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Industrial policy, progressive derisking, and the financing of Europe's green transition

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78 WORKING PAPER



Industrial Policy, Progressive Derisking, and the Financing of Europe's Green Transition

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List of Abbreviations

BGS	Big Green State
CHIPS	(The US) Creating Helpful Incentives to Produce Semiconductors act
DARPA	Defense Advanced Research Projects Agency
DB	Development Bank
EC	European Commission
ECA	European Court of Auditors
ECB	European Central Bank
EFSI	European Fund for Strategic Investments
EIB	European Investment Bank
EIF	European Investment Fund
ESIF	European Structural and Investment Funds
EU	European Union
FTT	Financial Transaction Tax
GFC	Global Financial Crisis (of 2007-2009)
IMF	International Monetary Fund
IP	Industrial Policy
IPCEI	Important Projects of Common European Interest
IPR	Intellectual Property Right
IRA	Inflation Reduction Act
MFF	Multiannual Financial Framework (of the EU)
MS	Member States
NGEU	NextGenerationEU
NRRP	National Recovery and Resilience Plans
NZIA	Net Zero Industry Act
PDR	Progressive Derisking
RRF	Recovery and Resilience Facility
SGP	Stability and Growth Pact
STEP	Strategic Technologies for Europe Platform
VoD	Varieties of Derisking

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Abstract

To address Europe's environmental, economic, and geopolitical challenges, the European Commission has decided to proactively accelerate digital transformation and decarbonization through industrial policies. As the annual green investment gap exceeds 2 percent of the EU's GDP, of particular relevance is not least *how* the EU's industrial programs will be financed. Amid scarce fiscal resources and public sector austerity, paradigmatic cases of (financial) *derisking* aiming to "escort" private finance to green but unprofitable investments have been key to European policymakers' aim to accelerate the green transition. This paper offers two contributions in this context. Firstly, it examines to what extent and how finance for industrial policy has been provided in Europe since the early 2020s. Secondly, it conceptually advances the political economy of derisking literature by elaborating on progressive derisking and Big Green State policies as alternative industrial policy financing programs, and discusses those programs in relation to Europe's macrofinancial regime.

Keywords: Industrial policy, derisking, macrofinancial regimes, climate change, the green transition, digital transformation, European policy studies, political economy, development finance, financialization.

1. Introduction

"Is it possible to deploy industrial policies that strengthen green growth and economic security without hurting competition, economic openness and cohesion in the EU? Is it possible to do so without stronger EU-level governance, backed by financial resources? To me, the answer to the first question is 'yes', and to the second, 'no'." Jeronim Zettermeyer, Director of Bruegel (Aghion et al. 2023:11-12).

With the rise of industrial policy (IP) in recent years, the climate crisis is increasingly defined as an investment problem rather than a pricing problem. Amid ambitious IP in the US and China, European policymakers agree that carbon pricing alone will not bring about the several € trillions needed for Europe's green transformation (Jakob & Overland 2024). As the annual green investment gap exceeds 2 percent of the EU's GDP, of particular relevance is *how* the EU's green industrial programs will be financed. Amid scarce fiscal resources and public sector austerity, the paradigmatic idea of *de-risking*¹ aims to "escort" private finance to green and societally important but otherwise unprofitable destinations, instead of directly carrying out investments by fiscal means and public investment banks (UNCTAD 2019:143-166, Kedward et al. 2022a). Exemplified by the EFSI and InvestEU programs, policymakers have seen derisking as a cheap and attractive financing alternative under Europe's austerity framework. The Letta report similarly proposes the launch of a "European Green Guarantee" with a supposed multiplier of 12 (Letta 2024:31).

Derisking approaches are expected to crowd in significant sums of private capital for European investments needs (Griffith-Jones & Naqvi 2020). Meanwhile, critics argue that it reinforces commodification, contributes to carbon lock-in and undermines "mission-oriented" market-shaping approaches where states take more central roles (Mazzucato 2016, UNCTAD 2019, Gabor 2023). However, while "Most analyses conclude that financial statecraft undermines state capacities, as it empowers finance and exposes states to uncontrollable risks" (Findeisen 2023), some scholars argue that derisking does not undermine policy leeway, but contrarily reinforces the capabilities of state managers (Babic et al. 2020, Dafe & Rethel 2022, Findeisen 2023, O'Sullivan & Rethel 2023, Schindler et al. 2023).

Requests for further research are multitude (e.g. Ryner 2023:628, Golka et al. 2024). Schindler et al. (2023:236) call for more research on the links between industrial strategies and derisking. According to Findeisen (2023), further research is required to explore "financial statecraft" as an important tool to address the climate crisis. Cooman (2023b:11) proclaims a "need for further scholarly attention on financial intermediation and the surrounding politics-finance nexus". Gabor (2023) thereto highlights that studies on derisking in a European context are surprisingly scarce. Against the background of these calls, this paper asks to what extent Europe's policymakers have succeeded in steering finance to green and other strategic investments, both through derisking and non-derisking fiscal schemes? And, drawing from heterodox and mainstream academic and policy-oriented discussions on IP, what are some main alternative macrofinancial strategies to those currently pursued?

Inquiring these research questions, this paper has two objectives. Firstly, it describes to what extent and how finance for the twin transition has been provided in Europe since the early 2020s. Surveying different initiatives tasked to finance Europe's green structural transformation, the study shows that some financing programs show lower tendencies of derisking, while others are more fundamentally based on derisking, including setting explicit crowding-in targets for private investments.

¹ I.e. financial derisking, not to be misunderstood as "geopolitical derisking". From a Western standpoint, the latter implies the partial near-shoring and decoupling of supply chains and trade diversification vis-à-vis Russia and China.

Secondly, the paper contributes conceptually to the political economy of derisking by elaborating on “Varieties of Derisking” (VoD). So far, scholars interested in *derisking* and alternatives to derisking– the *Big Green State* (BGS) – have conceptualized these as polar opposites. Examining the derisking-BGS dichotomy (e.g. Gabor & Braun 2023, Christophers 2024, Golka et al. 2024), I distinguish another type of derisking, *progressive derisking* (PDR), and discuss these three concepts against the case of the EU’s IP financing strategies. I define PDR proponents as those who do not oppose derisking per se, but rather the way it is currently executed. Instead of naively subsidizing private capital with little or no strings attached, progressive deriskers argue that the public sector can and should mobilize private investments as long as risks and rewards (profits), knowledge (IPRs) and other outputs are shared equitably between firms and shareholders on the one hand, and governments and citizens on the other hand; that state-business relations are mutual rather than “parasitic” (Mazzucato 2021:167); and that policymakers can impact on investment decisions in various other ways through conditionalities (Amsden 1989, Maggor 2021, Bulfone et al. 2024). BGS proponents, instead, are doubtful about both market mechanisms and the private sector’s capability to deliver the green transition, pointing to the problems of regulatory capture, arbitrage (Kedward et al. 2022b:1), greenwashing (Dafermos et al. 2021:244, Cooman 2023b:9-11, Sastry et al. 2024) and the low profitability ratios of many green investments (Alami et al. 2023, Tagliapietra et al. 2023:52-53, Babic 2024:3, Christophers 2024, Ramesh 2024). BGS proponents instead put the public sector front and center to carry out the green transition through planning and large-scale public investment.

In terms of methodology, the report triangulates documents, interviews and descriptive statistics. A document analysis comprising academic papers, policy reports, annual reports, press releases and financial media articles have been carried out. In addition to informal conversations with academic and non-academic IP and financial market experts, nine interviews with ten experts (three central bank economists, one senior economics professor, two think tank officials, two innovation consultants, one environmental consultant and one economist at a financial supervisory authority) were conducted between December 2023 to May 2024. Based on the preferences of the interviewees, some but not all interviews were recorded. “Policy taking” (as opposed to “policymaking”) public sector employees, especially those working at the European Investment Bank (EIB), communicated very cautiously and were reluctant to give interviews.

Before moving on, it is necessary to define how *industrial policy* is conceptualized in this paper. On the one hand, one can differentiate between different forms of investments: in electrification and other measures to decarbonize industry and society; circular economy investments (reducing energy consumption and increasing material efficiency); energy system investments (including energy efficiency and power network investments); energy system manufacturing equipment (electrolysers, battery cells, heat pumps, solar panels, wind turbines) as well as in their supply chains (back to mining of the materials used), etc. On the other hand, which investments should fall under the label of climate policy, energy policy or IP is unclear due to a considerable degree of overlap. In addition, since the green transition is based on a systemic change of the entire productive system, I use an extended definition of IP and apply it broadly as “[supranational] governmental policies targeted at sectoral allocation of the economy... including... innovation and R&D... infrastructure... education... integration of markets..., enduring stability and financial policies” (Esteban, Stiglitz & Lin 2013, cited by Aiginger & Rodrik 2020:205). In similar fashion, Bulfone et al. (2024) define it as “pursuing long-term transformative goals such as favor industrial upgrading, increase employment and human capital, tackle climate change, or reduce interregional disparities”. Using broad instead of a narrower definition of IP makes it easier to shed light on a larger pool of European investment mechanisms and funds in order to get a holistic idea of the extent derisking versus non-derisking is applied in Europe’s macrofinancial regime. Moreover, while IP is also carried out on regional and domestic levels, EU-level schemes have numerous environmental and fiscal advantages. Just as the American IRA, passed in August

2022, has multiple goals of maintaining American technological supremacy, energy independence and climate ambitions, coordinated EU investments can likewise enhance Europe's economy, its strategic autonomy and the continent's social equality (Heimberger & Lichtenberger 2023a:13-14). As state aid increased from around €80 billion between 2000 to 2019 to 335 billion in 2021, of which Germany received almost half (FT 2023b, cf. Gabor 2023:22), collective financing measures constitute a main mechanism for countering uneven economic development in the EU.

The next chapter reviews Europe's green and digital investment gap. Providing data on Europe's macrofinancial regime, the ensuing chapter discusses the hegemonic fiscal program of derisking, while providing an account on the extent of derisking of major EU investment programs. Chapter 3 discusses how a European BGS would look like, including zooming in on current and proposed "BGS" initiatives. Chapter 4 discusses PDR as an alternative to mainstream "neoliberal" derisking, while being a more feasible option than several BGS proposals. The paper ends with a concluding discussion and suggestions for future research.

2. The growing European investment gap

Future annual investment gaps are likely to grow the more necessary green investments are postponed in the present. In the early 2020s, the annual investment gap needed for the EU to reduce CO2 emissions by 55 percent until 2030 was estimated to €356 billion, or 2 percent of EU GDP (Von der Leyen & Hoyer 2021; see also Mertens & Thiemann 2023:68, EIB 2023:2; *for details*, see Pisani-Ferry et al. 2023:13). Another recent study estimated the EU's yearly climate investment needs to €813 billion, or 5.1 percent, of EU GDP. With around €407 billion being spent in 2022, the study estimated a €406 billion (2.6 percent of EU GDP) annual green investment deficit in Europe (Calipel et al. 2024:2-3). Meanwhile, there is an annual €620 billion investment gap needed to meet the objectives of REpowerEU and the European Green Deal until 2030 (Lagarde 2024, based on EC 2023:7), while the digital transformation would need additional investments of €125 billion (Lagarde 2024).² In relation to the EU's economy, with a nominal GDP of €19,35 trillion in the beginning of 2024 (IMF 2024), €620 billion amounts to 3,2 percent of the EU's nominal GDP. Furthermore, to reach the 90 percent target by 2040, the EC "estimates that between 2030 and 2040, investment needs will increase to €1.5 trillion per year" (Strategic Perspectives 2024:38). The gap, meanwhile, for the EU to reach net-zero by 2050 is estimated to average €360 billion per year, 2,3 percent of the current EU-27 GDP, according to one think tank (Institut Rousseau 2024:172). Others claim that the EC has underestimated the investment requirements and put the number to 6 percent of GDP annually until 2050 for making Europe climate neutral (for an overview, see Heimberger & Lichtenberger 2023a:10). In comparison, annual public EU resources dedicated to climate action, including from the EU budget, RRF, and various EU funds, amount to only €131,6 billion according to Kedward & Ryan-Collins (2022:281). Summing up the NGEU and MFF, totalling €1824 billion for 2021-2027, annual disbursement equal €230 billion on average (Mazzucato et al. 2023:23). By comparison, estimations of direct and indirect fossil fuel subsidies in the EU range between €290 billion (Strategic Perspectives 2024:40) to €359 billion annually (Institut Rousseau 2024:33). Meanwhile, yearly dividend payout in Europe amounts to €410 billion (ibid).

Table 1 breaks down investments gaps and suggested public-private investment shares in five major sectors as according to one study (Institut Rousseau 2024). Especially agriculture is

² Lagarde (2024) refers to EC (2023:7) which in turn refers to "Europe's moment: Repair and Prepare for the Next Generation, COM(2020) 456 final", regarding the number of €125 billion. This number is not explicitly mentioned in the latter document, however.

dependent on public investments. Buildings and industry require a relatively balanced level of future public and private investments, while the study argues that transport and energy require lower rates of public investments due to high levels of profitability and decarbonization levers (ibid). One can call for a higher public share of investment in transport than what is proposed in *Table 1*, the more one assumes public transport to replace private transport. One can also argue that the public sector’s future share of energy investments should be higher, not least considering Europe’s green energy shortfall (Christophers 2024, Strategic Perspectives 2024:38). However, one should note that financing is not always a question of private sector versus public sector investments, but between subsidization versus regulation. Regulation of certain sectors is nonetheless beyond the scope of this paper.

Table 1: A breakdown of investments gaps and public-private investment shares in five major sectors³

	Transport	Buildings	Energy	Agriculture	Industry
Annual investment needed by sector (€ billion)	689	434	177	155	25
Annual green investment gap ⁴ (€ billion)	52	142	79	47	16
Public share of total future investment	20%	41%	22%	70%	43%
Private share of total future investment	80%	59%	78%	30%	57%

Source: Institut Rousseau (2024).

3. Derisking – an overview of the European case

During the era of liberalized financial markets in neoliberal capitalism, the private sector has been a poor provider of long-term finance to innovation and shifted capital away from the productive sector and towards financial assets, commercial and residential real estate (Perez 2012:12). As highlighted by evolutionary and other heterodox economists, radical uncertainty makes risk incalculable and renders pricing mechanisms (e.g. interest rates and uniform carbon prices) blunt tools to stimulate investment in risky sectors and radical innovations, where “complex non-linear dynamics such as path dependency and ‘lock-in’ effects, network externalities, technological inertia, and institutional feedbacks” (Kedward et al. 2022a:13) as well as lengthy high-risk lead times are at play. This explains the lack of investments in green innovation, despite the recent era of low interest rates (Kedward & Ryan-Collins 2022:291). Financial short-sightedness (myopic behaviour, tragedy of the horizon, Carney 2015), liquidity preferences and herd behaviour are a deficit of private finance that calls into question its ability to satisfactorily fund the green transition.

As a response to this underinvestment, the G20’s “Infrastructure as an Asset Class”, the UN’s “Billions to Trillions agenda” and the World Bank’s “Maximizing Finance for Development” initiatives have been paradigmatic cases of “*derisking*”. Amid scarce fiscal resources and public sector austerity, macro-financial strategies based on derisking aim to guide financial resources of international institutional investors to green and societally important but otherwise unprofitable destinations (Kedward et al. 2022a). This is achieved by public sector actors absorbing private sector risk by tinkering on risk/return profiles through guarantees, public-private partnerships and

³ Numbers provided by Pisani-Ferry et al. (2023:13), based on the EC, for reaching a 55 percent emissions reduction by 2030 are as follows: power grids €34.2 billion, power plants €25.6, industry €11.3, residential €106.3, tertiary €46, transport €129.6, other €3.4, summing up to a total of €356.4 billion, or roughly 2 percent of GDP.

⁴ Needed to reach net zero by 2050

blended finance and thereby implicitly guaranteeing profits for private investors, which in turn has significant political, economic, environmental and social implications (Gabor 2021a). At its core, derisking strategies aim to mobilize and “crowd-in” private investment (Kedward & Ryan-Collins 2022:281) and make green sectors increasingly investible, instead of steering financial flows to preferred sectors directly through fiscal means, development banks and other public sector institutions (UNCTAD 2019:143-166). In contrast to the developmentalist literature that emphasizes the disciplining of private capital, with states on top in state-capital hierarchies (Amarnath et al. 2023), derisking strategies position the private sector and “institutional investors, rather than domestic governments, as the leading actors in a global sustainable transition” (Kedward & Ryan-Collins 2022:283).

Derisking approaches are expected to crowd in significant sums of private capital for European investments needs (Griffith-Jones & Naqvi 2020). Meanwhile, critics argue that derisking reinforces commodification and contributes to carbon lock-in, while it undermines “mission-oriented” market-shaping approaches where states take more central roles (Mazzucato 2016, UNCTAD 2019, Griffith-Jones & Carreras 2021:5, Gabor 2023). Due to the private sector’s prominent role in green transition project(s) financed through derisking strategies, derisking is especially exposed to regulatory capture, arbitrage (Kedward et al. 2022b:1) and greenwashing (Dafermos et al. 2021:244, Cooman 2023b:9-11), while it undermines policy-steer (Griffith-Jones et al. 2022:200, Gabor 2023:23) and conditionalities on private investments (Golka 2023:5). Derisking approaches have thereto failed to shift financial flows away from brown and towards green activities in much of the Global South (Ameli et al. 2021, Schoenmaker & Volz 2022:84, Kalinowski 2023) as well as in Europe (Kedward & Ryan-Collins 2022:284). These issues made derisking strategies politically controversial up to the COVID-19 pandemic (Dafermos et al. 2021:241; Kedward et al. 2022a:3).

Details on 16 important European financing programs are presented in *Table 2*. Scrutinizing six major investment initiatives, Demertzis et al. (2024:20) argue that “Only EFSI and the InvestEU Fund set explicit targets for mobilising private investment. Additionally, the Horizon Europe regulation mentions maximising the mobilisation of private capital where possible. Finally, the RRF regulation mentions mobilisation of private capital, but rather as an additional benefit than an objective in itself”. In *Table 2*, the green area indicates programs of which no explicit additionality figures are stated (no or weak derisking). The blue area indicates programs with explicit derisking estimations/targets (strong derisking). In other words, derisking “coexists with other, more muscular forms of state intervention” (Gabor 2023:26).

Out of *Table 2*, EFSI and InvestEU can be distinguished as having the most inflated nominal multipliers. While most of the assessments and evaluations of EFSI have been carried out by EIB itself, most scholars have taken these at face value (cf. Griffith-Jones & Naqvi 2020, Mertens & Thiemann 2022, Mazzucato et al. 2023:15). The supposedly unlocked €500 billion of private investments through €26 billion of EU guarantees and €7,5 billion of EIB’s own resources, reaching a multiplier of 15. The EIB thereto reports that EFSI projects were riskier than its typical projects. Yet as of 2022, only a modest €184 million in guarantees were called. The low default rate might indicate that these projects were not as risky as presumed, and that EFSI guarantees have not contributed to riskier investments (Demertzis et al. 2024:20). According to Mack & Findeisen (2023:7), “Many commentators, including the European Court of Auditors, have criticized the limited additionality of EFSI, its inability to unlock projects that were too risky from a private finance perspective”. EFSI’s guarantees also did poorly in stimulating investments related to climate change adaptation (as opposed to climate change mitigation), “which may reflect the specific difficulties in preparing bankable adaptation investments” (ECA 2021:39). The high leverage of InvestEU, the successor of EFSI, has likewise limited policymakers’ “capacity to turn innovative projects with transformative potential into propositions for private and market-based

finance as it limits their capacity to provide direct and balance-sheet-intense support” (Mack & Findeisen 2023:7). Instead, InvestEU seems to have been more effective to stimulate low-risk than high-risk investments, including retrofitting buildings for energy efficiency, as well as projects with sufficient short-to-medium term cashflows (ibid:7). However, the ECA reports that the InvestEU lacks transparency, partly due to protecting clients’ commercial confidentiality, which makes it difficult to assess its climate impact (ibid:8). In summary, “EFSI highlighted the difficulties of unlocking transformative investments with indirect financial instruments” (ibid:7), while InvestEU’s high leverage “prevents it from taking the risks necessary to provide truly additional green investment” (ibid:2).

Critique has also been voiced against the NZIA, which does not provide additional money from the EU level. Propositions have instead been made to reshuffle money from the Modernization Fund or the Cohesion Funds (Jansen et al. 2023:8). The same goes for the EU Sovereignty Fund/STEP, that is financed through other EU programs and MS contributions (Veugelers et al. 2024:11). The few EU resources dedicated to the Chips Act are also reshuffled from existing funds (see Table 2), and chip strategies are de facto mainly carried out by member states rather than by the EU, including through IPCEI programs. It can be mentioned that the three largest chip manufacturers (TSMC, Samsung and Intel) have collective capital expenditures corresponding to \$90-100 billion per year. The relatively small EU and MS funding through the Chips Act will not be near enough to increase the EU's global chip market share significantly (Yeung 2022). If the EU's share of global chip manufacturing is to increase to 20 percent until 2030, European chip production must quadruple, which is very unlikely to happen (Interview, March 12).

Moreover, the multitude of financing initiatives are often not coordinated and sometimes conflicting, which undermines Europe’s ability to capitalize on synergies and economies of integrated IP scale. Consequently, they might reinforce Europe’s uneven development and fragment the common market further. While the NZIA does little to address Europe’s fragmented IP (Veugelers et al. 2024:13),⁵ by comparison, IPCEIs “offer a good framework for pulling national and European resources together so as to avoid distortion in the single market” according to one study (Strategic Perspectives 2024:8).⁶ The merging of some programs and mechanisms would partly address this lack of coordination (Jansen et al. 2023:23, Strategic Perspectives 2024:40).

Some of the programs and financing mechanisms in *Table 2* are critically discussed in the remainder of the paper.

⁵ As to counter fragmentation, MS could be required to allocate a portion of their state aid toward pan-European IP funds (Letta 2024:26-27).

⁶ Ongoing studies are currently assessing to what extent IPCEIs actually succeed in countering fragmentation.

Table 2: 16 important European programs or financing mechanisms

Investment initiative / Program	Time frame	Budget, € billion	Explicit estimated private sector additionality?	Source of funding and instruments	Objective
_NextGeneration EU (NGEU)	2021-2026	750	No	Grants and loans financed through common debt (EU bonds)	Support the EU's COVID-19 recovery; green transition; economic resilience
Recovery and Resilience Fund (RRF)	2021-2026	724	No	The RRF is the operational arm of the NGEU	Digitalization, green transition, energy infrastructure
REPowerEU	2022-2026	300	No	Mainly RRF	Reduce Europe's energy dependence on Russia
Horizon Europe	2021-2027	96	No	Grants mainly (EU budget)	Research and Innovation
The European Regional Development Fund	2021-2028	226	No	Grants (EU budget)	Ameliorate regional imbalances
The Cohesion Fund	2021-2029	48	No	Grants (EU budget)	Ameliorate regional imbalances
European Structural and Investment Funds (ESIF)	2014-2020	535	Yes € 731 billion (including from the EU budget). Multiplier: 1.37	Various	Execute European economic, innovation, agricultural and cohesion policy
Strategic Technologies for Europe Platform (STEP)	2021-	15	Yes € 160 billion. Multiplier: around 10	Reshuffling of existing funds	Support technological upgrading (incl. digitalization, decarbonization and biotech)
European Fund for Strategic Investments (EFSI)	2015-2020	33,5	Yes € 500 billion. Multiplier: around 15	Guarantees, Loans, Equity, Venture Debt (EU budget, EIB, EIF)	Revive European investments to boost growth and competitiveness
InvestEU	2021-2027	26	Yes € 372 billion. Multipliers: from 11 to 14,3	Similar to EFSI	Similar to EFSI
Net-Zero Industry Act (NZIA)	2023-2030	16-18	Yes € 92 billion. Multiplier: around 5.4	Proposed member state spending	"strengthen the European manufacturing capacity of net-zero technologies"
Social Climate Fund	2026-2032	NA	Yes "at least € 86.7 billion"	Various	Support households and firms impacted by climate policies
Innovation Fund	2021-2027	NA	Yes € 40 billion	Monetization of 530 million ETS allowances, using a carbon price of €75/tCO ₂ .	Finance "innovative low-carbon technologies"
The EU Chips Act	2023-2030	NA	Yes € 43 billion (public and private investment)	Mostly private and MS funding; reshuffling of EU resources (e.g. Horizon, RRF)	Support Europe's semiconductor manufacturing
Important Projects of Common European Interest (IPCEI)	2018-	NA	Yes € 34,8 billion in public investments; € 56,8 billion in private investments	Various	"strengthen open strategic autonomy, by enabling breakthrough innovation and infrastructure projects"
Just Transition Fund	2021-2027	17,5	Yes € 30 billion	Various	Ameliorate regional imbalances

Note: The green area indicates programs where no explicit additionality figures are stated (no or weak derisking). The blue area indicates programs with explicit derisking estimations/targets (strong derisking). The grey area indicates that financial resources of the RRF and REPowerEU stem from the NGEU.

Sources: own elaboration, based on Demertzis et al. 2024 (mainly); Heimberger & Lichtenberger 2023b:211-212, Seidl & Schmitz 2023:16, Demertzis et al. 2024, the European Commission.

4. The Big Green State

Research on the actual private/public ratio of green investments is inconclusive. Some estimate public money to finance 17 percent of green investments, while other studies show that the number surpasses 50 percent, i.e. are larger than private investments (Heimberger & Lichtenberger 2023a:11). While European policymakers reiterate that the majority of climate finance should come from the private sector, one think tank contrarily propagates that the public sector should fund 70 percent of the European green investment gap to reach net zero by 2050 (Institut Rousseau 2024:172).

Proponents of the BGS argue that non-market mechanisms are needed to make large-scale investment for the green transition possible, as green investments are “widely considered a relatively risky, volatile, and often not profitable asset class” (Babic 2024:3; see also Tagliapietra et al. 2023:52-53). Despite the price-drop of solar and wind manufacturing, private investments into these mature green technologies are lacking – the European wind sector “has a cumulative annual shortfall of approximately €74 billion” (Strategic Perspectives 2024:38). Therefore, fossil fuel-fired power plants still generated 61 percent of global electricity in 2022, compared to 64 percent in 1985 (Christophers 2024:6). Borrowing from Karl Polanyi, Christophers (2024) likens electricity generation to a “fictitious” commodity, that is fundamentally unsuited to be commodified and traded (Ramesh 2024). Especially large-scale loans to mature technologies with limited technological uncertainty, such as wind and solar, are well-suited to be conducted by public institutions (Interview March 5, 2024). Moreover, much infrastructure is publicly owned, so private finance cannot be crowded in towards these ends anyway (Mack & Findeisen 2023:6).

The feasibility of large-scale public financing for societal challenges is enhanced from a historical perspective, as the 2-3 percent green investment gap to GDP can be perceived as a fairly small number for an advanced continent (Interview, February 22). The costs of wars and economic crises often surpass these numbers by far. In major post-World War II systemic banking crises, the “cumulative increase in public debt in the three years following a banking crisis” averaged 86,3 percent (Reinhart & Rogoff 2009:471).

Leaving politics aside, BGS proponents argue that significant enlargement of public sector lending and equity investment is needed to finance the green transition, move away from the “largely ineffective” derisking of the private sector (Golka et al. 2023:5), maximize policy steer, as well as to enhance transparency and democratic legitimacy (UNCTAD 2019). “The core idea here is to empower the state – discursively and institutionally – to take a central role in steering and financing sustainable investments” (Golka et al. 2023:12). Some core components of such a state-led program are presented below, including large scale issuance of EU bonds; a permanent investment fund; a progressive Europe-wide tax regime; a network of expanded supranational and public development banks; and reformist, developmentalist and credit allocating central banking that allocates credit, supports the EU’s economic and industrial policies, and thus moves beyond the currently dominant goal of price stability.

4.1. EU bonds and the RRF

It is widely believed that the Stability and Growth Pact (SGP) both failed to limit European public debt (Blanchard et al. 2021) while also hurting the EU’s growth performance in the years after the GFC (Constâncio 2020). While public underinvestment was chronic already before the GFC, public net investment has turned negative or close to zero in many MSs in the 2010s (Zylberberg 2023:115). The need to reform the EU’s budgetary framework has even been emphasized in IMF studies (Arnold et al. 2018, 2022). By the mid-2010s, flexibility clauses were introduced in the SGP rules to enable more public investments. However, since the clauses were complex and only

allowed for moderate increases of investments, only two countries, Finland and Italy, have used them so far (Pekanov & Schratzenstaller 2023:13-14).

As the centrepiece of the NextGenerationEU programme (2021-2026), the RRF was launched to alleviate the economic hardships during the COVID-19 pandemic. Authorizing the EC to borrow up to €672.5 billion (Hodson & Howarth 2023), the RRF has raised €723.8 billion through EU bonds issued by the EC as well as from the EU budget, of which around half (€338 billion) will be dispersed to MSs in grants and the other rough half (€385.8 billion) in repayable loans. MS receive grants or loans based on their National Recovery and Resilience Plans (NRRPs) that are evaluated by the EC and approved by the Council. Grants are distributed based on criteria including the magnitude of the economic downturn during the COVID-19 pandemic, average unemployment, GDP per capita and need for structural reforms. The total size of grants thereby ranges between from 9 percent of GDP for the EU's poorest member states to less than 1 percent of GDP for its richest member states.⁷ However, richer economies are set to benefit from demand increases fostered by the grants extended to poor MS (Heimberger & Lichtenberger 2023a:12). At least 37 percent of disbursed amounts should be dedicated to climate investments and at least 20 percent should be spent on digitalization.

Scholars have referred to the RRF as an innovative European investment model (Heimberger & Lichtenberger 2023a:13); a landmark agreement (Mazzucato et al. 2023:9) as well as an ambitious "institutional innovation"⁸ (ibid:32). According to Schmidt (2023:40), "The European Semester is now a much more bottom-up exercise emphasizing member-state buy-in through greater "national ownership" of the plans, at the same time that the Commission still exercises oversight via conditionality – such as determining whether certain pre-agreed "milestones" in terms of economic reform are met before disbursing the next tranche of funding". According to one commentator, "For all the instances of alleged waste and fraud, the recovery fund has worked as intended. The bigger recipients of the funds have seen the higher growth rates, which have restarted – at least for now – the economic convergence both the single market and the single currency promised. Sustaining this is a prerequisite for Europe as a whole to strengthen its performance as both a political and economic actor" (FT 2024b).

Moreover, EU bonds issued under the RRF represent a paradigm shift in European fiscal policy. EU debt increased 10-fold from €50 billion in 2020 to €500 billion in 2024, is projected to reach €900 billion by 2026 and will by then only trail four sovereign EU bond markets of (France, Italy, Germany and Spain) in terms of volume (FT 2023a). Unlike conventional government debt, EU bonds are not passed on to domestic public debt ratios, which alleviates fiscal constraints at the same time as necessary structural investments are carried out (Heimberger & Lichtenberger 2023a:21).

Despite being a crucial step forward, the RRF's temporary nature has decreased the effectiveness of some of its resources to be distributed to growth-enhancing ends (FT 2024a). The small scale of borrowing compared to national governments have also increased its costs of debt (Heimberger & Lichtenberger 2023a:21). Despite being triple-A rated, benchmark 10-year EU bonds trade at 3,6 percent, compared to 2,8 percent and 3,4 percent for its German and French counterparts. Liquidity is suffering as EU managers have told markets to decrease issuance as the NGEU terminates at the end of 2027 (FT 2023a). Arguments for making EU bonds a permanent instrument on Europe's fiscal template, other than to increase the attractiveness of EU bonds and make the instrument widely accepted among institutional investors, are plentiful (Demertzis et al.

⁷ Based on six pillars: "green transition; digital transformation; economic cohesion, productivity and competitiveness; social and territorial cohesion; health, economic, social and institutional resilience; and policies for the next generation" (Serger et al. 2023:8).

⁸ According to Schmidt (2023:40), "On the whole, NRRPs have worked effectively, although they have worked best in those countries that have taken ownership of the process, for the most part countries that were beneficiaries of RRF grants". For a comparison of how NRRPs have been implemented in Austria, Sweden and Finland, see Serger et al. (2023).

2024:21). Firstly, there is a lack of MS fiscal space given the (reformed) SGP. Secondly, there is a risk of increased regional imbalances of a financing strategy for the twin transition solely based on MS spending. Thirdly, EU bonds could provide a safe asset that enhances stability and liquidity on a unified EU capital market. In the words of Schmidt (2023:39), “Think of a permanent EU level debt facility as an EU wealth fund, akin to national sovereign wealth funds, which issues debt on the global markets to use to invest through grants to the member states in education, training, and income support; in greening the economy and digitally connecting society; as well as in big physical infrastructure projects”.

4.2. A Permanent EU Investment Fund

Many current instruments, including the RRF and InvestEU, have limited timespans and expire during the 2020s. This finite approach is not conducive to long-term goals of the twin transformation, including the long-term planning required for both the private and public sectors. Long-term financing mechanisms are hence essential (Demertzis et al. 2024:27). A legally simple option to permanently summon public investment would be through the establishment of a permanent European investment fund, such as a "Sovereignty Fund" mentioned in Ursula von der Leyen’s State of the Union Address in September 2022. The political feasibility of such a fund would be enhanced if it was to target European public goods⁹.

Like the RRF, the fund’s governance could be shared between the EC and MSs, consisting of climate plans submitted by MS as a prerequisite for cheap funding (Demertzis et al. 2024:39). The fund would thereby include incentives for MS to conduct climate investments, especially for those with high interest burdens, while it would avoid increasing the complexity of EU fiscal rules (Pekanov & Schratzenstaller 2023:20-21). Similarly to the RRF, per capita allocation of the fund’s resources could be based on the need for reaching specified performance targets, such as emission reductions plans. This would render higher per capita investments for Eastern Europe, followed by Southern and then Northern Europe (Heimberger & Lichtenberger 2023b:207). In this fashion, an “EU Climate and Energy Security Fund providing €500bn by 2030 would be an effective and efficient option for addressing these climate and energy-related public investment needs”, according to an ECB report (Heimberger & Lichtenberger 2023b:207).

A permanent EU fund could be set up in multiple ways (Schmidt 2023:39-40), including having one component for long-term structural investments, and one "rainy day fund" that would be used for counter-cyclical investments in economic downturns. Pointing to an IMF study, Heimberger and Lichtenberger (2023a:19) reiterate a hypothetical example where MSs would dedicate 0,35 percent of GDP to a rainy-day fund in good times, that would later be used in economic downturns (Heimberger & Lichtenberger 2023b:210). The fund would contribute to net investment regardless of business cycles or MS’ fiscal situations. As future generations would benefit from these investments, having them participating in the financing through long-term EC-issued debt instruments (Aghion et al. 2023:39) would be another option¹⁰. The fund could also be financed through taxation, issue its own bonds (receive “autonomous borrowing powers”) and could be augmented through additional voluntary contributions from MS (Griffith-Jones & Carreras 2021:28). All in all, “The introduction of a common European debt agency could circumvent the debt difficulties of individual countries, provide more funding space with lower funding costs, help stabilise government bond markets, and offer advantages in the issuance of highly demanded safe assets that are considered particularly safe and liquid” (Heimberger 2023b:208). The EIB,

⁹ Such as investments in cross-border energy-and transportation systems, pan-European purchases of critical raw materials, a continental platform for labour market exchanges and skills acquisition, etc (Buti 2023).

¹⁰ This would not have any adverse effect on MS’ fiscal budgets.

with its experience and technical expertise, is a suitable candidate to manage such a fund (Griffith-Jones & Carreras 2021:28, Demertzis et al. 2024:30).

4.3. Central banking – from a risk-based approach to a reformist, developmentalist and credit allocating approach

“[V]irtually all central banks have [at some point] engaged in ‘industrial policy’ or ‘selective targeting’.” This was still widespread practice until the central banking revolution of the 1980s. Even today, despite their rhetoric to the contrary, many central banks, including many across the OECD, are effectively directing lending and investment.” Epstein, cited by Volz (2017:13)

“Historically, central banks coordinated with ministries of finance and other government agencies to proactively steer credit and support major structural change of the type required by the climate crisis, complementing active fiscal and industrial policy regimes... Such coordination is absent today” (Kedward et al. 2022a:2).

Central bank policies have a large impact on financial markets. In the post-war period, politically accountable central banks were tasked to pursue policies to stimulate full employment and welfare state expansion. Since the 1980s and especially 1990s, many central banks have become politically independent and are tasked to prioritize price stability ahead of full employment. However, since the GFC and further during the Covid pandemic, central banks have become increasingly “unorthodox/heterodox” in Western economies. In addition to price stability, they increasingly consider growth, employment, financial stability, exchange rates, while there are recent calls for central bankers to also combat climate change (Dikau & Volz 2021, Nölke 2022:53). The prevailing so-called “risk-based” approach in central banking implies however that central banks mainly enhance price discovery, correct price signals, combat inflation and counter financial instability, rather than steer credit flows to politically prioritized sectors (Kedward et al. 2022a, 2022b, Almeida et al. 2024).

In contrast, the BGS involves “comprehensive state-led planning across most sectors, by directly mandating investment and, crucially, divestment” (Gabor & Braun 2023:2, see also Ergen & Schmitz 2023). Meanwhile, historical and contemporary country cases demonstrate a plethora of policy instruments that central banks (can) have at their disposal to steer financial flows (Dikau & Ryan-Collins 2017, Nölke 2022:51-58, Kedward et al. 2022a, Schoenmaker & Volz 2022:116-118, 129-132). Central banks can indirectly steer credit through e.g. subsidized loan rates for priority sectors, differential rediscount rates, direct budgetary subsidies, credit floors, credit ceilings and the establishment of specialized financial institutions (Volz 2017:14-15).

Of these, firstly, subsidized interest rates for priority sectors have been the most common measure in recent years, meaning that central banks provide commercial banks with cheaper discount rates if they lend to prioritized sectors, such as green sectors. Similarly, directly subsidized lending measures, sometimes under the name of “targeted refinancing lines” that direct lending to the “real economy” have been practiced by both the ECB since June of 2014 (TLTRO) and the Federal Reserve during the Covid-crisis (Nölke 2022:55-56; for a critical overview and policy recommendations for the greening of TLTROs, see van't Klooster & van Tilburg 2020). Refinancing operations could thus be greened so that central banks provide cheaper loans to banks with a relatively green loan portfolio (Dafermos & Nikolaidi 2023:161).

Secondly, the ECB can manipulate the costs of green and brown assets through collateral frameworks, where private institutions are requested to use green assets as collateral when obtaining central bank credit. Assets included in such collateral frameworks are usually in high demand from banks and other financial investors, which in turn reduces interest rates and costs of borrowing for their issuers. The lower haircuts banks receive, the lower interest rates and the

higher demand for these assets will be. By increasing haircuts and excluding some especially dirty assets from collateral frameworks, respectively, while promoting green non-financial and public assets in collateral frameworks, including government issued green bonds, central banks can contribute to the greening of bond markets and simultaneously support green investment (Dafermos et al. 2022, Dafermos & Nikolaidi 2023:159, Jäger & Dziwok 2024:106).

Thirdly, through public green and brown asset taxonomies¹¹ and differentiated reserve requirements and capital requirements, regulators can make it increasingly costly for financial institutions to hold fossil assets and other “dirty” assets, while making it cheaper to hold green assets and lend to green sectors (Volz 2017:15, Dikau & Ryan-Collins 2017, Kedward et al 2022a). Capital requirements can likewise be greened, where green loans require less capital and reserve requirements, and loans to the fossil sector require penalizing capital requirements, making such loans less profitable (Kedward et al. 2022b:5, Dafermos et al. 2022) The ECB initiated some of the aforementioned measures until 2022, but later reversed course for a number of reasons, including issues of inflation, financial stability and conservative sentiments (Dafermos et al. 2023).

Fourthly, asset purchase programs can be greened, meaning that central banks could increase purchases of green non-financial assets and exclude dirty assets from their portfolios (Dafermos & Nikolaidi 2023:160-161). By contrast, the ECB’s policy of “market neutrality” such as in the Corporate Securities Purchase Programme tends to benefit carbon-intensive and fossil-extracting firms which are overrepresented on capital markets¹² (van ‘t Klooster & De Boer 2023:737). For an overview of central bank asset ownership over time, see *Figures 1* and *2*.

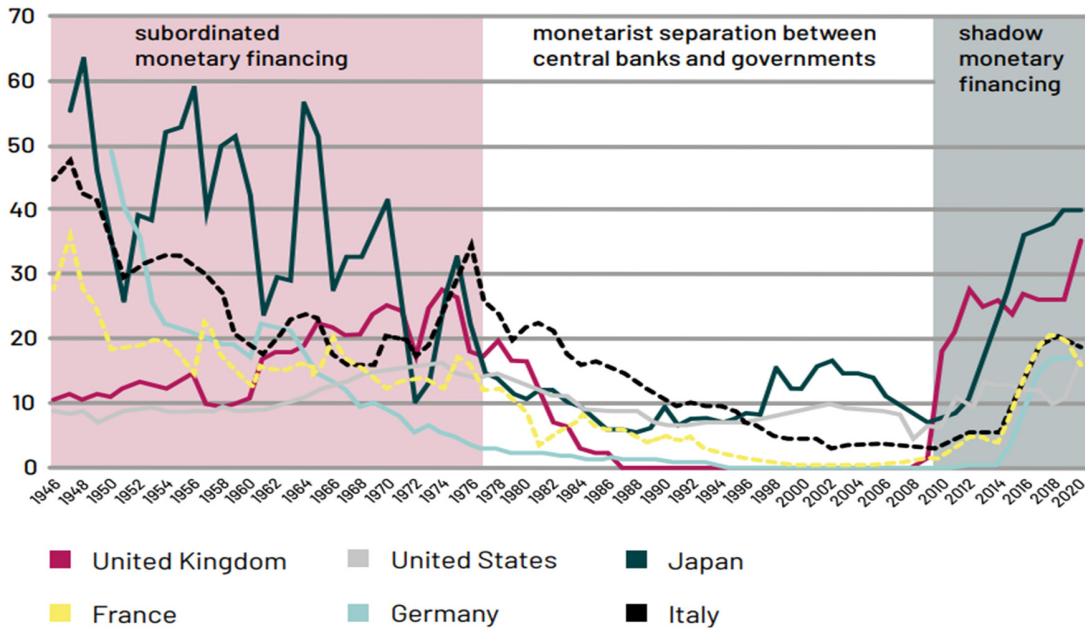
However, it remains unclear to what extent the aforementioned central bank policies are able to reallocate capital to productive and green ends. According to one central bank economist, “generally speaking, again, what we are doing is not really that important. For example, if you compare the amount of money we can really indeed incentivize, that amounts to some tens of billions, while the NGEU, for example, alone was some 700 billion, of which 40 percent was dedicated to green issues (Interview March 5, 2024. See also Aghion et al. 2022:8-9). Some scholars have therefore proposed stronger “command and control policies” (Jäger & Dziwok 2024:9) and to apply more direct ways to steer financial flows under the banner of “credit allocation policies”, which were extensively used in many post-war Western economies (cf. Skyrman 2024b:140-141). These take the form of credit ceilings, or limitations, to sectors deemed climate-unfriendly, and credit floors that makes it compulsory for credit institutions to lend a minimum to prioritized projects and green ends. Examples can be found in Bangladesh, whose central bank’s green floor obliges banks to allocate a minimum of 5 percent of credit to green ends, as well as the Reserve Bank of India, that forces banks to allocate 40 percent of lending to “priority sectors”¹³ (De Baer et al. 2021:5).

¹¹ Classification schemes have failed to steer institutional capital away from brown sectors. Kedward et al. (2022a) describe how the most prominent risk disclosure taxonomies and ESG ratings “have been developed almost exclusively by coalitions of multinational firms acting through non-profit entities”. Public sector entities, be it central banks, supervisory authorities or other regulators have rarely been formally involved in the construction of these initiatives, as “the private sector actors behind these initiatives arguably have attained ‘de facto’ regulatory power in defining new standards for what is deemed ‘green investment-worthy’, which have lead one Bundesbank board member to call for in-house versions of public sector taxonomies (Kedward et al. 2022a:14).

¹² “ By driving up the price of financial assets and real estate, Europe’s asset owners have been amongst the biggest beneficiaries of these programmes” (van ‘t Klooster & De Boer 2023:736; see also Dossche et al., 2021).

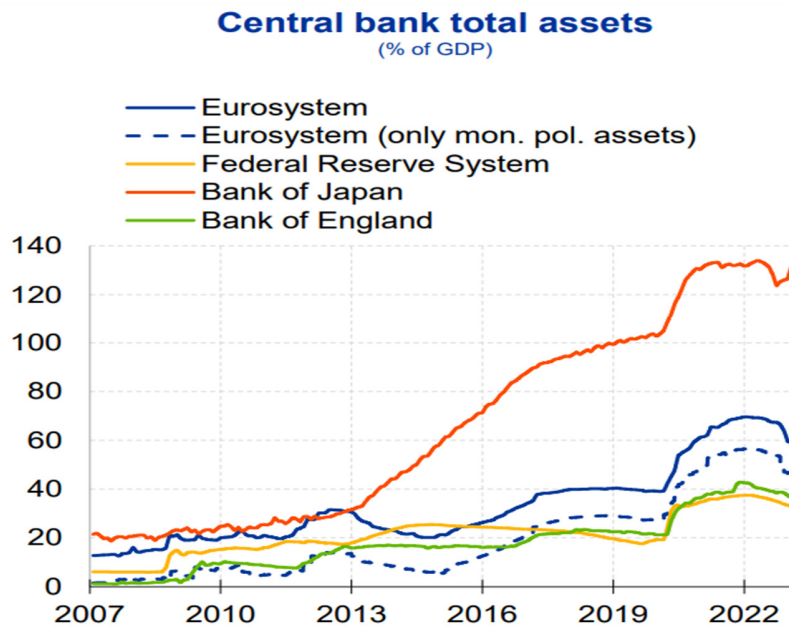
¹³ For more details on credit allocating approaches, see Kedward et al. (2022a:20-22, 2022b, 2024:15-20). For concrete examples in Bangladesh, Malaysia, Indonesia, South Korea, Brazil and China, see Dikau and Collins (2017) and Almeida et al. (2024:113). For a critical discussion on the risk-based approach, see Dafermos and Nikolaidi (2023:164-165).

Figure 1: Public debt held by central banks as percentage of total central bank debt (1946-2020)



Source: Gabor (2021b).

Figure 2: Total assets held by central banks



Source: Schnabel (2023).

To what extent are central banks and not least the ECB legally entitled to steer financial flows towards the green transition? Whereas the ECB's primary mandate is the pursuit of price stability, its secondary mandate requires it to “support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on the European Union”, one of the two treaties forming the EU's constitutional basis (van 't Klooster & De Boer 2023:730). Following a strict adherence to monetarist thought, ECB staff chose to ignore the ECB's second mandate during the 2000s to almost exclusively focus on price stability. This changed in practice in the years after the GFC amid quantitative easing, although often in the guise of stabilizing financial markets and interest yields. In the 2020s, on some occasions, the ECB explicitly pointed to its secondary mandate to bring about measures to “decarbonize European capital markets” (ECB 2022). To undergird how the ECB could support the EU's general economic policies, a trilogue could be established with the European Parliament and European Council. The trilogue should discuss EC policies that support the EU's IP, on the basis of an enhanced understanding of the democratic legitimacy and mandate of the EU institutions. Questions to be coordinated could include “the permissibility of buying government bonds, the way in which the ECB should take into account the economic effects of asset purchases, as well as how the ECB should incorporate environmental concerns into its monetary policy decisions” (van 't Klooster & De Boer 2023:742).

4.4. The Big Green State and development banks

“If central banks are the command centre of a country's banking system, then national public banks are the engine room – intimately involved in the heavy lifting.” (UNCTAD 2019:156)

Rather than to execute mainstream or progressive derisking, DBs can be used as main investment vehicles for the green transition. In the early 2020s, the 25 largest development finance institutions, seven of which are European, had nine trillion dollars in assets, or 78 percent of all development finance assets (Gallagher and Kozul-Wright 2021:110), while state-owned development banks and development finance institutions held 20.2 trillion dollars in assets in 2023. Five countries, the US, China, France, Germany, and Japan, controlled over 70 percent of these assets (Mazzucato & Macfarlane 2023:3). New development banks are likewise emerging. For example, a new US federal green bank with an initial public capitalization of \$20 billion, is currently in the making. Due to their already important footprint and large size, multilateral development banks account for over one third of climate finance to developing countries (UN DESA 2022:88), and 10 percent of global investments annually (UN DESA 2022:20).¹⁴ As of 2020, the EIB funded 40 percent of offshore wind capacity in Europe (Griffith-Jones & Naqvi 2020:13). Another example of a development bank with a good track-record is the Brazilian BNDES. Since its creation in 1952, BNDES has funded infrastructure, agricultural development, and later provided venture capital to Brazil's pharmaceutical sector since the 1990s. During the 21st century, BNDES has financed innovation and strategic sectors set out by Brazilian governments, “including IT, pharmaceuticals and health, oil and gas, defence, aerospace, and renewables”, as well as financed more than 90 percent of Brazil's wind power capacity (Mazzucato & Macfarlane 2023:15). Beyond developed economies, new development banks should be established as over one third of the world's 46 Least Developed Countries lack a national development bank (OECD 2020).

¹⁴ It should be added that the efficiency of supranational development banks is enhanced when working closely with domestic development banks and public sector institutions with better knowledge of local economic circumstances and networks, including through co-investing or co-lending (Mertens & Thiemann 2022:87, Griffith-Jones et al. 2022:213).

Proponents of the BGS argue that the quantity of lending and financing should significantly increase to meet Europe's stated climate ambitions (Gabor 2021a:435-436). Several alternatives exist for funding development banks, including granting them "autonomous borrowing powers", i.e. letting them issue their own bonds and equity on capital markets, taking savings and deposits from savers, receiving central bank financing or manage public pension or social security funds (Mazzucato & Macfarlane 2023:20). Further public resources could be allocated to development banks for credit creation. This might include sovereign wealth fund (SWFs) assets that were conservatively estimated to amount to \$8,6 trillion in 2020, while public multilateral institutions, public pension funds, SWFs and central bank assets amount to some 93 percent of global GDP (Steinfort & Kishimoto 2019). Multilateral development banks could thereto be leveraged by accepting new member states, while receiving increased refinancing from existing member states (UN DESA 2022:89). Central bank seigniorage profits, development bank profits and Special Drawing Rights (SDRs) have also been promoted as means to finance development banks (Cashman et al. 2022, UN DESA 2022:78, 83-84, UNCTAD 2022:175). MS' paid-in capital to the EIB could increase – preferably double, as was done in 2012 (Griffith-Jones & Carreras 2021:26-27). National DBs should also be leveraged through several of the aforementioned options (Griffith-Jones et al. 2022:220-221). However, the unwillingness of MS and the EC to commit further resources to the EIB will likely force it to stick to derisking programs in the foreseeable future. This remains an issue to be resolved (Griffith-Jones & Naqvi 2020:22).

Lastly, central banks and DBs are not the only financial institutions that could be used and managed by states. Banking sectors have been publicly controlled to varying extent. Significant state control of the financial system, along with coordination between government institutions (MoF, central banks, SOEs, development banks) to manage IP, are key to BGS proponents. Even American policymakers have "found it desirable to have active state provision of credit: the Small Business Administration plays a major role in the provision of small business loans, the Export-Import Bank is a major provider of lending support, especially for exporters like Boeing, and, in recent years, more than 90 percent of all mortgages have been underwritten by the federal government" (Noman & Stiglitz 2015: 13-14). More than 40 percent of banking assets are currently state-owned in Germany, compared to 65 percent in India, 60 percent in China, while less than 10 percent in the UK, France, Spain, Italy, Japan and the US. (DiPippo et al. 2022:15). In the postwar period, many states required state pension funds, other SWFs and also private financial institutions to hold large parts of their assets in prioritized sectors, such as government bonds or assets related to housing construction or mortgages (cf. S kyrman 2023:7).

4.5. EU-wide taxation

Tax revenue to GDP has decreased during the last decades, while the burden of taxation has been increasingly transferred from capital to labour (Guzzardi et al. 2023:173). Given competition for capital and investments under a regime of free capital movements, governments have successively decreased taxes on profits, capital income, real estate, wealth, gifts, inheritance and other forms of capital (cf. Kalecki 1943, Neilson & Stubbs 2016, Neilson 2020). This is not only ideologically questionable, including from liberal perspectives (in particular Georgism); it has also undermined fiscal space that could have been used for necessary investments.

One argument against such taxation is that many forms of capital are mobile and thus subject to tax evasion – the higher capital taxation, the higher the incentives for capital holders to evade one jurisdiction for another. While EU-wide capital taxes (Antón 2023) would not eliminate such problems, it would make tax evasion and avoidance less worthwhile by partly pooling enforcement agency resources. EU-wide capital taxes would thereto reduce economic inequality, increase tax system fairness, likely enhance European cross-border investments, reduce negative-sum tax competition between MS, increase efficiency and simplicity and reduce administrative burdens

for firms, and, above all, significantly improve Europe’s fiscal space (Diamond & Saez 2011, Mazzucato 2023:10-11, Mazzucato & Macfarlane 2023:23-23). More specifically, Guzzardi et al. (2023:182-184) provide details for the size and makeup of EU-wide wealth, capital gains and corporate tax rates. In addition, the EC’s previous ambition to introduce a common Financial Transaction Tax (FTT) should re-enter the agenda (European Commission 2013a, 2013b, Kalaitzake 2017, Kastner 2018). With Brexit, the most influential actor opposing such as tax, the UK, is no longer an MS. An FTT proposal by the EC in 2013 was estimated to generate revenues corresponding to 0,4 percent to 0,5 percent of the GDP of participating MS (European Commission 2013c).

Aside from capital taxes,¹⁵ “only 11 EU member states have some form of carbon tax, and those that do tax carbon below the levels recommended by economists” (Aghion et al 2022:3). Against this backdrop, some scholars propose a transnational carbon taxation system instead of a globally regressive EU carbon border scheme (Gallagher & Kozul-Wright 2021), both as a means to generate taxation revenues, but crucially to stimulate green investments at the expense of brown investments (Aghion et al. 2022:26-27). A European broad-based carbon tax¹⁶, based on the "social cost of carbon", would generate between 0.5 percent to 5 percent of GDP in tax revenue annually (Breckenfelder et al. 2023:25).

Table 3 gives an overview of some of these taxes and their estimated revenues. Several other EU-wide taxes have been proposed, and the EuroMemo Group (2024:15) calls for “an enlarged EU budget corresponding to 5 percent of GNI, financed by new fiscal resources, including taxation of the super-wealthy and of the windfall profits of corporations which had benefited from the crisis, such as energy companies and banks”. For a discussion of a European re-insurance system as a de facto alternative to a fiscal union, see Schelkle (2023).

Table 3: Yearly tax revenues of proposed EU taxes

	Tax revenues, % of EU GDP
EU wealth tax	1%
EU FTT	0.5%
EU capital gains tax	0.4%
EU corporate tax (25%)	1.5%
Total capital taxes	3.4%
EU carbon tax	0.5-5%
Total	3.9-8.4%

Sources: European Commission (2013c), Guzzardi et al. (2023:182-184), Breckenfelder et al. (2023:25).

¹⁵ Other studies have estimated revenues from an EU-wide wealth tax to correspond to between 1,5 percent to 11 percent of GDP (Kapeller et al. 2021, 2023, Heimberger & Lichtenberger 2023b:207).

¹⁶ “Carbon taxes are indeed typically regressive, hitting more the poorest income classes, possibly triggering social protests as in the case of French *Gillets Jaunes*” (Guzzardi et al. 2023:183).

5. Progressive derisking – improved state presence under Europe’s neoliberal fiscal rules

This section discusses mission-oriented development approaches, public sector market shaping, progressive conditionalities and development banking, all of which constitute key progressive derisking instruments under a model of “coordinated capitalism” based on the work of Mariana Mazzucato and other non-radical progressive scholars.

5.1. The mission-based economy and a new state-capital contract

Although states often initiate several climate related financial initiatives and programs, these are often poorly coordinated. Political uncertainty and the lack of holistic approaches are frequently perceived as obstacles to steering public financial resources to green ends and limit state capacities for intervention and control (in particular for local governments). One reason for this is linked to the neoliberal “common sense” (in the meaning of Antonio Gramsci) that the public sector, as a poor resource allocator due to information problems and susceptibility to political capture (Juhász et al. 2023), should play only a secondary, complementary role to the private sector in the green transition. Another reason relates to the lack of public sector resources, fiscal and administrative capacities as an impediment to efficient planning and management, as well as diffusion of state investments and subsidies throughout the European economies (Berry 2022, Kuylenstierna et al. 2022, Bremer et al. 2023, Ducastel et al. 2023). Coordination of investment programmes is also fragmented on the European supranational level (Mazzucato et al. 2023:8), and especially in the EU peripheries, including in Eastern Europe (Medve-Bálint & Šćepanović 2020, Mertens & Thiemann 2022:89).

Against this backdrop, PDR proponents highlight that markets are co-created by private and public sector actors rather than being ahistorical, technical institutions detached from the political sphere. By acting as investors of first resort, co-creating and shaping markets, and financing general-purpose technologies such as the internet, nanotechnology, biotechnology and emerging clean-tech sectors, states have remained core (albeit latent) contributors to radical innovation in the neoliberal era (Cypher 1987, Block & Keller 2009, Mazzucato & Semieniuk 2018, Demertzis et al. 2024:28). According to one op-ed, “if you want to know what’s worth investing in, look at what US federal research funding organisations ... [e.g. NIH, DARPA] are investing in today, and then go long 30 years. In the 1950s, the big thing was transistors, which gave us the microelectronics revolution in the 1980s. In the 1960s, it was digital processing, which gave us personal computers in the 1990s. In the 1970s it was biotech, which started to come on line in the 2000s. And in the 1980s, it was the beginnings of machine learning and big data” (FT 2017).

Thus, rather than to merely “de-risk private risk-takers” (Mazzucato 2021:123), the public sector should be more engaged in innovation-specific risk-taking. As innovation is an uncertain collective process that requires collaboration, learning from trial and error, as well as allowing for failure (Mazzucato 2021:206), “a 'mission-oriented' approach – partnerships between the public and private sectors aimed at solving key societal problems – is desperately needed” (Mazzucato 2021:6). By prioritizing ends over means, Mazzucato advocates for governments, business and civil society to define major societal challenges and setting ambitious missions to address them. According to Mazzucato (2021:206) “We know from the past that public and private actors can come together to do extraordinary things... To do this successfully, governments need to invest in their internal capabilities – building the competence and confidence to think boldly, partner with business and civil society, catalyse new forms of collaboration across sectors, and deploy instruments that reward actors willing to engage with the difficulties”. She points to the Apollo spacecraft programme as an example of what a new state-business “partnership with a common

purpose” can accomplish (Mazzucato 2021:93). Yet, while emphasizing governments, the role and potential of the private sector is also acknowledged – “The Apollo spacecraft programme was the outcome not only of public investment but also a lot of commercially minded private investments” (Mazzucato 2021:96).

Mazzucato’s emphasis on a virtuous state-capital interplay is echoed by prominent IP scholars such as Rodrik (2014, 2023:46-48), who similarly describes IP as a mode of cooperation between government bureaucrats and firms, rather than top-down state command-and-control processes. Similarly, “industrial policy should be about institutionalised collaboration and dialogue between governments, the private sector and civil society” according to Tagliapietra et al. (2023:53; see also Veugelers et al. 2024:16).

5.2. Progressive conditionalities

Similarly to mainstream derisking, PDR proponents argue that risks should be shared between public and private actors, while “relationships between public and private sectors, and between them and civil society” should be institutionalized, “so they all work symbiotically for a common goal” (Mazzucato 2021:205). A key difference with mainstream derisking, however, is that the public sector should not subsidize the private sector without performance related progressive conditionalities. Conditionalities come in the form of “rules, governance structures, benchmarks and ownership agreements that align the preferences of state and corporate actors thereby limiting the scope for rent-seeking behavior and strategic failures” (Bulfone 2023:35), and can be used to steer private investments, co-create markets and foster innovation. Where it is impossible to impose conditionalities, direct financing from development banks might be more suitable (Griffith-Jones & Naqvi 2020:22). Four important areas are covered by progressive conditionalities: companies can be required to reinvest profits¹⁷ into R&D, worker training or other productive activities; profits can be shared with the government via royalties or partial government equity ownership; directionality, meaning that only societally desirable goals are subsidized; access, i.e. that government will have access to intellectual property rights it helps to co-finance (Mazzucato & Macfarlane 2023:18; for more progressive conditionalities, see also Mazzucato & Rodrik 2023:8-9). Moreover, current EU programs, the ECB’s asset purchase programs as well as the RRF lack many conditionalities integrated to the US IRA and CHIPS act (Cohen et al., 2019, Gabor 2023), including decent wages, job creation, right to collective bargaining, taxes on excess profits, profit sharing and bans on excessive shareholder remuneration, including on dividends and share buybacks (Mazzucato 2022:13, Schmidt 2023:39, Mazzucato & Macfarlane 2023:19). Clearly, practical and legal challenges, as well as trade-offs regarding the volume of investments, have to be faced (Griffith-Jones & Carreras 2021:27). As 100 percent of EIF (the EU’s multilateral development bank for financial intermediation; for a critical overview, see Cooman 2023a, 2023b) and about one third of EIB (the European Investment Bank) activities are carried out via private actors, these EU institutions have an important role to apply progressive conditionalities (Griffith-Jones & Carreras 2021:27).

¹⁷ “[...] as in the cases of KfW’s Green Loans and South Korea’s territorial development strategies” (Mazzucato 2022:13).

Table 4: Forms of conditionalities.

CONDITIONALITY TYPE	CONDITIONALITY MEASURES
<i>PERFORMANCE STANDARDS</i>	Production, investment, employment, and export quotas; environmental and safety standards; training and skill programs; technological or local content requirements; geographical location
<i>CORPORATE CONTROL</i>	Public or domestic ownership; promotion of intra-firm or intra-sectoral cooperation; acceptance of collective bargaining rules; accepting joint ventures; inclusion of independent directors; disclosure of pollution information; regulation of intellectual property rights

Source: Bulfone et al. (2024).

5.3. Progressive derisking and development banks

In addition to progressive conditionalities, DBs are highlighted as key tools for PDR (Griffith-Jones & Carreras 2021:26, Griffith-Jones et al. 2022, Mazzucato & Macfarlane 2023, Mazzucato 2023). Here, derisking is legitimized and deemed progressive as long as DBs reap some of the profits “where feasible” (Griffith-Jones and Carreras 2021:4), while retaining policy steer, rather than outsourcing too much influence over IP to private actors (e.g. Dafermos et al. 2021:244, Kedward et al. 2022b:1, Griffith-Jones et al. 2022:200, Gabor 2023:23). As benchmarking and anchor institutions, DBs mainly utilize four types of funding instruments: loans (ordinary and concessional), guarantees, grants and equity investments¹⁸, (Griffith-Jones et al. 2022:203), as well as providing consultancy services. Progressive deriskers highlight that different sectors, type of investments and end-goals require different instruments, or a mix of instruments (Griffith-Jones et al. 2022:213), as “[i]t is important to stress that DBs can involve private finance in different ways, some of which will be more desirable in terms of maximizing development impact, and minimizing future contingency risk”¹⁹ (Griffith-Jones et al. 2022:200).

Meanwhile, progressive deriskers have been sympathetic to some derisking programs executed by the EIB. While Gabor (2023), a proponent of the BGS, lambasts InvestEU as derisking “per excellence”, progressive deriskers have contrarily voiced some mild praise to the InvestEU’s predecessor EFSI (e.g. Griffith-Jones & Naqvi 2020:3, 7, Mertens & Thiemann 2022:89). Mazzucato et al. (2023:15) argue that among the “best practices and results achieved by the EFSI, two key points deserve major attention. First, additionality played a great role as it enabled the triggering of private investments at a national level... for an amount of resources up to 15 times of that received by countries as part of the programme. Second, the role of the EIB Group has been crucial for the successful crowding-in of additional financial resources and implementation of the plan” (see also *Table 2*. For details, see Mertens & Thiemann 2022:86. For a critical discussion, see Demertzis et al. 2024:20). In the meantime, progressive deriskers acknowledge limitations of some derisking instruments. For example, guarantees, one of the main derisking instruments, have limitations when it comes to finance innovation (Demertzis et al. 2024:20). According to Griffith-Jones et al. (2022:209), “when there is extreme uncertainty,

¹⁸ “It could thus be argued that there is a loose hierarchy of involving private finance in development funding in terms of impact, with most impactful mechanisms being DBs borrowing on private capital markets to offer direct loans; private lenders and investors co-lending or co-investing with DBs; on-lending to commercial institutions; and complex opaque financial engineering products least attractive in terms of development impact, while also creating contingent liabilities” (Griffith-Jones et al. 2022:200).

¹⁹ Similarly, Rodrik (2023:47) says that “business assistance should be viewed as a portfolio of services rather than a particular incentive, with the actual mix attuned to local conditions”.

guarantees may not be sufficient to overcome investors' heightened risk aversion, unless governments/development banks are willing to assume most of the risk, which could subject them to unacceptably high losses. Indeed, the level of guarantees needed to catalyse private lending in conditions of high uncertainty may be close to 100 per cent".

Importantly, DBs play a crucial role in current neoliberal capitalism. While BGS measures, including increased taxation, stringent financial regulation and expanded fiscal expenditures, are prone to political backlash, DBs already have an impressive track record and essentially do not clash with neoliberal policy prescriptions (Mertens & Thiemann 2019, 2023). Given their green and safe (usually triple A-rated) profile, large amounts of institutional capital already flow to DB bonds. Importantly, they help to overcome fiscal constraints as DB liabilities do not register towards the Maastricht criteria. Hence, the further leveraging of DBs to address public underinvestment could be done without challenging the Union's fiscal orthodoxy, and an EIB that leads a coalition of European DBs would essentially not add much to EU or individual member states' budgets (Adler et al 2019:32, UNCTAD 2019:163).

According to proponents of mission-oriented policies, the EIB should take a more proactive and market shaping role rather than to respond to private sector demand, market failures, and financing conventional technology (Griffith-Jones & Carreras 2021:26, Mertens & Thiemann 2022:89, Mazzucato & Macfarlane 2023:17, Demertzis et al. 2024:20). While loans and guarantees are important, what needs to increase are equity and quasi-equity instruments as "debt finance seems to be ineffective in stimulating green innovation" according to one commentator (Padoan 2023:110; cf. Aghion et al. 2022:27). Firstly, these instruments avoid unsustainable leveraging of firms. Secondly, equity stakes by public actors such as the EIB significantly increase policy steer needed to speed up green technological innovation. Thirdly, increasing the use of equity stakes help EIB, national DBs and other public actors to not only capture risks but also rewards (that can be used for further investments and lending) stemming from successful co-financing of innovative firms (Griffith-Jones & Carreras 2021:27, Griffith-Jones et al. 2022:200, Mazzucato et al. 2023:8). According to Mack & Findeisen (2023:7), derisking can potentially fund future high-tech sectors, "but this will require equity investment from InvestEU implementing partners to share risks and rewards and enforce performance-related conditionalities". For the most part, "transformative projects ... will require grant support accompanied by loans as these are commercially unviable on their own in the longer term" (ibid).

Lastly, mission-oriented approaches can be achieved through concrete mandates, such as incorporating missions and specifying "European strategic investments" (Demertzis et al. 2024), where development banks are set to support supranational as well as domestic IP. Two exemplary institutions are Germany's KfW and Brazil's BNDES. KfW, which has been key for Germany's post-war reconstruction as well as for innovation and green investments during the last decades, similarly has three explicit missions that go beyond fixing market failures: demographic change, climate change, and the broad goal of innovation and competitiveness. Progressive conditionalities have been central to KfW's success (Mazzucato & Macfarlane 2023:15).

5.4. Green innovation and European DARPAs

To counter the entrenchment of fossil fuel-based technologies, increased investment in green innovation is required, including but not limited to battery and storage technologies, carbon capture and storage (CCS), and electrolyzers and fuel cells²⁰. Profiting from green technologies and developing new low-carbon solutions is hindered by the lavish support provided to fossil fuel

²⁰ "Because the world has not cracked the problem of effective storage, renewable energy is routinely wasted. In 2020, nearly a fifth of wind power generated by Scottish windfarms was discarded" (Ramesh 2024).

products, ranging from the absence of carbon taxation to explicit subsidies. Furthermore, clean technologies often entail inflated costs or benefits for stakeholders beyond producers, while posing challenges due to their complexity and uncertainty (Tagliapietra et al. 2023:53). Yet, as most MS miss the Lisbon Strategy target of spending 3 percent of their GDP on R&D, the annual European R&D investment shortfall alone amounts to 110 billion annually (Aghion et al. 2022:38). Meanwhile, European firms are less innovative than international competitors and corporate R&D spending is lower (2.6 percent in the US and Japan compared to 1.5 percent in Europe) (EIB 2023:2). The EU has fallen behind the US and China²¹ in emerging high-tech sectors, including AI, nanotechnologies and big data²² (ibid:181).

Both domestic and EU-level public R&D funding should increase, as the social return of public R&D investment surpasses normal profitability rates (Jones & Williams 1998). Meanwhile, around 90 percent of Europe's public R&D money is administered by governments, while only 10 percent at the European level (Interview, March 12), the latter mainly being Horizon Europe, the European Research Council, the European Innovation Council, and the European Institute of Innovation and Technology. Ideally, the current low share of EU-level public R&D funding should increase vis-à-vis the share of MS as there are positive aspects of centralizing public research grants to the supranational level, which would make research funding less biased and distributed more equally throughout the EU. While guarantees limit the Commission's ability to tie performance criteria or conditionalities to financial support, grants give the EC direct control over profit sharing and performance-related conditionalities (Mack & Findeisen 2023:7).

How could innovation in Europe be enhanced and R&D expenditures distributed more equitably? The last PDR mechanism presented in this paper, before discussing on how BGS policies could finance Europe's IP, is the DARPA, or the American Defense Advanced Research Projects Agency, as a successful model for collaboration between government and business. Founded in 1958 as the innovation agency of the US department of defense, the DARPA model rests on relative independence from government, flexible contracts and flat internal structures (Mazzucato 2021:77). According to Aghion (2023:35-36) DARPA projects "are midway between basic and applied research; it is possible to organise research toward a precise objective; and the existence of coordination problems makes large-scale funding and testing of the technology difficult without public intervention". With an annual budget exceeding \$3 billion, while funding over a hundred private-public programmes, DARPA-sponsored projects have played important roles in developing cutting edge innovation and technologies, including the precursor to the internet, the GPS, and headways into robotics and stealth technology. Some argue that European DARPAs, financed either through EC-issued EU bonds or through MS budgets (Aghion 2023:37), could make Europe more technologically competitive (Dittrich & Ständer 2017). To account for uneven development, they could be administered by the "European Research Council and its international jury panels: excellence, not nationality, is the primary criterion for selecting those research projects that receive ERC funding" (Aghion 2023:37).

²¹ For a recent analysis on Chinese industrial subsidies, see Bickenbach et al. (2024).

²² IP spending in 2019, including but not limited to R&D and other tax incentives, state investment funds and direct subsidies, was significantly higher in China (1,73 percent to GDP) compared to Germany (0,41 percent), France (0,55 percent) and the US (0,39 percent) (DiPippo et al. 2022:30). Despite being a middle-income economy on a per capita basis, China has invested 10 times more in photovoltaic supply capacity than Europe since 2011 and controls 60 percent of net-zero technology supply chains, while the US retains global leadership in digital innovation (Kalcher & Makaroff 2024). Meanwhile, being similar in scale, the IRA has brought about investments more efficiently than the EU's IP programs. The EU also trails the US in productive investments since the GFC (Zylberberg 2023:115).

6. Conclusions

Investment must significantly increase if the EU is to reach its decarbonization and digitalization targets. This paper has brought up financing alternatives for Europe's twin transition and contrasted two progressive strategies, Progressive Derisking (PDR) and the "Big Green (European) State" (BGS), in relation to the politically dominant strategy of mainstream derisking. Amid Europe's austerity paradigm, derisking has been seen by EU policymakers as a cheap and attractive alternative to guide private investment to green and societally important but otherwise unprofitable destinations. This has been exemplified by the EFSI and InvestEU programs, while the Letta report similarly proposes the launch of a "European Green Guarantee" with a supposed multiplier of 12 (Letta 2024:31). Critics have pointed out the limitation of derisking, including its failure to bring about green investments and its tendency to accelerate commodification. Some scholars have therefore proposed BGS policies, i.e. public sector initiatives that could provide a majority of the financing of the green transition, as an alternative to derisking. Examples of such measures include the permanent issuance of EU bonds, a permanent EU fund, Europe-wide taxation and the further leveraging of national development banks as well as the EIB. In the light of such proposals, one should keep in mind that the annual green investment gap of between 2-3 percent of EU GDP is dwarfed in comparison to the costs, governments have had to bear historically during wars and financial crises. In other words, 2-3 percent of GDP is in reality not an insurmountable figure from a technical viewpoint. Lastly, a more politically feasible approach than the BGS proposal is what this article refers to as progressive derisking. In contrast to BGS proponents, progressive deriskers are not averse to derisking as such as long as public policy steer is maintained, the state-capital relationship is "symbiotic" and not "parasitic" (Mazzucato 2021:167), and as long as risks and profits are shared through progressive conditionalities. Another difference is that while progressive deriskers also focus on innovation, BGS proponents mostly focus on large-scale public investments to reach climate goals. A summarizing comparison of the three financing strategies is made in *Table 5*.

The financing of IP on a continental scale is a highly complex, multi-level process that includes a plethora of private and public sector actors who must accommodate various structural path-dependencies and institutional logics. The near future of European IP is similarly highly contingent on the makeup of the new European Commission of 2024-2029 as well as on economic and geopolitical developments in the global political economy, making the EU's IP an uncertain, politically contested and open-ended project in the making. Ultimately, who is going to pay for the transition, and who will assume the risks – taxpayers, as under the mainstream derisking paradigm? Should the private sector be paid by issuing public bonds, including EU bonds and green government bonds? Should it instead pay for the green transition through increased taxation? Or, should more radical solutions be brought to the table, including central banks directly financing governments or public development banks? As the latter has been done in the post-war period, as well as in extraordinary situations, the crucial question is if and when the climate crisis will increasingly be perceived as such an extraordinary situation. As for now, funding measures presented in this paper should be further elaborated. Among other things, there should be a public discussion of how much, in theory and practice, the EC could be able to borrow through EU bonds.

Table 5: A typology of mainstream derisking, progressive derisking, and the BGS

	Mainstream derisking	Progressive derisking	The Big Green State
Main emphasis and core assumptions	Scarce public resources; abundance of private capital; private sector optimism	Market and coordination failures. The State as entrepreneur. A progressive state-capital nexus is possible through mission-oriented programs and progressive conditionalities	Private sector pessimism and skepticism about governments' ability to steer private finance in contemporary financialized capitalism
Macrofinancial/Accumulation regime	Shareholder value; financialization; independent central banks; full capital mobility	Industrial capitalism	Fiscal dominance; industrial capitalism; tightly regulated financial markets
Fiscal policy	Austerity or fiscally subsidized private investment; market fixing	Relaxed fiscal rules; market shaping	Paradigm shift in fiscal policies; market making as well as non-market mechanisms
Structural tendencies	Assetization, commodification, financialization, neoliberalization	Increased regulation; coordinated capitalism	Decommodification, definancialization, state planning, non-market mechanisms
Main instruments	Public first-loss anchor investors, public investor of last resort, creation of new asset classes, guarantees, grants, PPPs, tax credits	Subsidies with progressive conditionalities: limits on shareholder remuneration, reinvestment guarantees, decent pay and employment, private actors share profits and IPR with the public sector	Large-scale public lending, investment and equity stakes through development banks, SOEs, public funds, central banks and other public sector institutions. Credit quotas and lending ratios
Role of development banks	Derisk investment and crowd in private capital	Progressive derisking and market shaping. DBs should be further leveraged	Main actors in large scale public investment programs
Central bank policies	Risk-based approach	Pragmatic – central bank reform neither needed nor opposed	Reformist, developmentalist and credit allocating approach
Proponents	G20, the World Bank, The European Commission, fiscal hawks, mainstream economists	Mazzucato, Rodrik, Griffith-Jones, centre-leftists, greens, institutionalist Post-Keynesians, heterodox scholars	Gabor, Marxist Post-Keynesians, heterodox, critical and radical scholars, socialist and radical parties

Source: own elaboration

While further studies on conditionalities are imperative, additional research on PDR and BGS should be carried out. To what extent are PDR and BGS politically, technically and ideologically commensurable? In terms of varieties of derisking (VoD), can future studies conceptualize other forms of derisking – financial, industrial, sectoral or mortgage derisking (Skyrman 2024a), or conceptualize the derisking of public sector institutions – “public derisking” or “democratic derisking” (Amarnath et al. 2023)? Further research can also discuss what the three different approaches (derisking, the BGS and PDR) would imply for the distribution of power between financial capital, industrial capital, workers and governments. In what ways are the three financing alternatives efficient in time and space, benevolent or malevolent to different stakeholders, more or less socially inclusive or regressive, and stable, prone to crisis, or externally crisis-generating? Should derisking instruments be fully abandoned and instead give way to public grants, loans, and equity? Given the heterogeneity of Europe, are some regions more prone to PDR rather than BGS strategies, and vice versa? Lastly, preliminary research questions on “mainstream” derisking remain: In what sectors and for what purposes does derisking have the most or least potential? What can public derisking of private investments achieve? If EFSI achieved multipliers of 15, why are not more public resources dedicated to such endeavours? Why do supposed multipliers differ so extensively, officially ranging between slightly more than 1 to 15? As the debate on green industrial policy and its funding is likely to intensify in the years to come, addressing these and similar questions will be pivotal.

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