity among the Western clan is rare, but it also involves risks.

The first is isolationism: too many barriers lead to giving up partnership opportunities, which in some areas are increasingly unavoidable, as well as opportunities for strengthening Western companies. The second is the risk that equity bans will be circumvented by Chinese investors.

Acquisitions are not always hostile, and companies that are being acquired are often ready for partnerships that can take other forms. Thus the failure of the merger of Alibaba with the American MoneyGram was offset by numerous agreements that the company sealed with European and American partners to facilitate the payments of Chinese tourists, in particular to allow the use of the Alipay payment platform. It will certainly seal a partnership of this type with MoneyGram. These partnerships lead to technology transfers and to sharing skills, or even data, without the counterpart of capital inflows. The third risk concerns the flow of Chinese capital into Asia and/or Africa, for example, allowing the capture of markets and resources that will handicap Western firms. Any Chinese capital available will have to be invested. The absence of Western partners will imply a loss of control and isolation that could be detrimental.

It is thus necessary to come back to the use of well-chosen but demanding controls, which are absent from the dichotomous reasoning that prevailed in the Minister's statements, if not his intentions. As long as French technology is attractive, this should be celebrated and the pluses and minuses of alliances need to be assessed. It will only be a matter of years before China's technology becomes as attractive as France's. And the Chinese will not fail to come and remind Mr. Le Maire of his position.

The Janus-Faced Nature of

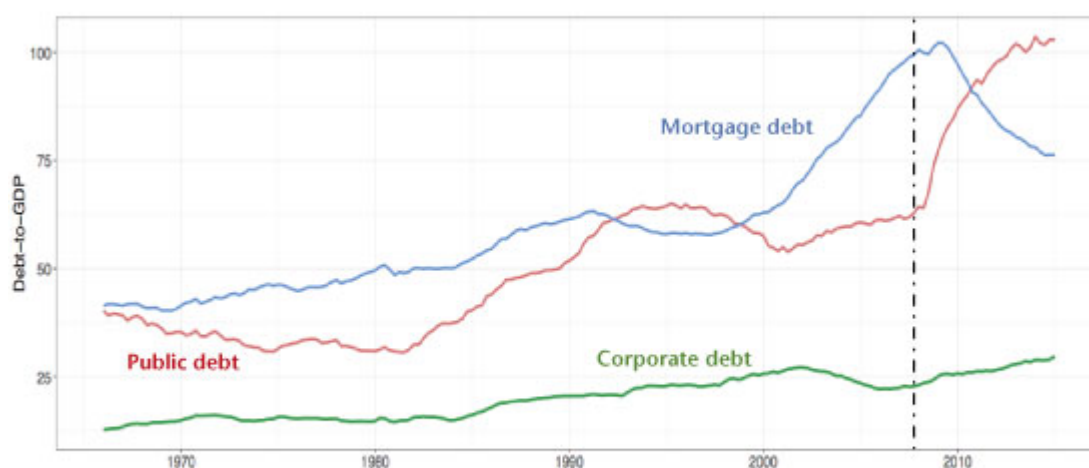
Debt

by Mattia Guerini, Alessio Moneta, [Mauro Napoletano](#), Andrea Roventini

The financial and economic crises of 2008 have been intimately intertwined with the dynamics of debt. As a matter of fact, a research by [Ng and Wright \(2013\)](#) reports that in the last thirty years all the U.S. recessions had financial origins.

[Figure 1](#) shows that both U.S. corporate (green line) and mortgage (blue line) debts have been growing steadily from the sixties to the end of the century. In the 2000s, however, mortgage debt increased from around 60% to 100% of GDP in less than a decade. The situation became unsustainable in 2008 with the outburst of the subprime real asset bubble. The trend in debt changed since then. Mortgage debt declined substantially, while the U.S. public debt-to-GDP ratio (red line) skyrocketed from 60% to a level slightly above than 100% in less than 5 years, as a consequence of the Great Recession.

Figure 1. Private and public debt-to-GDP series



The vertical dashed line represents 2007 (Q4).

Source: authors.

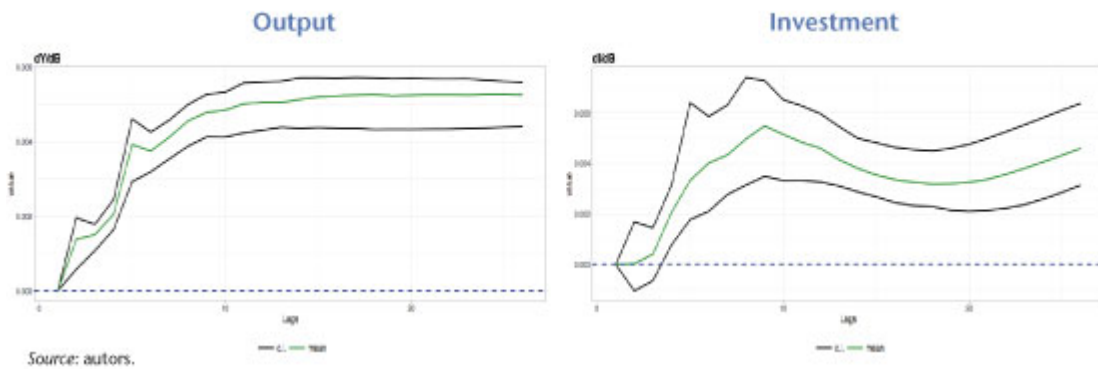
This surge in public debt has been raising concerns about the sustainability of public finances, and more generally, about the possible detrimental effects of public debt on economic

growth. Some economists argued indeed that there exist a 90% threshold after which public debt harms GDP growth (see [Reinhart and Rogoff, 2010](#)). Notwithstanding a large number of empirical studies contradicting this hypothesis (see [Herdon et al., 2013](#) and [Égert, 2015](#) as recent prominent examples), the debate is still open (see [Ash et al., 2017](#) and [Chudik et al., 2017](#)).

We have contributed to this debate with a new empirical analysis that jointly investigates the impact of public and private debt on U.S. GDP dynamics and that will appear on “*Macroeconomic Dynamics*” (see [Guerini et al., 2017](#)). Our analysis keeps the *a priori* theoretical assumptions as minimal as possible by exploiting new statistical techniques that identify causal structures from the data under quite general conditions. In particular, we employ a causal search algorithm based on the Independent Component Analysis (ICA) to identify the structural form of the cointegrated VAR and to solve the double causality issue.^[1] This has allowed us to keep an “agnostic” perspective in the econometric analysis, avoiding restrictions on the model, thus “letting the data speak”.

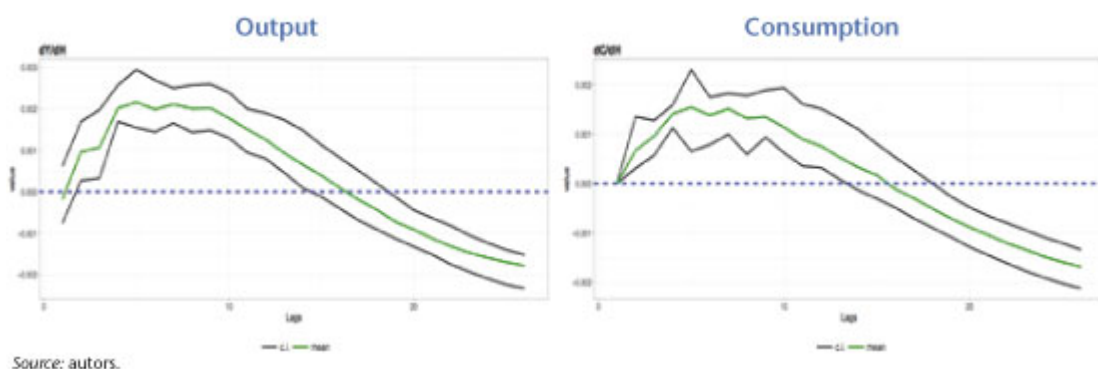
The results obtained suggest that public debt shocks *positively* and *persistently* affect output (see [Figure 2](#), left panel).^[2] In particular, our results provide evidence against the hypothesis that upsurges in public debt hamper GDP growth in the U.S. In fact, increases in public debt—possibly channeled through an increase in public spending in investments—crowd-in private investments, (see [Figure 2](#), right panel) confirming some results already brought to the fore by [Stiglitz \(2012\)](#). This implies that government spending and, more generally, expansionary fiscal policy spur output both in the short- and in the medium-run. In that, austerity policies do not seem to be the appropriate policy answer to overcome a crisis.

Figure 2. Effects of public debt on output and investment



On the contrary, these positive effects are not fully observed when we look at the effects of private debt and in particular when we focus on mortgage debt. More specifically, we find that the positive effects of private debt shocks are milder than public debt's ones, and they fade out over time. Furthermore, increasing the levels of mortgage debt have a negative impact on output and consumption dynamics in the medium-run (see [Figure 3](#)), while their positive effects are only temporary and relatively mild. Such a result appears to be fully consistent with the results of [Mian and Sufi \(2009\)](#) and [Jordà et al. \(2014\)](#): mortgage debt fuels real asset bubbles, but when these bubbles burst, they trigger a financial crises that visibly transmit their negative effects to the real economic system for longer periods of time.

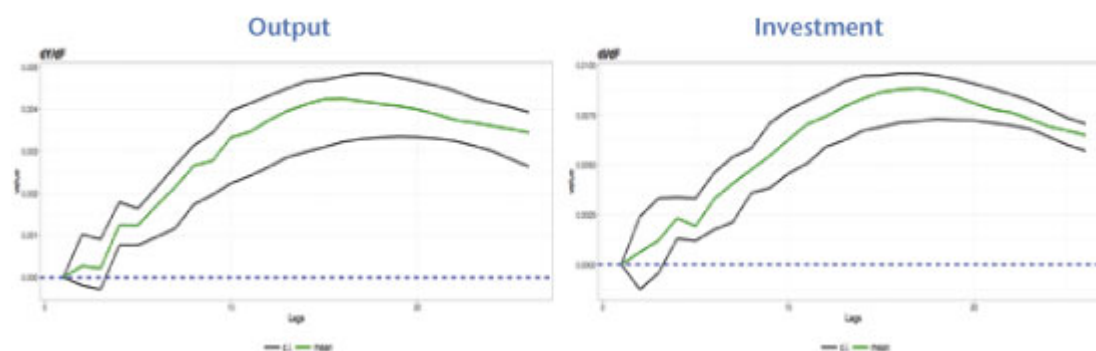
Figure 3. Effects of mortgage debt on output and consumption



Another interesting fact that emerges from our research, is that the other most important form of private debt—*i.e.* non-financial corporations (NFCs) debt—does not generate negative medium-run impacts. As a matter of fact (as it is possible to

see in [Figure 4](#)) surges in the level of NFCs debt seems to have a positive effect both on GDP and on gross fixed capital formation, hence directly increasing the level of investments.

Figure 4. Effects of corporate debt on output and investment



To conclude, our results suggest that debt has a *Janus-faced* nature: different types of debts impact differently on aggregate macroeconomic dynamics. In particular, possible threats to medium- and long-run output growth do not come from government debt (which might well be a consequence of a crisis), but rather from increasing too much the level of private one. More specifically, surges in the level of mortgage debt appear to be much more dangerous than the building up of corporate debt.

^[1] For details about the ICA algorithm see [Moneta et al. \(2013\)](#); for details about its statistical properties see [Gourieroux et al. \(2017\)](#).

^[2] When computing the Impulse Response Functions, we apply a 1 standard deviation (SD) shock to the relevant debt variable. Hence, for example, on the y-axis of Figure 2, left panel, we can read that a 1 SD shock to public debt has a 0.5% positive effect on GDP in the medium run.

Investment behaviour during the crisis: a comparative analysis of the main advanced economies

By [Bruno Ducoudré](#), [Mathieu Plane](#) and [Sébastien Villemot](#)

This text draws on the special study, [Équations d'investissement : une comparaison internationale dans la crise](#) [Investment equations : an international comparison during the crisis], which accompanies the 2015-2016 Forecast for the euro zone and the rest of the world.

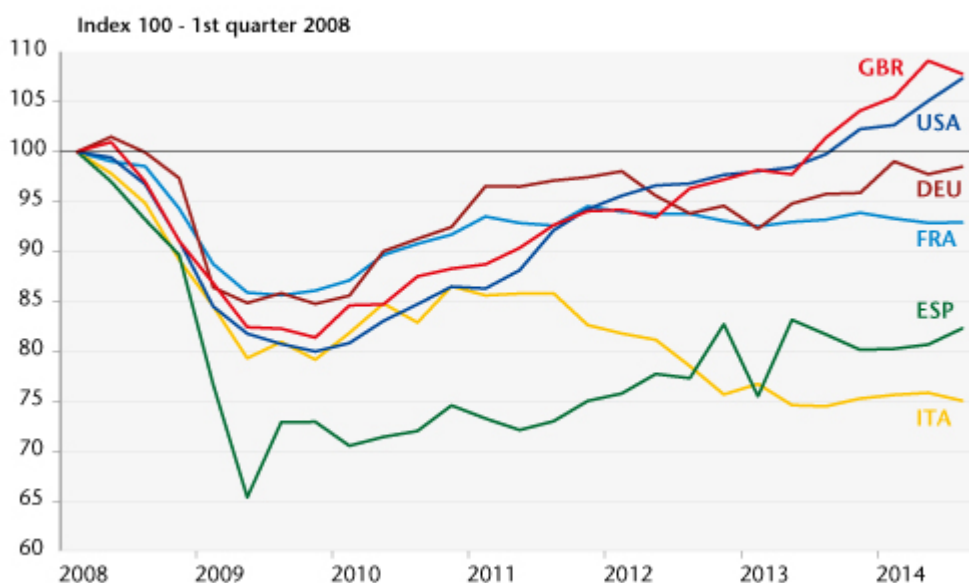
The collapse in growth following the subprime crisis in late 2008 resulted in a decline in corporate investment, the largest since World War II in the advanced economies. The stimulus packages and accommodative monetary policies implemented in 2009-2010 nevertheless managed to halt the collapse in demand, and corporate investment rebounded significantly in every country up to the end of 2011. But since 2011 investment has followed varied trajectories in the different countries, as can be seen in the differences between, on the one hand, the United States and the United Kingdom, and on the other the euro zone countries, Italy and Spain in particular. At end 2014, business investment was still 27% below its pre-crisis peak in Italy, 23% down in Spain, 7% in France and 3% in Germany. In the US and the UK, business investment was 7% and 5% higher than the pre-crisis peaks (Figure).

Our study estimates investment equations for six major countries (Germany, France, Italy, Spain, the UK and USA) in

an effort to explain trends in investment over the long term, while paying particular attention to the crisis. The results show that using the traditional determinants of corporate investment – the cost of capital, the rate of profit, the rate of utilization of production capacity and business expectations – it is possible to capture the main developments in investment for each country in recent decades, including since 2008.

Thus, since the onset of the crisis, differences in decisions on taxation and on how tight to make fiscal policy and how expansive to make monetary policy have led to differences between countries in terms of the dynamics of the economy and real capital costs and profit rates, which account for the current disparities in corporate investment.

Investment by non-financial corporations



Sources: National accounts, authors' calculations.