



Strategic economic policy to advance green innovation and investment in Europe

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The urgency of the green transition has been recently highlighted even more by the energy crisis, exposing the vulnerability of the European economy to external geopolitical pressure, notably in the energy field. Green transition and energy security will require a significant upgrading of European innovation and industrial policy, both in terms of volume of investments and rethinking the whole approach to innovation and development, making it more strategic. This paper explores what this upgrading may mean and what kind of instruments and institutions could be used. In addition to Europe-wide policies, we also look closely at the Central and Eastern Europe (CEE) situation.

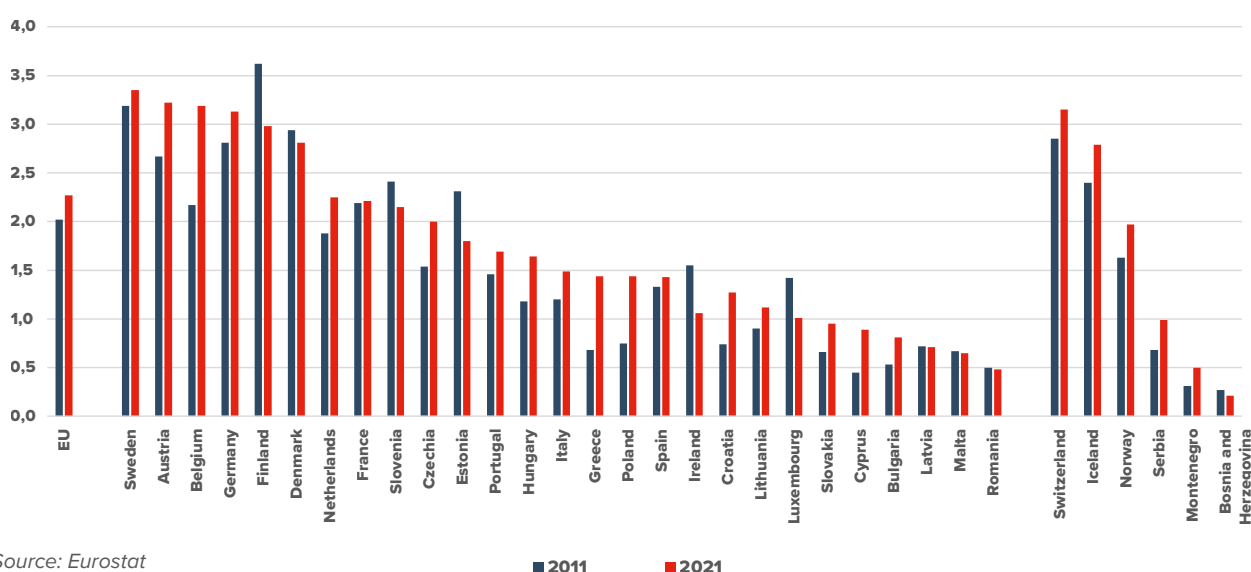
Most countries of the CEE region are substantially lagging in their innovation investments behind other EU countries. Regarding research and development (R&D) investments as a share of GDP, only Slovenia and Czechia were close to the EU average in 2021. The rest were behind, especially Slovakia, Latvia, Bulgaria, and Romania (Chart 1).

On top of it, the EU itself has been behind other major global players in terms of R&D expenditure (Chart 2). Between 2011 and 2021, EU investments increased from 2.02% to 2.27% of GDP, compared to the US' increase from 2,76% to 3,45%. In nominal terms, the EU spent €328 bn¹ in 2021, approximately half of that spent by the US - \$792bn².

The picture will improve in 2022 and in the future as the EU has boosted its spending on digital and green transformation, particularly through the Recovery and Resilience Facility (RRF). The EU plans to spend EUR 723.8 bn for RRF until 2026, which would mean an extra 0,8% of the EU's GDP per year on average, but not all of it is for innovation.

To understand how to foster investment in innovation in the EU, we need to ask why the EU has been lagging behind other regions of the world. The key factors are some features of the EU design itself. Notably, the European macroeconomic

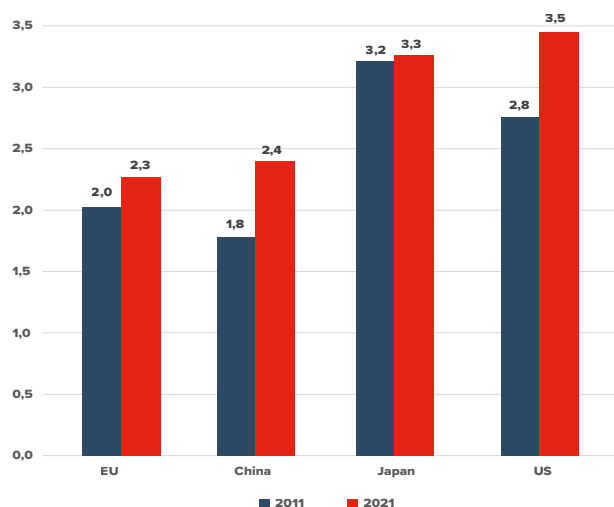
Chart 1. Gross domestic expenditure on R&D in Europe, 2011 and 2021, % GDP



Source: Eurostat

1 Eurostat: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=R%26D_expenditure#Gross_domestic_expenditure_on_R.26D
 2 US National Science Foundation: <https://ncses.nsf.gov/pubs/nsf23321>

Chart 2. Gross domestic expenditure on Research and Development, % GDP



Source: Eurostat

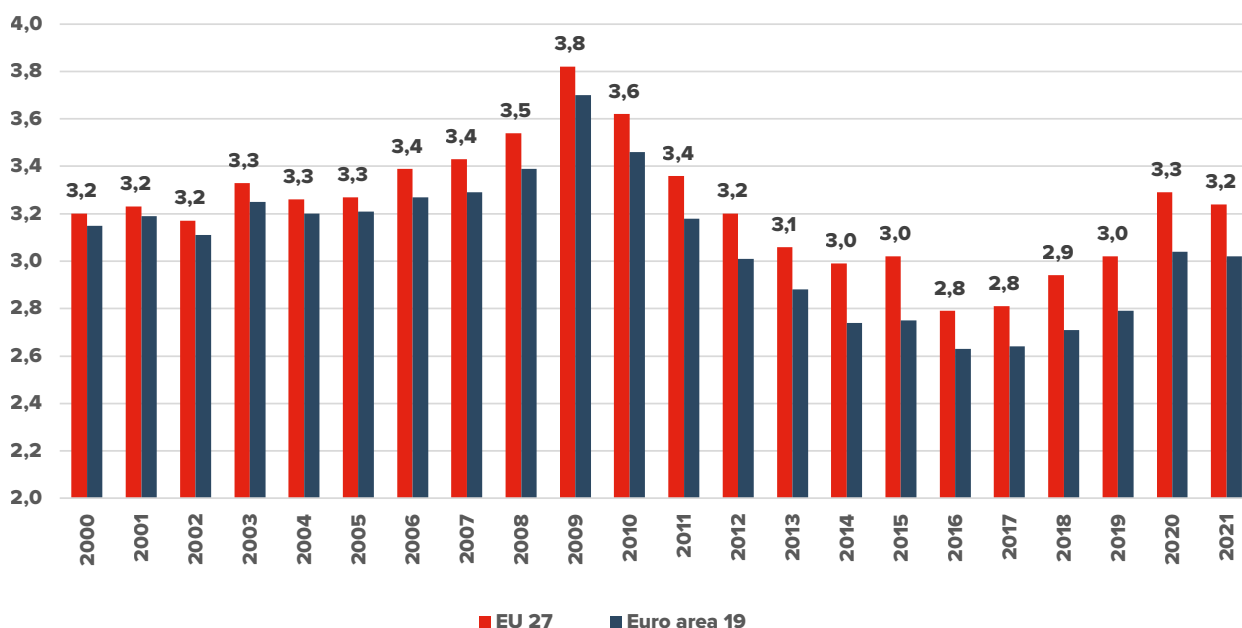
framework, the Stability and Growth Pact (SGP), imposed substantial constraints on member states' investment capacity.³ In the aftermath of the global financial crisis, the program of austerity pursued by the European Union led to a stagnating aggregate demand. Public investment was the first casualty, as other budget items, like social expenditures, are more challenging to cut. The government

investment's share in the EU GDP shrank from 3,8% in 2009 to 2,8% in 2017 (Chart 3), and for the Eurozone, this decline was even more pronounced.

The problem of SGP is that it has a one-sided view of public finance: it looks at the liability side of the government sector but ignores its assets. By focusing exclusively on debt and deficit, it targets their reduction. By contrast, when any private company considers an investment, it looks at both sides of the balance sheet of a project, comparing how much value it will generate vs the amount of debt needed to finance it. If the value of created assets is higher than the amount of financing, the project is undertaken. Therefore, when the only thing that everyone looks at in the case of state investments is liabilities and not the value of created assets, the investment is not – or is not enough - undertaken.

A possible solution to this problem is the wider use of **capital budgeting**⁴ in public sector investments like it is done for private investments. Due to the intangible nature of many assets created through public investment, the precise assessment of their value might not always be possible. At a minimum, there should be a **separation of consumption and investment expenditure** and the latter should be excluded from the SGP's limitations. Many analysts

Chart 3. Government investment, share of GDP, %



³ For an extensive discussion see the book by Stiglitz (2019)

⁴ Calculating net present value of investments.

and EU players have discussed and proposed this in the ongoing discussion of the SGP reform.⁵

It would be helpful if the current **revision of the EU economic governance framework** brought more flexibility for state investments. In its Communication on SGP reform published in November 2022 (EC, 2022), the European Commission acknowledged the need to foster investments. The Commission's reform proposal includes more flexibility in that member states will have more time to reach the budget and debt targets of 3% and 60%, respectively. However, the proposal does not envisage ambitious enough exemptions for green investments. Hopefully, further elaboration of this reform will bring more substance to the promises of investment promotion.

A second prominent feature of the EU rulebook that inhibited public investment in innovation and economic development is limitations on **state aid**. The development of the Single Market has prioritised creating a competitive environment and limiting the state's role to the extent possible. As a result, the European industrial and innovation policies were enablers for private sector activities but were not employed as instruments of a visionary, innovative agenda.⁶ This approach no longer seems possible due to the strategic rivalry with China and, now increasingly, the United States. The EU must revise its attitude to industrial policy and state aid to preserve its innovation and technological capacity.

Speaking in December 2022, EC President Ursula von der Leyen said that the Commission was ready to **loosen limits on subsidies** within the EU. She indicated that the Commission was preparing a framework that would simplify state aid rules and allow member states to provide aid to greenfield investments to match the subsidies of third countries.⁷ In fact, the EU has already shown that it can give more flexibility to its own rules during the COVID-19 pandemic and, more recently, in the energy crisis, making it easier for governments to channel support to their economies.

EU investment banks and funds

Public investment banks and funds are the most common way to make state investments without jeopardising the fiscal stance. The big advantage of such banks and funds is

that their spending does not count towards the government's fiscal stance, thus allowing governments to stimulate strategic investments without increases in the government deficit. There remains, of course, the need to finance their capital, which may require debt issuance.

The EU has had a very successful experience with its investment bank, EIB. As of December 2021, its total loan portfolio contained €433bn, which is 3% of the EU's GDP. During the pandemic, the EIB group played a counter-cyclical role by increasing its lending to EU countries by 20% in 2020 and 30% in 2021 (Table 1).

Table 1. EIB Group financing, EUR bn

	Total	EU	Non-EU
2021	95,0	86,7	8,1
2020	76,8	66,6	10,2
2019	63,3	55,4	7,9

Source: EIB Activity Reports 2019- 2021

Making state investments through development banks and funds has many other advantages, such as the possibility of **leverage through guarantees** and diverse financial instruments. EIB claims that the effect of its financing was much more significant than suggested by lending volumes because it used diverse leverage instruments that brought private investors in. This is especially the case of commitments of the investment funds under the EIB umbrella - the European Investment Fund (EIF), the European Fund for Strategic Investments (EFSI, active in 2015-20), and the Pan-European Guarantee Fund (EGF, launched in 2020). For example, the EIF claim that by using EUR 11.9bn of EGF resources, it committed EUR 26.2bn of financing to financial intermediaries, which allowed mobilising EUR 115bn of financing for SMEs in 2021.⁸ Through EFSI, EUR 99.3bn of approved financing has allegedly mobilised EUR 524.3bn of investment across Europe EC (2002b).

There is a clear need to increase the scale of EIB and EIF investments and most likely create other targeted funds as well. To fund them, the EU will most likely have to issue debt, which can create contention. In her 2022 State of the Union

⁵ For example, see the statement "EU fiscal rules must address need for public investment in cohesion and sustainability" by the European Committee of the Regions from 9 Nov 2022: <https://cor.europa.eu/de/news/Pages/EC-proposal-SGP-reaction.aspx>

⁶ There were some exceptions at the national level, for example, German KfW, that is considered a secret gem of the German industrial policy.

⁷ Speech by President von der Leyen at the European Parliament Plenary on the preparation of the European Council meeting of 15 Dec 2022: https://ec.europa.eu/commission/presscorner/detail/en/speech_22_7727

⁸ Pan-European Guarantee Fund: https://www.eif.org/what_we_do/egf/index.htm

address⁹, Commission President Ursula von der Leyen called for the creation of a ‘European Sovereignty Fund’. Internal market commissioner Thierry Breton recently suggested that such a fund can amount to €350bn (~ 2% of the EU’s GDP), partly funded by common borrowing.¹⁰ Germany, however, has already flagged its reservations about yet another emergency borrowing.¹¹ Using diverse leverage instruments, as done by EIB and EIF, will help reduce the funding requirement.

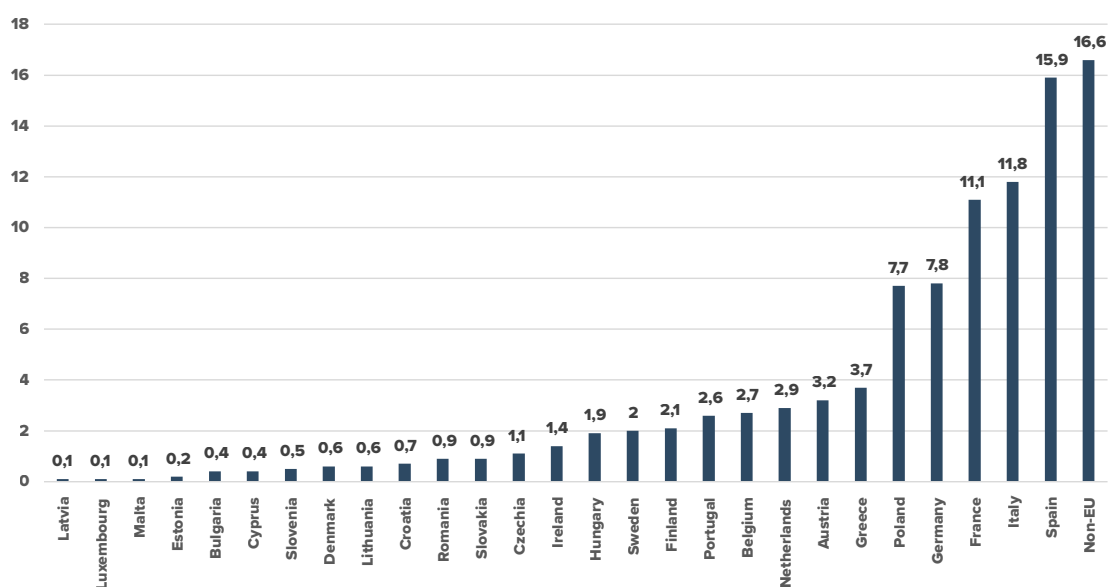
It is also possible to enhance EIB resources by converting the capital reserves that the EIB has accumulated through profits over the years into paid-in capital, as suggested, for example, in Koutny et al. (2022). As of the end of 2021, the EIB had accumulated €51,3bn in profits as reserves.¹² These reserves have grown continuously due to the relatively low-risk profile of EIB lending and have increasingly grown out of proportion to the capital (€22,2 bn in 2021). Conversion of these reserves in capital will allow expanding loans by up to €128 bn, as EIB statutory lending limit allows 250% loans to capital ratio.

On top of that, the risk appetite of the EIB should probably be reconsidered. Compared to other development banks, such as the World Bank, the EBRD, and the African Development Bank, the EIB has a very low-risk appetite, evidenced by its low non-performing loan ratio.¹³ The focus on low-risk loans and investments does not allow the EIB to play the developmental role it is supposed to play. In particular, this puts the CEE region at a disadvantage because it has a higher risk profile. Among CEE counties, only Poland has been able to attract a substantial amount of EIB funding in nominal terms (Chart 4). The major recipients of EIB funds were Italy, Spain, and France.

Apart from Poland, Bulgaria, Croatia and Estonia in 2021 also received proportionately more than other EU countries in relation to GDP. Still, they were far behind Portugal and Greece (Chart 5).

Another major reason for the skewness of EIB financing towards Western Europe is its institutional setup and decision-making procedures. Bruszt et al. (2022) argue that EU core countries enjoy

Chart 4. EIB outstanding loan stock, Dec 2021, % of total



Source: EIB Financial Report 2021

9 2022 State of the Union Address by President von der Leyen, 14 September 2022: https://ec.europa.eu/commission/presscorner/detail/en/speech_22_5493

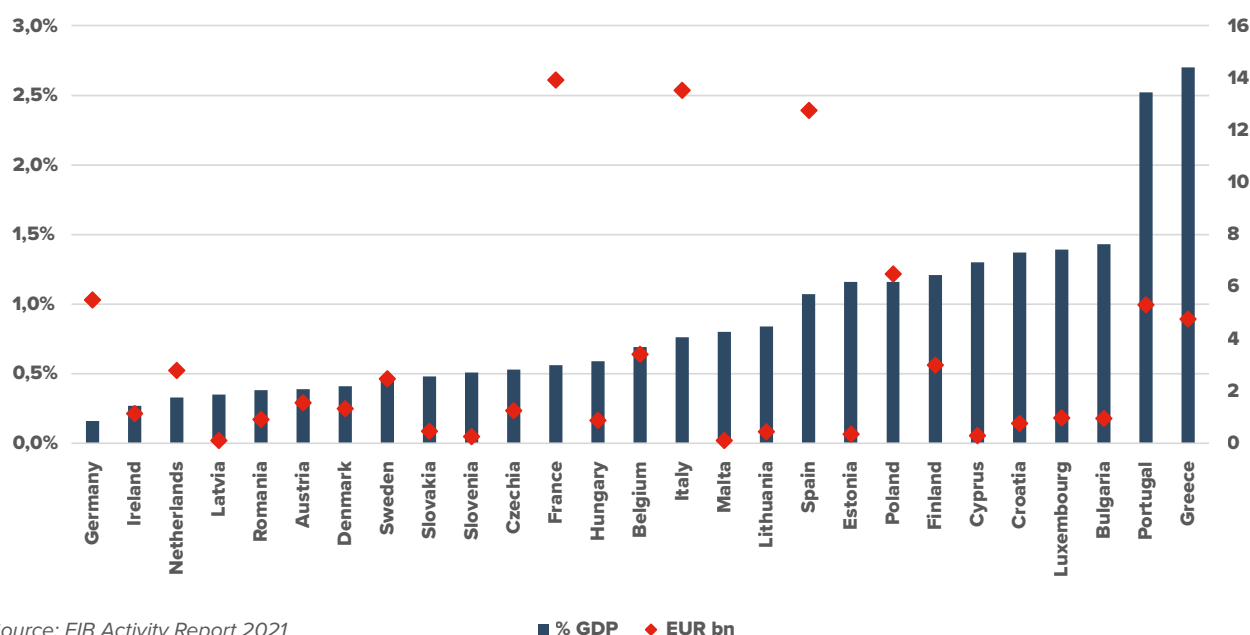
10 EU struggles to counter Joe Biden’s big green push, FT, 12 Dec 2022: <https://www.ft.com/content/9978a911-c898-4d0c-b641-fcfc0cf029>

11 No new European debt to fund competitiveness drive - German fin min, Reuters, 5 Dec 2022: <https://www.reuters.com/article/eu-germany-idUKS8N32O00C>

12 EIB Financial Report 2021: https://www.eib.org/attachments/publications/eib_financial_report_2021_en.pdf

13 European Investment Bank, Credit Opinion by Moody’s, July 2022: https://www.eib.org/attachments/external/Moodys_EIB_Report_01Jul2022.pdf

Chart 5. EIB financing in 2021



Source: EIB Activity Report 2021

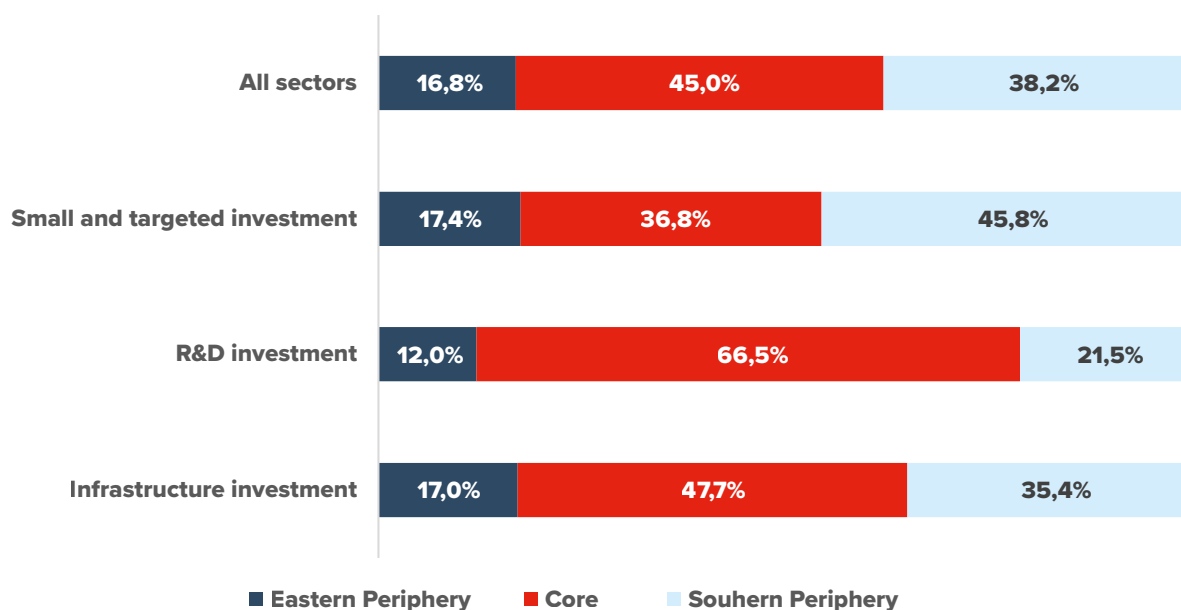
an overwhelming voting majority in EIB decision-making because all EIB governing bodies are composed of Member State representatives, and the weight of the votes is proportional to subscribed capital (where core countries are main subscribers). Naturally, country representatives channel funding to their own countries.

What is even more relevant for innovation financing is that the EIB finances R&D in CEE proportionately much less than in the rest of the EU. From 2004 to 2019, EIB projects in CEE

skewed towards infrastructure and SME investment, with proportionately less R&D investment. EIB R&D investments went predominantly to core EU countries (Chart 6). The picture is even more skewed for EFSI investments (Bruszt et al., 2022). Such lending practices perpetuate the status of CEE as a low-cost manufacturing base.

For CEE to catch up on innovative development and move up on the production ladder, European R&D lending practices need to change, and CEE needs to receive proportionately more, not less, funding

Chart 6. Share of EU regions in various parts of EIB financing, 2004 –2019



Source: Bruszt et al. (2022)

for innovation investments. The funding should consider the local governments' limited capacity to finance innovative projects on their own due to limited budget resources and technical capacity, and explicitly prioritise R&D funding for CEE.

National public investment banks and funds

should also be used more actively for funding green innovation and transition, especially in CEE. The past decade since the 2008 financial crisis has seen a significant expansion of these banks' capacities and tasks. They played an essential counter-cyclical role in helping firms to mitigate the impact of the economic shock in the wake of the 2008 crisis. More recently, they became more active in advancing European industrial policy and a green transition, often in cooperation with EIB and EIF. However, as Mertens et al. (2020) point out, there is significant variation in the financial and institutional capacity of national development banks and funds, so more EU-wide solidarity is needed to support countries with smaller capacities.

The role of the national development banks (NDBs) in the CEE members of the European Union has been limited so far. According to the analysis of Piroska and Mérő (2021), CEE governments did not employ development policy more actively for a host of reasons, a prominent one being the negative perception of the state after decades of Communist rule. The early years of the transition were marked by massive liberalisation and privatisation. The prevalent view, advanced by international institutions and companies, was that the state should be limited to the minimum. In later years, during the EU accession, development finance revived in CEE countries as the EU channelled Structural and Cohesion funds and helped develop national development banks. However, the mandate of these NDBs was quite limited, as they were built in the framework of the need to limit state aid – the cornerstone of the EU integration approach. This framework of limiting the state applied to the whole of the EU, as we discussed above, yet it was even more pronounced in the case of CEE. For example, some older member states, such as Germany, employed their development banks more ambitiously. In the CEE, by contrast, their mandate was limited from the very outset.

Some limitations on domestic development banks in CEE were self-imposed. Hungary, for example, has chosen to subjugate its development bank, MFB, to the domestic banking law, unlike Germany, which excluded its main development bank KfW from many banking sector regulations. One reason Hungarian authorities made this choice is for MFB to be able to attract external

financing more easily, including through the issuance of bonds. Another reason was, allegedly, to avoid too much interference from the government (Piroska and Mérő, 2021, p. 10). Polish development bank BGK had more flexibility and could ask to be excluded from certain prudential regulations, but rarely did that.

The lack of capacity of NDBs in CEE limited their own activity and may have also contributed to relatively weaker inflows from the EIB and EIF compared to Western European countries. For example, the EIF and EFSI funding requires the creation of sophisticated financial instruments. Companies and financial institutions in CEE often do not have the technical capacity to participate in such deals. National NDBs should enhance their capacity and provide support for local companies to participate in such projects.

The active role of the state in innovation

The second major recommendation concerns the **role of the state**. Namely, the state should be more **proactive** in steering green innovation. This applies not only to CEE but to the EU as a whole. Now, it is not only China but also the US that has become more active in its industrial policy, especially in the field of green investments. The Inflation Reduction Act (IRA), adopted by the US in August 2022, is likely to lure green investors at the expense of the EU, thanks to massive subsidies and tax credits that it provides for American-based production. Moreover, the disruption of supply chains in the wake of the COVID-19 pandemic exposed a lack of EU strategic capacities in a range of innovative technologies and products. The EU has been enhancing its funding for R&D in the last couple of years, especially for green and digital projects. **Strategic innovation and industrial policy** need to come on top of it.

The strategic vision of the American and other governments gave birth to and nourished the early development of all significant innovative technologies that we use today, such as the internet, semiconductors, and solar and wind energy generation. The United States government has been the most successful innovator for several decades after World War 2, an example of an “entrepreneurial state” taking significant risks in launching ambitious research programs. A prominent role was played by the US military agency called DARPA (Defense Advanced Research Projects Agency), but later similar structures were created to promote innovation in diverse sectors, notably in energy. Mazzucato (2013) convincingly

argues that without the vision and investments of DARPA, the Silicon Valley miracle would not be possible. Today, Silicon Valley is perceived as a story of successful, talented tech investors who dared and succeeded. This narrative is only partially true and leads many outsiders to believe that this is what it takes to have an innovative economy. The fact that the US government financed the technologies that tech companies have picked up for several decades is less widely advertised, which leads to unsuccessful attempts at emulating Silicon Valley's success. As Mazzucato says, "If the rest of the world wants to emulate the US model, they should do as the United States actually did, not as it says it did: more State, not less" (Mazzucato, 2013. p. 1).

The need for a more active state role in fostering innovation is also made apparent by the private financing problems that came to the fore last year. The tightening of policy interest rates in 2022 led to a collapse in tech equity prices. As a result of the correction in the equity markets, tech companies had to slash their costs and investments substantially, and new companies could not get market financing. Chart 7 shows this boom-bust cycle for major venture capital (VC) destinations, with a large surge in VC funding in 2021 and a substantial correction in 2022.

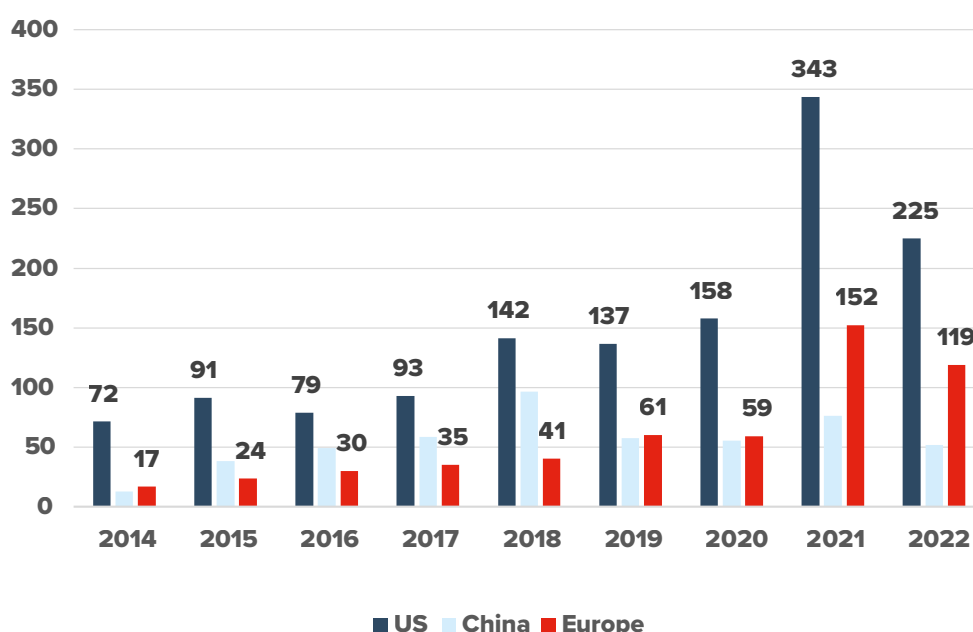
Apart from high volatility, there are also other features of the VC model that make it unsuitable for generating and sustaining serious innovation in the economy, namely, its short-term orientation

and aversion to uncertainty. This model is built on quick product placement, targeting to catch a large market share with a subsequent IPO, through which the original venture capital investors exit and reap the gains for their investment. This kind of innovation financing has a very short horizon, usually up to 3 years, thus making any serious innovation unlikely. What is possible to achieve in such a short time span is the adaptation of already existing technologies for use in consumer products. Also, VC does not invest in fundamental research, as its results are very uncertain, so VC normally invests in bringing to market the already developed technologies.

Even if we look at more prominent tech companies independent of VC, their willingness for innovation is hampered by the focus on the market performance of their equities. Instead of investing in innovation, they have been buying back their shares to boost shareholder value and manager bonuses. Over the last ten years, Dow Jones 500 companies have spent \$6.4 trillion on buybacks, and the last couple of years have seen a major deal boost: \$742bn in 12 months to Sep 2021 and \$982bn in 12 months to Sep 2022. The latter is higher than the total US R&D expenditure in 2021, both private and public (\$792bn). Tech giants such as Apple, Alphabet, Meta, and Microsoft, were far ahead of everyone else in the volumes of buybacks, especially in 2021 and 2022 (Annex 1).

These unhelpful tendencies of market-based financing for innovation make it clear that

Chart 7. Venture capital invested, USD bn



Source: Dealroom

this cannot be the major route for innovation advancement. This is especially the case for green innovation financing because green technologies and their deployment are much more capital-intensive and take longer to put into industrial production than consumer apps developed by Silicon Valley.

The European **industry-based innovation model**, through industrial alliances, is very suitable for the green transition. It makes sure that research results are translated into industrial capacity and technological innovation. Green innovation is more about B2B interaction than the B2C model characteristic of digital tech. Siemens, for example, has been successfully combining innovation with industrial processes, doing the trials of new technology in their own industrial facilities. Following this path would be natural for CEE countries, given that they are already integrated into the production processes of major European industrial companies, like German car manufacturers.

The state should assume its **entrepreneurial function** to promote innovation and economic development.¹⁴ It means it should envision a direction for technological change and invest in that direction. This approach combines the best of the two worlds: the Keynesian idea of an active state with the Schumpeterian idea of creativity. The concept of a visionary and entrepreneurial state should replace the narrative about the inefficient and incapable state. The reality is that the state has been like that in many instances¹⁵. However, the narrative of the last 30 years provided a distorted picture, neglecting the enormous successes of state innovation policies and focusing only on failed cases.

Pursuing of such an ambitious agenda would mean not only providing financing for R&D but also facilitating the development of innovation ecosystems and markets for new products. Over the last several years, the EU has been setting up projects and funds to that end, such as the Battery Alliance and the Chips Act. In her 2022 State of the Union Address, President von der Leyen announced a plan to create a market for hydrogen, which will involve creating a European Hydrogen Bank that will guarantee the purchase of hydrogen using resources from the Innovation Fund.¹⁶

In 2018, the EU launched a flagship policy promoting industrial innovation - the **Important Projects of Common European Interest**

(IPCEI). The current projects focus on hydrogen, microelectronics and the industrial cloud. The activation of the Recovery and Resilience Facility (RRF) has provided a major boost to IPCEI, especially in Eastern Europe. CEE countries did not participate in the initial wave of IPCEI, mainly because of financial constraints. With the help of the financial resources of the RRF, they are now part of projects on microelectronics and cloud systems. This initiative needs to be put on a more sustainable footing, both financially and organisationally. Eisl (2022) points out in his analysis that these projects need to be transformed from repeated and strongly national ad hoc exercises to a permanent tool of EU industrial policy. The current funding arrangement coming from national RRF allocations also needs to be changed toward a more permanent mechanism – a special EU fund, for example.

The European approach in all the projects discussed so far was to define the investment priorities and ask private companies to submit proposals. More directional EU/state activity needs to complement this bottom-up pillar. The example of DARPA in the US discussed earlier shows how to make such an agency a visionary innovation promoter. DARPA was given substantial autonomy, unlike other government agencies, and acted as a broker between different agents in the innovation field. Using its funding networks, DARPA increased the flow of knowledge across competing research groups and facilitated workshops for researchers to gather and share ideas. It engaged in business and technological brokering by linking university researchers to entrepreneurs, connecting start-up firms with venture capitalists, and assisting in procuring a government contract to support commercialisation (Mazzucato, 2013, p. 83). In sum, the state needs to become innovative and entrepreneurial to promote innovation.

To take on this entrepreneurial role, the European and national development banks and funds should consider the option of **equity investments** in innovative companies. In essence, that would mean they would become venture capital investors. This would allow greater risk-taking but also would offer profit potential for the state from successful investments. Having an upside, which could be big in the case of successful innovative investments, would resolve the issue of **sustainability of innovation financing**: the profits and royalties can be used to finance new investments. This could be much more attractive to EU Member States than

14 Here we draw on the idea of “entrepreneurial state” as proposed in Mazzucato (2013).

15 Documented in Mazzucato (2013) with references to multiple research papers.

16 2022 State of the Union Address by President von der Leyen: https://ec.europa.eu/commission/presscorner/detail/en/speech_22_5493

doing debt financing, which has no upside except interest payments. The EIB had engaged in equity-like financing through EFSI equity instrument for the first time.¹⁷ It was not standard equity financing, but so-called “venture debt” in the form of loans.¹⁸ The financing was predominantly directed to venture funds, which invested in enterprises. Despite all these caveats, this experience can be considered the first important step in the right direction.

Conclusions and recommendations

- ▶ The European Union must enhance its financing for R&D. For that, it would be helpful to relax fiscal constraints and state aid regulations. Some of it is already on the way, but it does not look to suffice.
- ▶ Given fiscal constraints, national and EU-wide development banks and funds can play a bigger role. They allow leveraging the state resources with private money, thus achieving a much bigger impact. The EIB and EIF have good experience in that. Additional funds must be established, and the capacity of national development banks must be enhanced.
- ▶ CEE countries lack the financial and technical capacity to promote innovation and industrial policy. While the effort should be put into developing their national development banks and funds, EU-wide instruments and institutions should play a major role. Capacity-building efforts should accompany the provision of funding from European instruments.
- ▶ Private financing of innovation offers only a partial solution. Private venture capital investments are short-term and very volatile, depending on the markets. They are good at commercialising existing technologies but are incapable of long-term strategic investments in innovation.
- ▶ The states and the EU should become more entrepreneurial in promoting innovation, not limiting themselves to the provision of funding but engaging in market creation. The US’s experience since World War 2 is very instructive on that.
- ▶ State development banks and funds should consider the option of equity investments in innovative technologies - this will offer the state an upside in investments and provide resources for financing future investments.

17 EFSI Equity instrument: https://www.eif.org/what_we_do/equity/efsi/index.htm#:~:text=Under%20EFSI%2C%20the%20EIF%20provides,in%20specific%20EU%20policy%20areas

18 What is venture debt? <https://www.eib.org/en/stories/what-is-venture-debt.htm>

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Annex 1

S&P 500 20 LARGEST Q3 2022 BUYBACKS, \$ MILLIONS

Company	12-Months Sep, '22	12-Months Sep, '21	5-Year Buybacks	10-Year Buybacks
Apple	\$95.625	\$92.527	\$409.123	\$582.041
Alphabet	\$57.362	\$44.705	\$154.884	\$163.102
Meta Platforms	\$45.600	\$31.532	\$108.389	\$115.597
Microsoft	\$30.585	\$28.326	\$116.316	\$172.130
Exxon Mobil	\$10.634	\$101	\$12.492	\$52.459
Procter & Gamble	\$11.253	\$11.759	\$41.922	\$64.291
Lowe's Companies	\$16.140	\$12.442	\$37.598	\$56.537
Marathon Petroleum	\$9.496	\$1.912	\$16.395	\$24.603
NVIDIA	\$10.579	\$1.508	\$16.000	\$20.789
Chevron	\$5.386	\$618	\$12.124	\$22.210
Comcast	\$11.868	\$2.722	\$22.066	\$45.381
Cigna	\$7.295	\$8.011	\$20.751	\$26.260
Walmart	\$11.127	\$8.807	\$35.887	\$65.594
ConocoPhillips	\$7.928	\$2.390	\$18.500	\$20.690
Morgan Stanley	\$11.973	\$9.278	\$35.895	\$47.763
S&P Global	\$11.091	\$60	\$15.557	\$19.970
Charter Commun	\$13.842	\$15.183	\$51.132	\$60.521
Johnson & Johnson	\$5.711	\$2.781	\$24.821	\$55.373
Visa	\$11.709	\$8.820	\$44.807	\$71.674
Union Pacific	\$6.942	\$6.595	\$31.653	\$46.843
Top 20	\$392.146	\$290.077	\$1.226.312	\$1.733.828
S&P 500	\$981.593	\$742.209	\$3.785.087	\$6.404.065
Top 20 % of S&P 500	39,95%	39,08%	32,40%	27,07%

Source: S&P Global

