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POLICY DEBATE OF THE HOUR

Overregulation in the EU? How to Boost Competitiveness with Smarter Legal Frameworks

Béatrice Dumont, Jan Blockx, Bertin Martens, Fredrik Erixon and *Oscar Guinea, Gabriel Felbermayr* and *Klaus Friesenbichler, Thomas Weck, Oliver Falck, Yuchen Mo Guo* and *Christian Pfaffl*

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In recent years, the EU has significantly shaped framework conditions in areas such as data protection, consumer health and safety, environmental protection, the supply chain, and antitrust law. However, the EU's overregulation in some areas is seen not as beneficial, but as a detrimental factor limiting innovation, competition and growth. The EU now needs better, evidence-based regulation ensuring that its legislation is drafted in a transparent and inclusive manner and is as simple and targeted as possible to reduce unnecessary bureaucracy burdens and costs.

In this issue of EconPol Forum, our authors critically assess the negative economic impact of complex regulations and bureaucracy in the EU. They make policy suggestions on how the EU can improve the quality of legislation and enforcement performance. In particular, they look at institutional aspects related to the single market and the enforcement of EU rules by member states, which have been neglected in previous initiatives.

In "Economic Policy and Its Impact," the authors find that the proportion of Ukrainian refugees wishing to settle outside their country of origin has risen steadily over time. In "Institutions Around the World," the authors show that governments around the world are increasingly using nudges to collect taxes, as simple reminders, tax morale, and deterrent nudges significantly improve tax compliance. In "Big-Data-Based Economic Insights," we highlight that low market integration is a major obstacle to Europe's competitiveness in the digital economy and that international collaboration of knowledge workers could help realize market size advantage. Another article uses an analysis of job advertisements to shed light on strategic changes in the automotive sector in Germany.

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ECONOMIC POLICY AND ITS IMPACT

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BIG-DATA-BASED ECONOMIC INSIGHTS

Introduction to the Issue on

Overregulation in the EU? How to Boost Competitiveness with Smarter Legal Frameworks

Chang Woon Nam

By adopting regulations that affect the international business environment, set global standards, and lead to the Europeanization of some crucial aspects of world trade, the EU has so far managed to shape policy in areas such as data protection, consumer health and safety, environmental protection, supply chain, antitrust law, etc. This "Brussels effect," which once stood for the supposed influence of the EU on the shaping of global regulations, is now increasingly contributing to the global fragmentation of regulations: not only has the EU's insistence on "autonomy" and "European values" led to the rise of global protectionism, but regulatory cooperation in the single market also appears to be stagnating and in many cases even declining – this is reflected in the fact that it is difficult for companies to enter markets and expand in the EU, as well as to adapt and modernize their businesses. On the other hand, overregulation in some areas is not expedient, but can restrict innovation, competition, and growth.

Under its last two presidents, the European Commission has evolved into a more policy-oriented body, whose role has helped the EU in recent crises. However, the EU has lost its strengths as a technocratic legislative body that focuses on drafting laws based on evidence and best practice and is less tied to short-term politics than the European Parliament and the European Council. A more technocratic stance is also important so that the European Commission is perceived as an impartial enforcer of EU law – and so that it can hold member states to account if they do not implement these laws properly.

What the EU needs now is "better regulation," equipped with a set of practices that ensure EU legislation is evidence-based, produced in a transparent and inclusive way, and as simple and targeted as possible to reduce unnecessary bureaucratic burdens and costs. In the search for ways to boost economic growth and competitiveness, EU policymakers need to reduce distortive regulations and must prioritize regulatory strategies and measures that unleash the collective ingenuity of individuals and companies and help foster innovation and maintain high levels of productivity.

This issue of EconPol Forum contains seven articles on the impact of EU regulations on innovation, competitiveness, and growth. With a particular focus on the institutional aspects related to the single market and the enforcement of EU regulations by member states, the authors critically assess the extent of the negative economic impact of complex regulations and bureaucracy in the EU, also addressing the specific areas of climate and data protection, supply chains, etc. They also make some policy suggestions on how the EU can improve the quality of legislation and enforcement performance needed to successfully implement "better regulation."

According to *Béatrice Dumont*, "ambitious" regulatory standards can promote innovation and competitiveness, while the complexity of regulation is perceived as a burden for companies. For this reason, debates on regulation and competitiveness appear to be less conclusive and benchmarks are being sought for assessing the notion of complex/ambitious regulation. There is no ready-made solution for the implementation of a regulation reduction law or a corresponding law in the EU. However, what is proposed is a policy of "smart regulation" in the sense that it should not be a policy of numbers, but of sound principles of systematic ex post evaluation of regulations in pre-announced periods, with review clauses in the same periods that allow anticipation of regulatory changes and flexibility in the regulatory timeframe. The phases of the EU Emissions Trading System can be an interesting starting point for further reflection, as they involve planning dates for potential regulatory changes, encourage past evaluation, and facilitate debate on reform.

The volume of legislation is increasing in the EU, but enforcement resources are not, which in turn means that in order to enforce new legislation, other legislation will need to be left unenforced. In contrast to the European Commission, which sees such a "one in, one out" principle only in terms of the administrative burden on businesses and citizens, *Jan Blockx* argues that the enforcement costs imposed on public authorities are particularly crucial for EU legislation, the enforcement of which usually depends on the member states. There seems little doubt that (mostly national) enforcement resources cannot keep pace with the increase in EU legislation, especially in these times of tight budgets. As a result, the adoption of new EU legislation almost inevitably leads to less enforcement of old (EU or national) legislation. If legislators do not take this effect into account, the

introduction of more and more regulations will only lead to less and less enforcement.

The rapidly growing volume and economic importance of digital data has prompted EU policymakers to enact several data market regulations, including the General Data Protection Regulation, the Data Act, and the European Health Data Space. All of these regulations aim to open up access to data locked in technical silos, facilitate the emergence of data markets, and encourage the development of innovative data-driven services. However, *Bertin Martens* criticizes the current EU data market regulations for being fragmented, driving up compliance costs, and failing to realize the full social value of data. Economies of scope in the reuse and aggregation of non-rival data, together with transaction costs, can create a gap between the private and social value of data, leading to market failure and the need for regulatory intervention in data markets. Where feasible, the tension between the private and social value of data can be bridged by private incentives for shared use. If this is not possible, binding conditions for sharing apply.

According to *Fredrik Erixon* and *Oscar Guinea*, a large part of the productivity gap between the EU and the US is due to the fact that the EU invests less in ICT-related tangible and intangible capital. This, in turn, is partly due to the EU's digital regulations, which restrict companies' access to modern resources such as data and force EU companies to specialize in less ICT-intensive activities. In this context, the EU has overlooked the full impact of digital regulations by focusing on compliance rather than such "behavioral" effects. The EU urgently needs to reduce the restrictions of digital regulation in order to increase the contribution of digital technologies to productivity growth.

The EU Corporate Sustainable Due Diligence Directive requires companies to carry out due diligence on their own conduct and that of their direct and indirect suppliers. They must identify and prevent, end, or mitigate actual or potential negative impacts on human rights and the environment in their own operations, in their subsidiaries, and in the value chain. In this context, the costs of social and environmental compliance are shifted to private companies within complex supply networks. To ensure effective and cost-efficient implementation, the Directive should aim to reduce economic complexity. To this end, *Gabriel Felbermayr* and *Klaus Friesenbichler* suggest (1) excluding countries with strong regulatory systems; (2) public agencies should set harmonized standards and organize a private certification system that focuses on the suppliers and not on the entire network; and (3) the new European Parliament may need to adapt the legal framework accordingly.

In view of the ageing of the European population and to better address serious challenges such as slow growth, the lack of contribution to the digital revolution, and the weak exploitation of cutting-edge technologies and innovation, the Draghi report published in September 2024 advocates institutional and economic measures that focus on equipping Europeans with the necessary skills to benefit from new technologies, using decarbonization as an opportunity to promote competitiveness and growth, and to increase security and reduce dependencies. However, *Thomas Weck* critically argues that the EU economy would probably benefit more, if the existing Treaty framework (established by the Treaty on European Union and the Treaty on the Functioning of the European Union) were fully implemented than if the recommendations of the Draghi report were followed. In this context, the following points were emphasized: (1) the EU treaties are based on an open market economy – the Draghi report does not; (2) the EU's lag in advanced technology is well known and Draghi's state-driven response is unconvincing; (3) EU overregulation is a problem, especially in the strategic areas Draghi mentions; (4) extensive public funding distorts markets and burdens the population; and (5) the Draghi report advocates reducing dependencies but lacks a global trade strategy.

Oliver Falck, *Yuchen Mo Guo* and *Christian Pfaffl* estimate the overall economic costs caused by a high level of "bureaucracy," which often has negative connotations, as too much regulation unnecessarily burdens citizens and companies, and stands for inefficient, non-service-oriented administrative processes. Such bureaucratic burdens cause additional costs for economic activity and have a negative impact on the country's competitiveness. Their international analysis shows that a fundamental reduction in bureaucracy is associated with an average increase in real GDP per capita of 4.6 percent. If Germany had carried out such a reduction in 2015, GDP per capita would have been EUR 2,449 higher in 2022. On average, over this period this would have corresponded to an annual increase in real GDP per capita of EUR 1,766 or a total of EUR 146 billion per year. A digitalization push in public administration would have increased real GDP per capita by 2.7 percent with the same level of bureaucracy.

We hope you enjoy this Policy Debate of the Hour!

Béatrice Dumont

On a Search for a Regulation Reduction Act (RRA)

KEY MESSAGES

- **Ambitious regulatory standards can stimulate innovation and competitiveness**
- **Complexity of regulation is perceived as a burden for firms**
- **Debate on regulation versus competitiveness is inconclusive**
- **Need for metrics to assess the notion of complex/sophisticated regulation**
- **Smart regulation based on systematic ex post evaluation with review clauses might be a path to explore**

THE BRUSSELS EFFECT QUESTIONNED

By adopting regulations that affect the international business environment and set global standards, the EU has *de facto*, but not necessarily *de jure*[1] externalized its regulations outside its borders. In practice, the EU is "exporting" its stringent regulatory standards by applying the single market rules consistently to both domestic and foreign businesses, expecting others to adhere to these rules when they operate within its market. By doing so, the EU has managed to shape policies in areas such as data protection, consumer health and safety, and environmental protection, to cite a few. As with environmental standards, the prevailing idea is that the existence of ambitious regulatory standards should not be seen solely in terms of the additional costs that businesses will have to bear, but also as a generator of business opportunities through eco-boosting technologies.

This unilateral ability to regulate some of the global markets is often referred to as the so-called "Brussels effect," coined in 2012 by Bradford, and named after the similar "California effect."[2] This represents a "race to the top," where the strictest standards become attractive to companies that operate in various regulatory environments,[3] as it makes global production and exports more cost-effective. Bradford (2012) identifies five underlying components that determine the extent to which this effect is deployed: market size, regulatory capacity, high standards, inelastic consumer markets,[4] and indivisibility of production.[5]

Recently, however, the impact of this Brussels effect has been questioned. More precisely, questions addressed have revolved around the potential benefits of this effect and its beneficiaries, i. e., whether overall, the effect creates added value for society despite regulations that are *a priori* stricter that those applied outside the EU, but also more costly for economic actors, both in terms of investment but also compliance costs.

The outline of the paper is as follows. In the following section, an overview of the literature on the opposition between regulation and competitiveness is presented, and this in the specific setting of environmental economics, given the long-standing debate that has prevailed on this matter. The third section discusses the issue of regulatory stringency and complexity and the difficulties of fully apprehending what it encompasses. The final section concludes by proposing some policy recommendations.

REGULATION AND COMPETITION: FRIENDS OR FOES?

Opponents of environmental regulations often argue that they increase costs and reduce firms' competitiveness. This opposition between regulation and competitiveness is not new. As stressed by Jaffe et al. (1995), the conventional wisdom is that environmental regulations create substantial costs, slow productivity growth, and ultimately hinder the ability of firms to compete in international markets. However, an alternative view is that a well-designed and stringent environmental regulation can stimulate innovations, and in turn can increase firms' productivity or product value for end-users (Porter 1991; Porter and van der Linde 1995). The main argument of these

[1] Non-EU firms that have adapted their production mechanisms to EU regulations often have an incentive to level the playing field against their domestic competitors and put pressure on their governments to align their national rules with those of the EU, the so-called "*de jure* Brussels effect."
[2] The California effect refers to the adoption by other US states of the stringent environmental standards initially adopted by California.
[3] This Brussels effect is in opposition to the so-called Delaware effect, where some countries can purposefully choose to lower their regulatory burden in an attempt to attract businesses.
[4] Consumer markets regulated by the EU are considered as relatively inelastic. This contrasts with capital markets, which, while not perfectly elastic, are significantly more mobile, meaning that capital is more easily transferable to another legal jurisdiction to circumvent a new financial regulation.
[5] Here, indivisibility refers to the standardization of activities on all the markets in which an economic player is present, usually to save costs.

authors is that, in the presence of a lax environmental policy, firms are not encouraged to reduce the inefficiencies to which they are subject in the use of resources, as they are not necessarily on their technological frontier. Their argument therefore departs from the usual economic paradigm that there is "no free lunch," suggesting that it is unrealistic to believe companies can boost their profits after implementing environmental regulations (Palmer et al. 1995). As stressed by Baudry (2022), "the Porter hypothesis is attractive [for policymakers] because it allows environmental policy to kill two birds with one stone: reducing environmental pollution on the one hand, promoting industry by strengthening its competitiveness on the other hand."

The debate on regulation vs. competitiveness is, however, inconclusive.[6] Jaffe et al. (1995) show that, although the long-run social costs of environmental regulation can be significant, there is relatively little evidence to support the hypothesis that environmental regulations have had a large adverse effect on competitiveness. The estimates are either small and statistically insignificant or not robust.[7] Similar to the lack of consistent empirical evidence for the conventional hypothesis about environmental regulation and competitiveness, there is also scant evidence backing Porter's hypothesis that regulation fosters innovation and competitiveness through dynamic efficiency. Indeed, benefits from regulation may partially or fully offset the costs of complying with environmental restrictions. Looking at the empirical evidence provided in the literature through a meta-analysis of 103 publications on whether regulation boosts productivity and competitiveness, Cohen and Tubb (2018) conclude that the picture is rather mixed in the sense that there is a very strong heterogeneity in terms of the sign and magnitude of the effects of environmental policies on competitiveness. More precisely, empirical results strongly corroborate the weak version of Porter's hypothesis, namely that stricter environmental regulation stimulates the development of environment-friendly innovation, whereas many studies do not corroborate the strong version of Porter's hypothesis on whether stricter regulation enhances business performance.[8] In addition, it is worth noting that the economic literature that aims to support Porter's hypothesis is rather vague regarding the specific mechanisms that lead to a decrease in firms' internal inefficiencies (Ambec et al. 2011).

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[6] For an overview of the dimensions of this debate, see Stewart (1993).
[7] This might be explained by the fact that existing data is limited in its ability to measure the relative stringency of environmental regulation and by the fact that the cost of compliance is usually a small fraction of the total cost of production. Moreover, there is a need for the empirical research aimed at testing Porter's hypothesis to rely on a dataset with significant variation in both the stringency and flexibility of policies across different observations.

REGULATORY COMPLEXITY: A CONCEPT DIFFICULT TO APPREHEND

Is regulation needed for firms to adopt profit-increasing innovations? Ambec and Barla (2002) point to the fact that Porter's hypothesis rests on the idea that firms frequently overlook opportunities for profit-enhancing innovations, and that environmental regulations can incentivize them to seize the "low-hanging fruit" presented by the environmental challenges they face. In short, the assumption here is that firms are not making optimal choices. Hence, regulation tools are designed to correct this market failure by creating external pressure to overcome organizational inertia.

This external pressure of regulation on firms is more and more perceived by firms themselves as a burden. Beyond the perception that there is over-regulation in some areas, there is also a recognition that being a first-mover regulator does not necessarily translate into being a "good" one. Rules like the Digital Services Act and the AI Act are seen as not having helped and perhaps actively hindered the development of Europe's comparatively stunted digital economy (Rey 2024).

Additionally, critics point out that regulatory decision-making has become fragmented and unpredictable. This increased regulatory complexity is believed to discourage entrepreneurs and hinder the growth of small and medium-sized enterprises (SMEs) in global markets. A recent survey by the European Investment Bank (2023) indicates growing concern on the part of businesses with regard to the EU economies' ability to adapt and respond quickly to global changes and challenges, affecting their long-term growth. The survey shows that 60.2 percent of large firms and 65.4 percent of SMEs perceive business regulations, such as licenses and permits, together with taxes, as a serious impediment to investment (Marcus and Rossi 2024). This mantra on excessive regulation signals the necessity to pivot away from the EU's traditional focus on market rules, to focus on reviving the EU's lackluster economic growth instead. This necessary shift has been recently underlined in the Draghi report (2024), which stresses that the former might impede the latter. As pointed out by Mario Draghi, in the 2019–2024 period, 3,500 pieces of legislation were passed in the US at the federal level, against 13,000 acts passed by the EU in the

[8] Building on Jaffe and Palmer (1997), economists have established a convention of breaking down Porter's hypothesis into various causal effects that can be interrelated: the Porter "weak" hypothesis, along with a variant called the "narrow" hypothesis, which emphasizes regulations that allow flexibility in how firms can comply, and the Porter "strong" hypothesis.

same period. This leads Draghi to call for EU policymakers to reduce companies' regulatory burden to boost the bloc's faltering competitiveness.

However, driving away from regulation is easier to say than to do. Like the signaling effect of the Inflation Reduction Act (IRA) of August 2022 in the United States, adopting a Regulation Reduction Act (RRA) in the EU could convey a credible signal about the willingness of the EU to radically depart from current practices in terms of regulation. The main issue is that the perceived increase in the complexity of regulation often relies on anecdotes. Moreover, the concept of regulatory stringency and complexity is difficult to apprehend and to measure and so far, there is no objective proxy to do so. Marcus and Sekut (2024) have attempted to develop such a metric. They use, as a proxy for complex regulation, the net number of new legislative laws introduced in the EU and their length. They show that under the presidency of former EU President Prodi, the average length of regulations was 4,501 words, while under von der Leyen's presidency, it was 8,582 words. From Prodi's presidency to Barroso's second term, the combined average length of articles and annexes increased by 76 percent. From Barroso's second term to Juncker, there was a decline in average length of 1.4 percent, followed by an increase of 9.7 percent in von der Leyen's first term. Overall, this data shows that judged solely from the crude criteria of the net number of new regulations introduced and the length of those texts, the volume of new EU regulations has increased over time. If the Commission were merely scoring itself based on the number of legislative measures introduced, it could obviously game this metric by introducing fewer measures, but available proxies indicate only that texts are longer, but not that they are more complicated or sophisticated. This lack of reliable and objective indicators stresses the necessity to develop tools to trade off the increase and complexity/sophistication of regulations against other objectives.

Beyond these methodological aspects, it is worth remembering that qualitative and quantitative extension of the missions of the EU are a key driver of the increase of regulations over time, as the EU legislative framework evolves to meet new societal demands. This is somehow in contrast with the principle that public authorities are supposed to give a push and that private companies are supposed to take the next level. However, considering the small size of the EU budget, regulatory activism can somehow be considered as a way for the Commission to exert influence without extensive financial resources, especially since the cost of complying with these regulations is primarily borne by firms and individuals.

More fundamentally, EU policymakers' preference for stringent regulation is supposed to reflect their aversion to risk. In this regard, the precautionary principle that aims at ensuring a higher level of environmental protection through preventative decision-taking in the case of risk, is illustrative of this approach. Briefly stated, a critical analysis of the regulatory practice at the EU level suggests that the EU is less interested in the objective and usefulness of the regulations that are created than in trying to limit windfall effects and identify all possible cases. It differs in this regard from the American approach where risks must first be quantified and found to be unreasonable before regulatory intervention can be justified.[9] Indeed, the cost-benefit analysis that is implemented in the US obliges American governmental agencies to substantiate that the benefits of intervention outweigh its costs.[10] This difference in terms of regulation is important to stress, in the sense that the US tends to be more concerned about the costs associated with regulatory actions and the risks of "false positive" regulations, while the EU focuses on the costs of inaction and the dangers of "false negatives." This difference in terms of regulatory philosophy can be illustrated, for instance, in the domain of intellectual property rights with the notion of "rational ignorance" that prevails at the US Patent Office (USPTO). In this respect, Lemley (2001) challenges the conventional wisdom that the USPTO should spend more time and money weeding out invalid patents as they supposedly impose significant harms on society. According to him, strengthening the examination process is not cost effective. Indeed, as few patents are economically significant, it makes sense to rely upon litigation to make detailed validity determinations rather than increase the expenses associated with conducting a more thorough review of all patent applications. The implication is that the weeding out of "lousy" patents relies upon *ex post* litigation in courts. In short, the administrative burden linked to review patent applications is shifted in the US, under the form of a judicial burden that takes the form of an increased legal risk for firms. Once again, this contrasts with the European Patent Office (EPO) practice of investing more resources in patent examination and screening to improve patent quality, leading the EPO to be considered as the gold standard of patent offices (Chien 2018).

POLICY CONCLUSIONS

Better regulation in the EU is an ongoing and relevant issue that has significant implications for the future of EU law and Europe's competitiveness. Since its inception, drafting regulations has been at the very heart of the EU integration process. However, despite the

[9] See cases "Indus. Union Dept. v. Amer. Petroleum Inst. (the Benzene case), 448 U.S. 607 (1980)," pp. 642–646, (https://supreme.justia.com/cases/federal/us/448/607/), and also "Exec. Order N° 13,563, 3 C.F.R. 215, 215 (2011)", available at https://obamawhitehouse.archives.gov/the-press-office/2011/01/18/executive-order-13563-improving-regulation-and-regulatory-review, which outlines general principles for regulation in the US, emphasizing the use of the "least burdensome tools for achieving regulatory goals."

[10] See Carey (2022) and Posner (2001) for a critical appraisal.

implementation of the "Think Small" principle[11] and a "one in, one out" principle[12] under the presidency of the von der Leyen Commission, there is a growing concern that the sheer volume and complexity of the European legal system and the cumulative impact of regulatory changes may not be fully consistent in all cases nor fit for purpose. This is not new as such, nor is it a new debate on the hypertrophy of regulation and bureaucracy. Montaigne (1580)[13] and Tocqueville (1835), to name but two, wrote some fine pages on the subject.

That being said, there is a renewed consensus that rolling back unnecessary regulation and therefore making it easier to do business in Europe is a necessity. But in practice, promises of a "simplification shock" are repeated almost identically over time by public authorities all over the world without any major change in the perception of allegedly excessive regulation. Beyond a reduction of regulations as such, it is important to ensure that regulations are stable in time to allow for a more certain environment for investment. Moreover, one basic principle should be not to create a new regulation to respond to a particular problem but how to make better use of those that already exist. This is an important point, considering that observations show that more time and energy are devoted to developing a regulation than to implementing it. What is also needed is to return to trust-based systems, whenever it is possible.

This issue of regulation versus competitiveness is not anecdotal. Indeed, if the EU doesn't produce enough results for European citizens, the risk is that they turn to populist parties that promise a lot but have no awareness of the difficulties of public action. In this respect, it is important to have *ex post* evaluations of regulations that have been implemented and to get rid of those that are considered inefficient or too heavy. In this respect, it could be interesting to rely on the *ex post* evaluations of micro- and macro-prudential regulations that have been made in recent decades in the financial sector. Indeed, economic analyses in this sector show that regulatory complexity can be strategically exploited by sophisticated agents (Carlin 2009). It can lead to a risk of capture by sophistication (Laffont and Tirole 1991; Hellwig 2010; Hakenes and Schnabel 2017).[14] Conversely, opacity to outsiders may give discretion to supervisors (Rochet 2010).

Beyond the question whether the Brussels effect creates added value for society, the future of the Brussels effect is also at stake. Indeed, the EU's capacity to establish global rules is dependent on its preference for the highest standards, which is not guaranteed to be the case, at all times. Moreover, various external and internal factors are likely to change the concomitance of the five components identified by Bradford (2012) and could diminish this effect or even make it disappear. So far, the success of the Brussels effect has depended on the EU's ability to balance economic growth with the enforcement of stringent regulatory standards. But to be a regulatory power, the EU needs to maintain its economic position in the world. Data on innovation from the European Innovation Scoreboard (2024) is worrisome in this regard, as it shows a shift of innovation performance towards Asia. As the economic power of countries like China grows, businesses' dependence on their access to the EU market is likely to diminish. In the same way, difficulties in regulating some technological innovations, like artificial intelligence, may give rise to a loss of confidence vis-à-vis the EU capacity to embrace economic change and growth.

There is however a glimmer in the capacity of the EU to export some regulations. The Carbon Border Adjustment Mechanism (CBAM) is a rather interesting illustration. At first sight, it could be seen as the recognition of the ineffectiveness of the European Union Emission Trading System (EU-ETS), the cornerstone of the EU's climate policy. Indeed, thanks to the emergence of a price for greenhouse gas emissions within the EU, the EU-ETS is supposed to reduce these emissions and help limit global warming. But the substitution of carbon-based imports for European production, or the relocation of this production outside the EU, simply shifts emissions out of Europe without reducing global warming, to the detriment of European industrial activity. This phenomenon is known as "carbon leakage." The CBAM is a new regulation which, by imposing the payment of a similar price for the direct and indirect carbon emissions contained in imports, primarily corrects a flaw in the first regulation, the EU-ETS, and contributes to a kind of regulation "inflation." But the CBAM also has a more incidental impact. It requires companies in the EU's trading partners to align themselves with European carbon accounting standards. By being the first to set up such a carbon adjustment at borders, the EU is likely to impose its standard at the international level, facilitating the setting up of carbon markets in places where there was no carbon accounting (a prerequisite for the pricing of emissions) while potentially avoiding EU firms' having to face alternative standards outside Europe.

To conclude, there is no ready-to-use solution to implement a Regulation Reduction Act or whatever

[11] See ec.europa.eu/commission/presscorner/detail/en/ip_08_1003.
[12] See an appraisal by European Parliament (2023).
[13] Montaigne (1580) wrote, "we have more laws in France than all the rest of the world put together, and more than would be necessary."
[14] These authors examine whether a further increase in the sophistication of financial regulation is desirable, or conversely whether less sophisticated regulatory measure play a bigger role. According to Hellwig (2010), "when the model-based approach to capital regulation was introduced, however, the regulatory community was so impressed with the sophistication of recently developed techniques of risk assessment and risk management of banks that they lost sight of the fact that the sophistication of risk modeling does not eliminate the governance problem which results from the discrepancy between the private interests of the bank's managers and the public interest in financial stability."

equivalent in the EU. However, despite the complexity of the problem, it seems reasonable to advocate a policy of "smart regulation," in the sense that there should be no policy of numbers (upwards or downwards) but "sound" principles of systematic ex post evaluation of regulations at horizons announced in advance, with "review" clauses at these same horizons making it possible to anticipate changes in regulations, allowing flexibility in the timeframe of the regulation (or even its abandonment). Here again, the phases of the EU-ETS are perhaps an interesting path of study for further thought, as they involve programming dates for potential changes

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Jan Blockx

One In, One Out: The Increase of EU Legislation Will Lead to a Crisis of Enforcement

KEY MESSAGES

- **The volume of legislation is increasing, also in the EU, but enforcement resources are not**
- **This effectively means that in order to enforce new legislation, other legislation will need to be left unenforced: one in, one out**
- **When introducing new rules that need to be enforced, legislators should therefore consider which older rules may go unenforced**
- **This is particularly important for EU legislation as this usually relies on enforcement by the member states, making enforcement costs less visible**

At least since the European Council meeting in Edinburgh in 1992, the European Union has aimed to pursue a program of "simplification" of EU legislation. In the past three decades, almost every College of Commissioners has repeated this objective, often inventing new acronyms to add weight to this program, from the 1996 SLIM (Simpler Legislation for the Internal Market) pilot project, to the 2006 ABR (Administrative Burden Reduction) objective, to the 2012 REFIT (Regulatory Fitness) program. Most recently, the Commission introduced the OIOO (One In, One Out) principle in its 2021 Better Regulation Communication: "when introducing new burdens, [it would] systematically and proactively seek to reduce burdens imposed by existing legislation" (European Commission 2021a).

Despite all these initiatives, the volume of EU legislation does not appear to have stopped growing. Precise figures are hard to come by, with the Commission's latest own calculation of the size of the EU acquis dating back to the end of 2002, when a staff working document (European Commission 2003) estimated it to comprise 14,513 legal acts covering 96,999 pages in the Official Journal (OJ). Through a request for access to documents, I asked the Commission whether it holds a more recent calculation of the volume of the acquis, but the response was that no such document exists (European Commission 2024a). The Commission therefore does not know how much EU law there is, nor whether decades of simplification efforts have made a difference.

There is, however, little doubt that the volume of new legislation has continued to grow. For one, the length of the OJ has continued to increase over the last two decades. In 2004 (when the accession of 10 new member states increased the number of languages in which the OJ is published to 20), it comprised 759,590 pages, whereas in 2023 (when the number of languages had slightly increased to 24), it had grown by 150 percent to 2,008,061 pages (Publication Office 2024). Some of these additional pages may well contain codifications and recasts of previous legislation (so not all of this is necessarily "new" legislation), but the impression still remains that the volume is only increasing. This already seems to be the case at the start of the legislative process, with a recent study by Sekut and Markus (2024) of Bruegel finding that the amount and length of legislative proposals by the European Commission has continued to increase over the last 25 years, which presumably translates into more and lengthier legislative acts after amendment by the Council and the Parliament as well.

The growth in the volume of legislation is not unique to the EU, nor is the failure of attempts to curb this flood. A similar development has been noted in the United States, and many EU member states similarly see the length of their Official Gazette increase year by year. There are multiple reasons for this, including the increasing complexity of modern life, the tendency to see legislation as a panacea for all societal problems, the difficulty of achieving compromises between multiple stakeholders and political actors, etc.

RULES WITHOUT STICKS

The proliferation of legal rules has many downsides. First and foremost are the compliance costs for legal subjects (often businesses), which hamper their ability to serve their customers, innovate, and compete on the world stage. Reducing compliance costs has indeed been one of the main drivers for the push for simplification described above. But the introduction of new regulations also creates adjustment costs for businesses and, especially if they happen often, may reduce legal certainty.

In theory, these costs imposed by new legal rules may be outweighed by the benefits that regulation brings, e. g., in terms of ensuring that products and services are safe, that harmful externalities are

avoided, and in overcoming market failures. But these benefits will accrue only if new regulations are not merely introduced, but also complied with, and this is very rarely taken into account.

Non-compliance is difficult to measure, but even studies performed by or for the Commission itself indicate that a significant share of EU rules is not complied with in practice. In the field of technology regulation, which I follow quite closely, this is readily apparent. For instance, Gineikytė-Kanclerė et al. (2022) investigated compliance of online platforms with the 2019 Platform-to-Business Regulation and found that out of the 290 platforms covered in the study, only 49 (17 percent) were assessed as being "significantly aligned" with that regulation, while the alignment of 128 platforms (44 percent) was qualified as medium level and that of 123 platforms (42 percent) as low level. Similarly, in the Commission's own October 2024 Fitness Check on EU consumer law on digital fairness, it found that the EU consumer directives covered by the report had "limited" effectiveness due to "lack of compliance by traders (which leads to consumer detriment), ineffective enforcement, legal uncertainty, regulatory fragmentation, compounded by the increased complexity of the rapidly changing regulatory landscape with the arrival of new legislation" (European Commission 2024b).

Compared with national legislation, ensuring compliance with EU law faces an additional hurdle, because enforcement of EU law is rarely carried out by the EU institutions themselves, but is usually a matter for the member states. While there are limited areas of EU law where enforcement is undertaken by the European Commission or by EU agencies, for the most part, EU legislation provides for enforcement by member state authorities and courts.

This idea is in fact baked into some of the fundamental EU legal tools, such as the directive, a form of legislation that, in the words of Article 288 TFEU, "shall be binding as to the results to be achieved," but it "shall leave to the national authorities the choice of forms and methods." Directives therefore usually contain a set of legal rules, but – in order to take into account the differences that exist between national legal systems – member states can themselves provide for the tools to enforce these legal rules. The Court of Justice has also encouraged this approach through the doctrine of national procedural autonomy, basically allowing member states to choose their own enforcement tools for EU law, as long as these are effective and at least equivalent to those that exist for national legal rules.

In those circumstances, it is tempting for the EU institutions to simply impose enforcement obligations on EU member states, rather than providing for any enforcement mechanisms themselves. This temptation is all the greater in today's tight budgetary climate, as for example attested in the recent legislative debate around the European Artificial Intelligence Act. The European Parliament wanted a centralized European AI Office to take on much of the enforcement of the new rules, but there was simply no money for this (Bertuzzi 2023). As a result, the AI Office that was created was charged with more limited duties, and member states were instructed to appoint the relevant authorities to do most of the enforcement.

Except: the budgetary situation in the member states is no rosier than that of the EU. According to Eurostat (gov_10dd_edpt1), in 2023, the government debt of EU member states represented 81.7 percent of their GDP and budget deficits were on average 3.5 percent of GDP, comparable to how they were in 2011, after the financial crisis. Several recently elected EU governments have announced that improving the budgetary situation is one of their priorities. In those circumstances, member states cannot be expected to make additional budgetary means available for the enforcement of the AI Act. Instead, they will have to find these resources by withdrawing resources elsewhere. More policing of artificial intelligence will therefore likely mean less policing of the P2B regulation or of the EU consumer protection rules even though, as indicated before, enforcement is already pretty poor in these areas.

ESTIMATING ENFORCEMENT COSTS

Enforcement costs are meant to be taken into account in Impact Assessments of new Commission proposals, but these estimates are not always very informative and may be far from reality. There are a number of reasons for this. First of all, like many other costs (and even more so, benefits) of regulation, the resources that will ultimately be required are difficult to estimate. This often leads the Commission to using a (broad) range of possible (enforcement) costs in its Impact Assessment, which obviously undermines the usefulness of such an estimate. A second very important limitation is that the Impact Assessment is made for the (options considered by the Commission that lead to its) legislative proposal, but not for the final legislative act that is adopted by Council and Parliament. If significant amendments are made to the legislative proposal, the enforcement costs may increase significantly.

This can again be illustrated by reference to the recently adopted AI Act. In the Impact Assessment accompanying its proposal (European Commission 2021b), the Commission estimated that, depending on the current setup of member state supervisory authorities, the AI Act would require between 1 and 25 extra full-time equivalents (FTEs) per member state. This is, of course, a very wide range: all

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member states combined, this implies between 27 and 675 FTEs – a huge difference in terms of enforcement costs. In addition, the European Parliament and the Council made amendments to the AI Act (e. g., expanding the compliance requirements for high-risk AI applications), which will likely require more enforcement resources, although no precise calculation has been prepared for this.

However, at the EU level, such a calculation is available. The Impact Assessment indeed estimated that, in addition to national enforcement staff, 10 FTEs would need to be hired at the EU level for support to the AI Board that is meant to ensure coordination between the national supervisors. During the legislative negotiations, this coordinating AI Board has been complemented by an AI Office, to be set up within the Commission, and it has been announced that 100 FTEs will be recruited by the Commission for this AI Office (Kroet 2024). At the EU level, the enforcement costs have therefore increased at least tenfold between the proposal and the final act.

Of the 100 FTEs needed for the AI Office, 80 will be recruited externally and 20 internally. While the former obviously have budgetary implications, the internal recruits also have costs: these people will indeed need to be removed from other positions, where they were (hopefully) also doing important work. It could be that their work in these previous positions was finished, but if that is not the case, then moving them to the AI Office effectively means that their previous work will no longer be done. Again: more policing of artificial intelligence means less policing elsewhere.

POLICY CONCLUSIONS

Impact Assessments are meant to look at all impacts of legislation, including all types of costs, i. e., those imposed on legal subjects (businesses and citizens) but also on public authorities. The "one in, one out" principle, on the other hand, is (according to European Commission 2021a) concerned only with the administrative burden for businesses and citizens, and not with costs imposed on public authorities. This can be explained by its adoption in the context of reducing the regulatory burden on legal subjects. However, the "one in, one out" logic is all the more relevant in the context of (enforcement) burdens imposed on public authorities as it is not merely a policy that can be pursued but an actual description of the impact of legislation. Very often, resources that will need to be devoted to enforcing the new rules will need to be taken away elsewhere. When it comes to enforcement, "one in, one out" is therefore not just a policy, but a fact.

There are obvious limitations to estimating enforcement costs of legislation, in particular in the EU. However, there seems to be little doubt that (mostly national) enforcement resources cannot keep up with the increase of EU legislation, especially in these tight budgetary times. As a consequence, the adoption of new EU legislation almost inevitably leads to less enforcement of old (EU or national) legislation. If legislators do not consider this effect, the introduction of ever more rules will merely lead to ever less enforcement – which will likely have knock-on effects on compliance as well. And legal rules that are not complied with merely have costs; no benefits.

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The Impact of EU Data Regulations on Innovation, Competitiveness, and Growth: How Can Their Quality and Capability Be Improved?

KEY MESSAGES

- **Current EU data market regulation is fragmented and fails to realize the full social value of data**
- **Economies of scope in the reuse and aggregation of non-rival data, together with transaction costs, are the main sources of market failures**
- **The European Health Data Space offers an almost perfect data governance template. The General Data Protection Regulation and the Data Act fall short of this standard**
- **Where feasible, the tension between private and social value of data can be bridged by private incentives to share. If not, mandatory sharing conditions will be applicable**

The rapidly growing volume and economic importance of digital data motivated EU policymakers to adopt several data market regulations, including the General Data Protection Regulation (GDPR),[1] the Data Act,[2] the European Health Data Space (EHDS),[3] and several others. All these regulations seek to open access to data that is locked up in technical silos, facilitate the emergence of data markets, and stimulate the development of innovative data-driven services. However, the sheer number of data regulations leads to regulatory fragmentation, increases compliance costs, and may result in inconsistencies between regulations. Is all the variation in data access rights and conditions in EU data regulations (Martens 2024) justified by sectoral differences in data market failures?

Draghi (2024, 26) observes that "limitations on data storing and processing create high compliance costs and hinder the creation of large, integrated data sets for training AI models. This fragmentation puts EU companies at a disadvantage relative to the US, which relies on the private sector to build vast data sets, and China, which can leverage its central institutions for data aggregation." The view of data as a production factor that drives international competitiveness is gaining traction globally (Diebold 2023). Bradford (2023) compared the US's laissez-faire data regime with China's centralized regime and with the EU's somewhere-in-the-middle regime and its mixture of private rights and some data-sharing obligations. Regime choices are inspired by political and ideological choices in their home countries, but they do have economic implications. The European Commission is increasingly aware of this. New digital Commissioner-designate Henna Virkkunen has been given the task to improve EU data market policies and "present a European Data Union Strategy drawing on existing data rules to ensure a simplified and coherent framework to share data seamlessly."[4]

Well-defined private property rights are important to make markets for physical goods work efficiently. Physical goods are rival: they can only be used by one party for one purpose at the same time. Non-exclusive rights would create conflict about their use. Data is non-rival, however. It can be used by many parties for many purposes at the same time. Exclusive control, de jure or de facto, would ensure that the data collector earns a return on his investment costs. However, with marginal cost of data collection close to zero, reuse by others would not be a disincentive for the original data collection. Moreover, data is usually co-produced between at least two parties, the data subject and the data collector. Both may claim to access the data. In the EU, this is reflected for example in the GDPR, which grants rights to data collectors as well as to natural persons whose behavior is observed. Exclusive private rights are not a good option in that case. Other EU data regulations, however, are swaying back and forth between more and less exclusive rights.

The cost effectiveness of EU regulation is often considered from a narrow private compliance cost

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[1] https://eur-lex.europa.eu/eli/reg/2016/679/oj.
[2] https://eur-lex.europa.eu/eli/reg/2023/2854.
[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex-%3A52022PC0197. Final version of the regulation not published yet.
[4] Virkkunen Mission Letter; see https://commission.europa.eu/document/3b537594-9264-4249-a912-5b102b7b49a3_en.

perspective. Following the EU's own "Better Regulation Guidelines" (EC 2023), we take a wider social welfare perspective. We examine the cost of forgone opportunities to achieve more efficient data markets and thus more efficient data-driven product and services markets. In the following section, we introduce two economic criteria to assess the potential economic efficiency gains from non-rival data: economies of scope in the reuse of data and economies of scope in data aggregation. Transaction costs can block these efficiency gains. These gains may create a gap between the private and social value of data. That constitutes a market failure that justifies regulatory intervention in data markets.

The third section applies these criteria to three existing EU data regulations: the GDPR, the Data Act, and the EHDS. It explores what can be done to improve their efficiency. For the GDPR, which entered into force in 2018, there is considerable empirical evidence about its opportunity costs. Other regulations are not in force yet and therefore cannot generate empirical evidence. We examine these from a more theoretical perspective and find that there are good reasons to suspect continued data market failures. We propose ways to improve them. The final section attempts to generalize from these case studies. It focuses on the growing tension between exclusive private rights and the social value of data and suggests ways to overcome this.

THE EFFICIENT USE OF DATA AS A PRODUCTION FACTOR

Data non-rivalry generates two potential sources of economic benefits:

- *Economies of scope in the reuse of data* (Panzar and Willig 1980; Teece 1980): once collected, data can be reused for many purposes at the same time. For example, the data that Google collects from search queries, data embedded in a bank account, or collected by a car can be reused for other services and/or other service providers, to offer complementary and competing services: advertising, payment services, car maintenance services.
- *Economies of scope in data aggregation* (Bajari et al. 2019; Calzolari et al. 2021; Carballa et al. 2023): data from many different sources can be pooled and aggregated. The data collected by search engines, navigation apps, and medical service providers becomes more valuable when aggregated across more users. Pooled data can reveal patterns and deliver service insights that cannot be extracted from fragmented datasets or individual data. For example, target advertising, social media newsfeed, or search engine recommendations would not be feasible with fragmented personal data.

Teece (1980 and 1982) pointed out that the existence of unrealized alternative services indicates a market failure for complementary service production inputs. For example, the holder of car navigation data may not have access to complementary data about hotels and restaurants and is therefore not in a position to offer a driver additional travel services. In the absence of vertical integration, he may try to join forces with a firm that has this data but strategic behavior makes contracting difficult (Schulze et al. 2006). He may also fear that the data will be used against his interests. As a result, data market failures persist and may require regulatory intervention. In some cases, markets can overcome obstacles to data reuse and aggregation. For example, Google Maps and Waze apps combine road and navigation data with complementary data about businesses and services locations and are able to privately monetize at least part of the consumer surplus value of economies of scope in reuse, and economies of scope in aggregation of this data across many users, through advertising.

These two sources of data efficiency gains imply that the social value of data for society as a whole is often higher than the private value for the original data co-producers. An efficient data regime should bridge that gap as much as possible and overcome the tension between private claims to data and the collective value for society. Unless private data holders can be incentivized by a business model that enables them to monetize economies of scope in the market, regulators may have to impose mandatory data sharing.

Transaction costs often stand in the way of realizing economies of scope. First, finding partners to share the data with, or arrange complementary inputs to generate value, may be difficult. Data cannot be exposed in a showroom. Because data is non-rival, it is hard to determine the value that data contributes to a data-driven service. Negotiated outcomes often depend on the market power of the partners. Second, data transfers often require intermediary institutions that define data formats and transfer protocols, and set the conditions for access and reuse. This can be simple for bilateral data sharing but may be complex for data aggregation or pooling between many parties.

POTENTIAL DATA MARKET EFFICIENCY GAINS IN EU DATA REGULATIONS

The General Data Protection Regulation (GDPR)

The GDPR (2019) is an important "foundational" data regulation that regulates markets for personal data collected from natural persons, not from legal entities. It imposes restrictions on the collection of personal data. Firms should ask for the consent of natural persons and should adhere to strict rules for the handling of this data. Personal data cannot be used for other

purposes than the ones for which it was collected. The GDPR grants natural persons the right to reuse their personal data for other purposes or let other service providers who compete with the original data collector reuse the data. That increases competition in data-driven services markets where the original data collector no longer has a monopoly over the data. There are no explicit provisions for data aggregation in the GDPR. However, data holders collect data from many persons and are therefore de facto data aggregators. Data holders can combine and pool different personal data sources provided that doing so is included in the consent notice.

The practical use of these rights often runs into high transaction costs. GDPR consent notices are too costly and vague for data subjects to be meaningful (Barocas and Nissenbaum 2009; Cate and Mayer-Schonberger 2013; Utz et al. 2019). Data subjects do not read the many consent notices that pop up during daily web surfing because they take too much time and are not intelligible. Requests for data access and transfers should be delivered free of charge by the data collector, in a common machine-readable format, but only within three months of the request. That delay greatly diminishes the service market value of the data. All this results in the so-called privacy paradox (Acquisti et al. 2016): natural persons consider privacy as important but in practice they do not use privacy protection tools because the costs of doing so are higher than the expected benefits.

The GDPR also imposes compliance costs on data service providers. Empirical evidence shows that the GDPR has reduced the supply of digital services in the EU, compared to other regions and to the pre-GDPR period (Johnson 2024). However, much of that evidence focuses on the supply side. It says little about the impact on consumer welfare on the demand side. Many of these missing services on the supply side might have reduced consumer welfare because they use personal data against the interests of the data subject. Others would have increased consumer welfare. How to distinguish between these two? Economists have so far been unable to come up with estimates of the economic value of privacy.

While the GDPR has created the potential for personal data market efficiency gains through economies of scope in data reuse and aggregation, policymakers still have some way to go to reduce transaction costs that impede the realization of these benefits. First, onerous transaction costs for consent notices could be substantially reduced by mandatory standardization and machine-readable consent notices. That could generate a more transparent market for consent services and enable natural persons to delegate that task to specialized service providers to handle it in function of users' stated preferences. It would also reveal preferences for different types of services and consent conditions. An ordinal ranking of preferences would be a step towards an economic assessment of welfare-augmenting and welfare-reducing personal data services. It would also put pressure on service providers to demonstrate data-sharing benefits for consumers, as a way to move up the ranking. Second, making personal data available in real time through APIs would greatly reduce transfer transaction costs and make transfers to competing service providers more meaningful in an online digital market setting.

The European Health Data Space (EHDS)

In fact, European data regulators have already gone far beyond the GDPR in terms of generating economies of scope in data reuse and aggregation, and in reducing transaction costs, for one of the most sensitive types of personal data: health data.

The EHDS is the first EU data regulation that distinguishes between market failures with regard to data reuse and data aggregation. Provisions regarding "primary" data transfers reduce transaction costs for one-to-one data reuse. It makes personal health data more accessible by defining the health data that should be made available for free "primary" reuse by other health service providers. It establishes intermediary health databases at the member state and EU levels that mandatorily store health data in a common format and sets protocols for data transfers.

It also includes provisions for "secondary" data pooling that go a step further and combine fragmented datasets from multiple parties in a single pool. It mandates free access to these health data pools for "secondary" scientific and policy research. Users only pay the marginal cost of access and processing of the data. This maximizes incentives for innovative research. In line with the Data Governance Act,[5] the intermediary aggregator remains neutral and does not monetize value-added from data aggregation. In some cases, private intermediaries may be in a position to offer incentives for data pooling when they can monetize at least part of the benefits of economies of scope in data aggregation and redistribute part of that value to data contributors. For example, online platforms in search, navigation, e-commerce, and social media have succeeded in doing so. In other cases, however, incentivizing private data contributors may be difficult because it is difficult to capture and privately monetize economies of scope. That requires regulatory intervention and mandatory data pooling to overcome these market failures. Some cases may also exhibit hybrid characteristics, with partial monetization and partial dissipation of benefits.

As such, the EHDS creates an almost perfect template for data regulations in other sectors that seek to realize the efficiency gains from economies of scope in data reuse and aggregation (Martens 2024). Of course, data requirements, formats, and protocols will have to be adapted to specific settings in other sectors.

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex-%3A32022R0868.

But the data market failures in terms of economies of scope and transaction costs that the EHDS addresses are very similar across sectors. Its governance regime could therefore easily be transposed to other sectors.

Still, the Commission decided not to apply the EHDS template in other "industrial" data pooling initiatives launched under the "European Strategy for Data" (European Commission 2020). For example, the draft policy proposals for a Common European Agricultural Data Space (CEADS) go in the opposite direction.[6] Designed by farmers organizations, it grants farm(er)s exclusive control rights over farm data co-producing parties. It essentially confirms prevailing agricultural data market conditions (Atik and Martens 2021) and thereby maintains the gap between the private and social value of agricultural data. This is all the more surprising since, under the EU's Common Agricultural Policy (CAP), a massive volume of farm data is already collected and pooled in databases. Rather than complementing these data pools with farm data that currently falls outside CAP requirements, it keeps the CEADS and CAP data segmented. Ironically, the CEADS design includes proposals for standard data formatting and transmission protocols for agricultural data, to reduce data transaction costs. But it offers no incentives to effectively use these standard protocols.

The Data Act

The Data Act will not become applicable until September 2025. There is no empirical evidence yet on its impact. Rather than filling the regulatory gap left by the GDPR for non-personal data, it created a new category, "product" data, i. e., data generated by the use of tangible devices that can communicate data wirelessly. This is a fuzzy category since all data requires a tangible carrier for interaction with users, whether held by users or located remotely. The Data Act facilitates economies of scope in data reuse by making it mandatory for manufacturers of devices to (a) inform the user about the raw data that is generated during use of a product; (b) make this data accessible to the user, free of charge and in real time; and (c) allow the user to transfer the data to a third-party service provider of his choice.

The Data Act also introduces a number of obstacles to data reuse.[7] First, the data holder can charge third-party data recipients a monopolistic price, though somewhat limited by Fair Reasonable and Non-Discriminatory (FRAND) conditions. The interpretation of FRAND in data pricing remains to be defined. The third-party service provider may (partially) recuperate this price from the product user. In that case, the user pays a second time for the same data. These pricing provisions illustrate the EU's wavering between exclusive ownership rights for one party and a fair distribution of rights between data co-generators.[8] The right for manufacturers to charge a license price for third-party access amounts to a quasi-ownership right.

Second, the Data Act puts anti-competitive restrictions on the reuse of product data. Data should not be used to design new products that compete with the product manufacturer. Data should not be transferred to the platform services of companies that have been designated as "gatekeepers" under the EU Digital Markets Act. This prevents a user from transferring data from, for example, smart home appliances to a Google Android or Apple iOS smartphone, or to a Windows computer. It prevents welfare-enhancing network effects in data reuse and aggregation in digital ecosystems.

The Data Act is the only EU data regulation that allows monopolistic pricing of third-party data transfers and puts anti-competitive restrictions on these transfers.

POLICY CONCLUSIONS: A BETTER DATA REGULATION AGENDA FOR THE NEXT COLLEGE

The Commission President has tasked the incoming College with improving existing EU data regulations. This paper proposes economic criteria to overcome market failures in economies of scope in the reuse and aggregation of non-rival data. It briefly examined the GDPR, the EHDS, and the Data Act with respect to these criteria and suggests improvements for a more competitive and innovation-oriented data market regulation.

The overall objective of data market regulation should be to narrow the gap between the private and social value of data, driven by reuse and aggregation, and minimize transaction costs. The three regulations achieve this by reducing the exclusive rights of data holders and granting access, reuse, and aggregation rights to data co-generators and intermediaries. The EHDS is "almost" perfect because it introduces protection of trade secrets and intellectual property held by these legal and commercial entities (Aplin 2024). They may constitute obstacles to economic efficiency gains from data reuse. The Data Act stands at the other end of the spectrum with a return to exclusive private data licensing and pricing rights for data holders.

This is where political data regime choices come in again. Policymakers decide on the trade-offs between individual and social welfare. The US tends towards the individual side, China towards the collective side, and the EU somewhere in between. However, the two sides are not necessarily juxtaposed. Pursuing social welfare does not necessarily imply weakening private rights to data. Technologies exist that can combine the two objectives, at least to some

[6] See https://digital-strategy.ec.europa.eu/en/library/blueprint-proposal-common-european-agricultural-data-space.

[7] For a more detailed discussion of the Data Act, see Sattler and Zech (2024).

[8] The EU Database Directive (1996) first introduced exclusive ownership rights on databases.

extent. For example, privacy-preserving technologies may still enable making personal or trade secrets data available for socially useful purposes. Realizing the full social value of data does not necessarily imply creating an Orwellian superstate that spies on citizens and companies. Governments should also be subject to data governance rules.

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Fredrik Erixon and *Oscar Guinea*

From Compliance to Constraint: How Digital Regulation Impacts Productivity and Innovation in Europe

KEY MESSAGES

- **A big part of the EU-US productivity gap is due to the EU investing less in ICT-related tangible and intangible capital**
- **These lower investments are partly explained by EU digital regulations limiting companies' access to modern endowments like data**
- **Limits to these endowments push EU firms towards a market specialization in less ICT-intensive activities**
- **The EU has overlooked the full impact of digital regulations by focusing on compliance over these behavioral effects**
- **The EU must reduce digital regulation restrictiveness to increase the contribution of digital technologies to productivity growth**

Mario Draghi's report on European competitiveness is a wake-up call for EU policymakers. It presents several reasons that explain the EU's poor economic performance. Chief among them is that Europe is behind the global frontier in the digital and structural transformation of the economy. Draghi says that "the key driver of the rising productivity gap between the EU and the US has been digital technology" (Draghi 2024, 20).

There are many factors behind Europe's underperformance in the creation and diffusion of information and communication technologies (ICT). One of these factors relates to the design of its regulations, particularly regulations that pertain to digital markets and technologies. The first part of the article explains how Europe's poor record in ICT investments impacts on its productivity performance. The second section sketches a typology to understand the economic consequences of these regulations. The final section presents the key policy conclusions.

EU-US PRODUCTIVITY DIFFERENCES AND THE ROLE OF ICT

In 1990, labor productivity in the EU and the US was very similar, with each worker's annual output averaging close to USD 53 per hour. However, a gap has since emerged – and it continues to grow – with US labor productivity now nearly USD 15 higher than the EU (Erixon et al. 2024b). The growing productivity gap between both economies can be explained by the difference between the two economies in total factor productivity (TFP) growth. While TFP's contribution to labor productivity has declined in both the EU and the US, TFP made a much more significant contribution in the US than in the EU (Erixon et al. 2024a).

TFP measures how efficiently an economy is producing goods and services. A significant factor increasing TFP is investment in intangible capital. Studies estimate that that one-fifth of intangible capital growth translates into gains in TFP. In other words, when a firm raises its investments in intangible capital by 1 percent, the knowledge spillovers that it generates translate into a 0.2 percent increase in TFP (Corrado et al. 2022). Between 1995 and 2020, the share of investments in intangible capital over gross value added (GVA) was, on average, 5 percentage points higher in the US than in the EU (Erixon et al. 2024a). Many of these intangibles relate to ICT such as databases, AI, and software programs. These ICT intangibles make a strong contribution to productivity and economic specialization. First, digital technologies help make business activities more divisible and create new opportunities for the internationalization of production, not least in services that have long been considered non-tradables. Second, digital sectors include a great deal of R&D activities.

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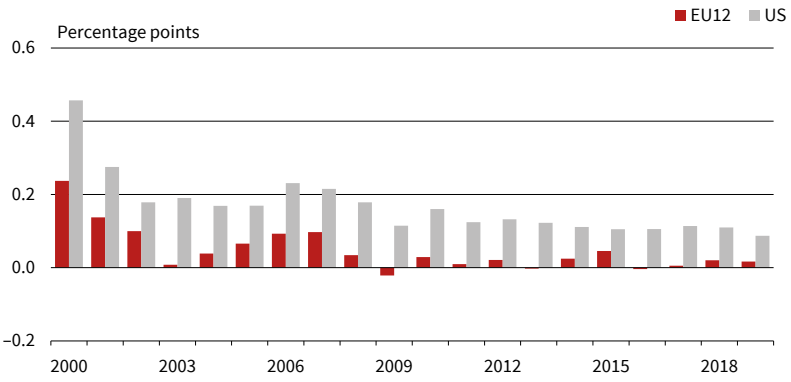
The EU and the US also diverge in their levels of investment in tangible ICT infrastructure. Physical assets such as computers, cables, and data storage facilities are necessary to support the deployment of ICT intangible investments. During the 1995–1999 period, both the EU12[1] and the US invested between 4 and 5 percent of non-residential capital into ICT equipment. However, by 2015–2020, this number increased by almost 16 percentage points in the US, while it went up by just 3 percentage points in Europe. (Erixon et al. 2024b).

The EU's sluggish investment in ICT intangible capital and digital infrastructure has resulted in an EU ICT sector that makes a much more modest contribution to Europe's value-added growth than the US ICT sector does to the US economy. As identified in the Draghi Report, this is a drag on the EU economy. First, it dampens the productivity gains from the diffusion of ICT technologies. Second, it undermines future productivity growth in the EU that could come from the next generation of intangible-related innovations, such as AI. Figure 1 shows the contribution of ICT services to value-added growth for the EU12 countries and the US. Though both regions follow a similar downward trend, US ICT services contributed, on average, six times more to value-added growth than in the EU12 (omitting years of negative contribution). (Erixon et al. 2024b).

Figure 1

Contribution of ICT Services to Value-Added Growth



Source: EU KLEMS – INTANProd. © ifo Institute

REGULATORY RESTRICTIONS, TYPOLOGIES, AND ECONOMIC EFFECTS OF EU DIGITAL REGULATION

Regulatory restrictions affect the extent to which firms can adopt digital technologies. For instance, restrictive regulation can limit access to digital technologies and services; decrease a firm's ability to use ICT-related intangible capital; and disincentivize firm growth, which hinders efforts to adopt digital technologies. Van der Marel (2020) shows that there is a negative association between digital adoption rates and the restrictiveness of digital regulation across the EU.

Moreover, during recent years, the amount of EU regulation in the digital sector has continued to grow (Sekut and Marcus 2024). As an example, in the case of EU Data and Privacy and E-commerce and Consumer Protection regulation, the number of pages and articles, which can be understood as proxies for regulatory complexity, increased by 833 (pages) and 758 (articles); while the count of the number of times the word "shall" appeared in the regulation, which can be used as a proxy for restrictiveness, grew by 3,673 (Guinea and du Roy 2024).

However, it is not only the volume but also the design of the regulation that matters. EU digital regulations, such as the General Data Protection Regulation (GDPR), the Digital Markets Act (DMA), the Digital Services Act (DSA), and the Artificial Intelligence Act (AI Act), cover many different aspects of the digital economy. These comprehensive regulations combine features of product regulation, market access regulation, and regulations governing firms' behavior, concepts traditionally used in competition policy to prevent abuse of market dominance. They are often ambiguous and sources of uncertainty, and they are rarely delineated in ways that conform to traditional concepts of regulation. As such, they are difficult to classify under previous indicators that measure regulatory restrictiveness, such as the OECD Product Market Regulation (PMR) or the OECD Digital Services Trade Restrictiveness Index (DSTRI).

We propose a new way to conceptualize the impact of these new EU digital regulations on the economy. Our starting point is that these regulations profoundly affect economic endowments. Historically, economists studied three key endowments: land, labor, and capital. Countries with abundant land, for example, often specialized in agriculture. By contrast, those with less land but an abundance of labor focused on labor-intensive industries, like manufacturing. As the economy has modernized, some endowments (such as land) have become less significant, while modern endowments, such as data and digital competencies, have emerged.

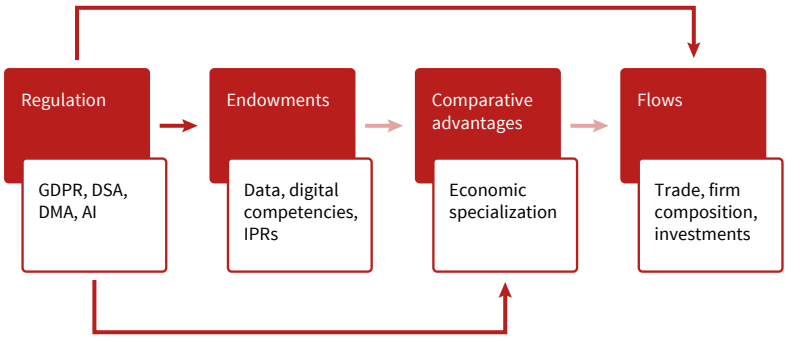
These digital endowments (many of them tangible and intangible ICT-related capital) are exploited by firms to create different comparative advantages within the economy. However, regulations play a crucial role in the ability of firms to transform these endowments into advantages. For instance, if digital regulations restrict access to endowments like data, firms may import goods and services with these endowments embedded – provided it is allowed. In such cases, downstream services can still function, but the regulation limits sectors and firms to specific segments of the supply chain.

Regulations do not influence only advantages but also the flows that result from these advantages. For example, a regulation can affect the portability of data between countries, which impacts their ability

[1] EU12 countries include: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain.

Figure 2

Model for Understanding the Behavioral Effects of Regulation



Source: Authors' own compilation. © ifo Institute

to export digital services. Digital regulations can also affect the relative balance between firms that are old or young, or big or small. For instance, digital regulations can limit access to endowments, such as data, through restrictions on intermediate services, making it more expensive for firms to access these endowments through the market. Indirectly, these regulatory restrictions benefit big companies, with access to in-house data processing, and penalize younger and smaller ones, which are more dependent on the market to access these endowments, making it harder for them to grow, thereby lowering their productivity and inhibiting their innovations. This has negative knock-on effects on the economy (Barone and Cingano 2011; Ferracane and van der Marel 2021, 2020a, and 2020b).

Figure 2 presents this conceptual framework. It describes how regulations impact modern endowments, advantages, and flows. At the same time, simply by limiting access to endowments, regulations shape the way firms create different comparative advantages and specializations, which ultimately lead to specific economic flows such as trade, changes in firm demographics, and investments.

These effects have been identified empirically in the case of the GDPR. Article 5 of the GDPR limits firms' ability to combine data for purposes other than those originally intended. These limitations on endowments affect Europe's comparative advantage. For example, EU firms had to destroy substantial amounts of data upon the entry into force of the GDPR. Forward data endowment creation was also damaged: EU firms stored 26 percent less data on average than US firms two years after the GDPR, and reduced computation relative to US firms by 15 percent (Demirer et al. 2024). Ultimately, GDPR also contributed to changes in flows such as innovation, with new app (Janßen et al. 2022) entries falling by half, and firm demographics in favor of older and bigger companies (Chen et al. 2022).

The DSA, DMA, and AI Act have been approved too recently for empirical evidence to emerge. However, since these regulations are also all-encompassing, the conceptual framework in Figure 2 helps us foresee some of the potential impacts on economic endowments, comparative advantages, and flows.

The DMA builds on the assumption that the combination of endowments or assets should be prevented when pursued by gatekeeping platforms. A core aspect of the DMA has the explicit intention of making it more difficult for firms to combine different sets of data. The obvious result is that gatekeeping firms will have to reduce the usefulness and competitiveness of the services they provide or could potentially offer in the future, impacting advantages and flows for EU firms. This is one of the reasons why some US firms have decided to pause the introduction of new data and AI services in the EU.

Endowments and advantages may also be impacted by the DMA with regard to scale. First, the threshold defining the designation of gatekeepers could incentivize digital firms to self-impose limitations on scale to avoid burdensome regulatory obligations. Second, the DMA is likely to reduce the incentives for outsourcing business activities to third parties. Finally, the AI Act defines the degree of regulatory restrictions based on the ethical risks associated with certain types of AI development. This approach tends to discourage offshoring and favors corporate solutions that make business activities indivisible, favoring large and established companies over younger and smaller ones, which are more dependent on intermediate services to buy the endowments they require for their products.

For the economic effects of new types of data regulation to be understood, new conceptual frameworks are necessary. Moreover, it is also required that the regulator, in the first place, is interested in factoring in economic effects when regulations are designed. The past decade of new data regulations in

Table 1

Cost Identified in the EU IAs for the GDPR, DSA, DMA, and IA Act

Regulation	Identified costs
GDPR	Large companies need to designate data protection officers and conduct data protection impact assessments. The IA identifies the risk of slow innovation. However, quantification of this risk is not provided.
DMA	Gatekeepers need to hire compliance officers and additional employees to handle regulatory inquiries. The IA identifies negative impacts on gatekeepers' profits and investments in innovation and recognizes that gatekeepers' innovations can spread to smaller companies. However, these negative impacts on profits and innovation investments are not quantified.
DSA	Large platforms face new obligations for transparency, content moderation, and reporting requirements. Platforms need to invest in new systems for handling users' complaints and complying with due diligence obligations. The IA recognizes that these compliance costs can have negative effects on the growth and innovation of European online platforms. However, innovation slowdowns and reduced investments were not quantified.
IA Act	High-risk AI applications must ensure the transparency, accuracy, and robustness of algorithms. This includes third-party conformity assessments and audits. These requirements result in substantive administrative costs in the form of documentation and reporting requirements. The IA recognizes that some firms may shift their focus from high- to low-risk applications, potentially reducing investments in more advanced AI solutions. However, the cost of investment displacement was not quantified.

Source: Authors' compilation.

the EU is in many ways an example of the opposite: the regulator has rather seemed actively disinterested in learning about the potential economic effects of the new regulations.

There were many weaknesses in the economic analyses conducted by the EU. However, the main weakness was that it completely disregarded the dynamic or behavioral costs of these regulations. Remarkably, as can be seen in Table 1, the only costs identified and quantified in the impact assessments (IAs) were direct compliance and administrative costs – and, as far as the GDPR is concerned, the observed ex-post compliance costs were far higher than those estimated in the IA. However, for these far-reaching regulations, the main costs are not the compliance burden, but the behavioral and downstream economic effects spurred by their implementation.

The conceptual framework in Figure 2 clearly shows that these regulations prompt firms and markets to change their current and future behavior. These changes manifest in the way firms access endowments, find their comparative advantages, and result in specific flows where some digital activities are penalized. As a result, the EU economy continues to be dominated by non-digital activities, dragging its performance down. Unsurprisingly, investments in tangible and intangible ICT-related capital and the contribution of ICT to the economy are much smaller in the EU than in the US, where the level of regulatory restrictions for the digital economy is much lower.

POLICY CONCLUSIONS

In this article we have argued that:

- The EU ICT sector makes a smaller contribution to the EU's value-added than the contribution of the US ICT sector to the US economy. This lower contribution can be explained by the EU's lower levels of investments in tangible and intangible ICT-related capital compared to the US economy.
- These lower levels of investment can be further explained by higher levels of restrictiveness in EU digital regulations. These regulations primarily affect firms operating in industries that are heavily reliant on digital technologies. This is significant because the creation and adoption of ICT are key drivers of higher productivity growth.
- The EU has failed to understand and quantify the full impact of its digital regulations, as it has focused on the administrative and compliance costs rather than the behavioral effects on firms, which account for the largest impacts of these regulations.
- We propose a conceptual framework that emphasizes these behavioral effects. This framework is based on digital endowments, advantages, and flows. Regulations that limit access to digital endowments, such as data, incentivize firms to specialize in less data-intensive activities. This market specialization leads to a flow of production, trade, and investment where non-digital activities play a larger role in the overall economy, to the detriment of digital ones.
- The true extent of the economic effects of the EU's digital regulations is already apparent in the case of the GDPR. Given that other EU digital regulations, such as the DSA, DMA, or the AI Act, are also all-encompassing, similar effects to those identified for the GDPR can be expected from these regulations.

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Gabriel Felbermayr and *Klaus Friesenbichler*

Considerations for Member States Implementing the EU Supply Chain Regulation

KEY MESSAGES

- **The EU Corporate Sustainable Due Diligence Directive shifts the costs of compliance with social and environmental rules to private entities within complex supply networks**
- **To ensure effective and cost-efficient implementation, the Directive should aim to reduce economic complexity**
- **Regulations should exempt countries with strong regulatory systems**
- **Public agencies should establish harmonized standards, and organize a private certification scheme that focuses on suppliers rather than the entire network**
- **The new European Parliament may need to adjust the legal framework accordingly**

The integration of developing countries into global production networks has led to a more specialized division of labor and a greater inclusion of developing economies in global value chains (Timmer et al. 2014). At the same time, internationalization of production has facilitated the alleviation of poverty worldwide. World Bank data indicates that the number of people living in absolute poverty decreased from 2 billion in 1990 to less than 650 million in 2019, even as the global population grew from 5.3 billion to 7.8 billion. This economic integration has driven growth and improved economically defined social welfare indicators (Felbermayr et al. 2022).

However, it has also led to increased economic inequality (Helpman 2018; Feyrer 2019) and mixed environmental outcomes (Cherniwchan 2017). The relocation of production to countries with lower labor costs and weaker social and environmental standards has resulted in human rights abuses and environmental degradation. Despite international frameworks like the 1948 Universal Declaration of Human Rights and the 2015 Paris Agreement, compliance remains inconsistent, exacerbated by the rise of autocratic governments. According to the V-Dem Institute, 72 percent of the world's population lived in autocracies in 2022, the highest level since 1986 (Papada et al. 2023).

In response to the unintended consequences of globalization, several countries are introducing supply chain due diligence regulations (Smit et al. 2020). In the United States, there are similar regulations, such as the Slave-Free Business Certification Act of 2022. In Europe, France implemented the "Loi de Vigilance" in 2017, and Germany enacted the "Lieferkettensorgfaltspflichtengesetz" in 2023. To prevent fragmentation of due diligence requirements across the EU's single market, the EU adopted the Directive on Corporate Sustainability Due Diligence.

The aim of this paper is to assess this Directive from an economic policy perspective. There are no comprehensive econometric evaluation studies of existing due diligence laws, and the Directive has just been passed. This is why we apply classical economic concepts to make progress. We do this in a changed economic and political environment: the new European Commission prioritizes growth and security. The Deforestation Directive, another controversial piece of legislation with similar motivation, has been postponed. And even within the German government, a champion of supply chain regulation, vice-chancellor Habeck from the Green party declared that the legislation took a "completely wrong turn." He went so far to say that one needs "to start the chainsaw and cut the whole thing down." The European Supply Chain Directive should be implemented with as little bureaucracy as possible.[1]

[1] https://www.welt.de/politik/deutschland/article253819876/Beim-Lieferkettengesetz-sei-man-voellig-falsch-abgebogen-sagt-Habeck.html.

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THE EU DIRECTIVE ON CORPORATE SUSTAINABILITY DUE DILIGENCE

The EU Directive on Corporate Sustainability Due Diligence (CS3D) aims to address adverse societal and environmental impacts of international trade by enhancing corporate governance and promoting sustainable practices throughout global value chains. Originally proposed in 2022 (CS3D; 2022/0051/COD), it entered into force on July 25, 2024 (Directive 2024, 1760), after intense discussions and adjustments. It aims to foster sustainable and responsible corporate behavior in companies' operations and across their global value chains. The regulations seek to ensure that companies identify and address adverse human rights and environmental impacts of their actions inside and outside Europe. Firms operating in the EU need to ensure that they abide by the EU's ethical, environmental, and labor standards throughout their operations.

The rules will apply to approximately 6,000 large EU-based companies with more than 1,000 employees worldwide and a net turnover exceeding EUR 450 million. It will also affect approximately 900 large non-EU companies with a net turnover exceeding EUR 450 million within the EU. The Directive includes provisions to facilitate compliance and minimize the burden on companies, both in scope and throughout the value chain. Companies will have to bear the burden of establishing due diligence processes and adjust their operations if necessary. Micro companies and SMEs are not directly covered by the proposed rules. However, they will be indirectly affected as they are integral parts of the supply chains. EU member states are required to transpose the Directive into national law and communicate the texts to the European Commission by July 26, 2026. One year later, the rules will start to apply to the first group of companies, following a staggered approach, with full application on July 26, 2029.

The adoption and implementation of due diligence in accordance with the proposed EU CS3D is fraught with barriers and challenges, particularly with respect to the requirements to identify, mitigate, and prevent human rights abuses and adverse environmental impacts throughout the value chain. Although an increasing engagement of companies in international business has led to a larger number of firms reporting on corporate responsibility and supply chain due diligence to meet the demands of suppliers, buyers, investors, customers, and regulators, many companies do not yet comply with the required due diligence practices as proposed by the EU CS3D (Meyer and Reinstaller 2022). The cost of implementing and monitoring the CS3D depends on the stage of the supply chain, the industry, and the location of trading partners.

The rationale of the CS3D is to address the lack of public enforcement in third countries by involving private companies in monitoring compliance. While some companies have voluntarily improved their supply chains, many have not due to the associated costs. Government intervention is necessary to prevent a "tragedy of the commons," but private companies cannot fully replace public enforcement mechanisms. The Directive aims to avoid fragmentation of due diligence requirements across the EU, ensuring a consistent approach to enforcing international law. It reflects the EU's commitment to social and environmental sustainability and responds to public demand for goods produced in compliance with these standards (Felbermayr et al. 2024).

TOWARD AN EX-ANTE ASSESSMENT

Firms' Reactions

The CS3D could lead to EU importers withdrawing from certain countries if compliance costs and the risks of continued operations become too high, negatively impacting diversification and economic development in those regions. Withdrawal could push employment into the informal sector, where conditions regarding human rights and environmental standards are worse. Preliminary evidence from France indicates that importers have withdrawn from small, risky countries, consistent with research showing that supply chain disruptions can harm company value (Duthilleul and de Jouvenel 2020; Kolev and Neligan 2021). There is also a risk of trade diversion, with trading partners from other countries with weaker requirements, such as China, filling the gap left by EU companies.

The Directive's impact on international economic relations must be carefully monitored to avoid unintended consequences. If costs become prohibitive, EU importers may reduce their engagement with certain source countries, undermining efforts to diversify EU imports and strengthen resilience. This could also hinder the economic development of poorer countries losing access to the EU market. The CS3D may unintentionally drive employment into less regulated informal sectors, exacerbating human rights and environmental issues. Trade diversion to non-EU importers could aggravate these dynamics.

Complex Inter-Firm Relationships

Effective assessment of supply chain regulations is hindered by limited data availability. In a recent technical paper published by the Supply Chain Intelligence Institute Austria (ASCII), this challenge was addressed by a synthetic dataset of EU firms. The dataset makes it possible to quantify the likelihood of links to firms that are potentially involved in human rights or child labor abuses in their supply chain (Hurt et al. 2023). The findings indicate that nearly every company in Europe faces supply chain risks because networks of suppliers and customers are very dense. The CS3D

could apply to approximately 20,000 EU-based companies, affecting millions of supply relationships. Monitoring these relationships is complex, as companies often lack a complete picture of their entire supply chain due to data protection and privacy concerns.

The extensive network of supply chains means that even small companies are exposed to risks through indirect relationships. On average, companies have thirty to fifty suppliers, with large firms having thousands. This complexity necessitates comprehensive monitoring, which the CS3D aims to address. However, the requirement to monitor such vast networks poses challenges in terms of data availability and the ability to effectively track compliance. The Directive's implementation will require innovative solutions to manage these complexities and ensure compliance across multiple levels of the supply chain.

Transaction Costs

The CS3D increases transaction costs, which may lead to fewer suppliers and reduced diversification. The Directive aims to improve local conditions but may result in withdrawal if operations become unprofitable. While increased monitoring can reduce the likelihood of abuses, it cannot eliminate risks entirely. The effective relationship-specific fixed costs include direct bureaucratic costs, the probability of failure, and potential fines and reputational costs. Companies may withdraw from foreign countries if they perceive high risks, leading to a concentration on fewer suppliers and undermining efforts to diversify the EU's supply base (Melitz 2003; Helpman et al. 2008).

The Directive's impact on fixed costs must be carefully managed to prevent adverse effects on supplier relationships (Wolfmayr et al. 2024). As costs rise, smaller suppliers may be excluded, reducing competition and diversity. This could lead to a concentration of suppliers, increasing vulnerability to supply chain disruptions. The CS3D must balance the need for rigorous compliance with the practicalities of maintaining diverse and resilient supply networks. Strategies to mitigate these costs, such as streamlining monitoring processes and leveraging technology, will be crucial to the Directive's success.

PILLARS OF THE IMPLEMENTATION

Any such regulation should be effective, i.e., it should improve local conditions, and efficient, i.e., it should not create an extra burden to firms and minimize adverse effects. Given the interwovenness of modern supply chains, complexity reduction is essential to achieve these targets. In practice, this concerns the monitored relationships, the geographic scope of the regulation, and the practical implementation (Felbermayr et al. 2024).

To ensure effective implementation, the Directive should limit fixed costs at the company level. Monitoring should focus on suppliers rather than bilateral relationships to reduce complexity and thus costs. Implementing a certification and blacklisting system could decrease monitoring expenses and enhance compliance incentives. Certification by specialized firms should ensure that the Directive's objectives are effectively implemented and relieve EU importers of liability. This should foster a European certification industry, which, in turn, would require efficient and effective regulation and oversight. This more centralized approach would allow for more efficient monitoring by focusing on the nodes of supply networks rather than individual links, reducing overall costs and increasing compliance incentives.

The geographic scope of the regulation should be limited to reduce the bureaucratic burden. It should not apply to transactions with trading partners in countries with strong rule of law, such as EU member states, EFTA countries, the US, Canada, Australia, New Zealand, Japan, and South Korea. A certification system could operate at the country or company level, carried out by public authorities or specialized private companies. This market-based solution would be more efficient than a government solution and can be thought of as resembling the financial auditing sector.

A certification (and blacklisting) system offers significant advantages in terms of efficiency and effectiveness. By pooling due diligence costs, the system increases the overall efficiency of monitoring. Certification would provide a "positive list" of compliant companies, incentivizing suppliers to meet EU standards. Non-compliance would result in delisting, amplifying the consequences for suppliers.

This approach not only reduces costs but also extends the EU's influence on global supply chains, creating a "Brussels effect" that encourages broader adoption of EU standards. Third-country companies that undergo EU certification would demonstrate compliance with norms not only regarding their business dealings with EU companies but with all their global clients and suppliers. In that sense, the CS3D would gain an extraterritorial application.

POLICY CONCLUSIONS

The CS3D mandates due diligence on companies' operations and supply chains to identify and mitigate adverse impacts on human rights and the environment. In this policy piece, we warn that the focus on supplier-buyer linkages is exponentially more complex than an alternative approach that focuses on suppliers, therefore driving up relationship-specific costs for European importers by more than necessary. The higher the costs, the more damaging the CS3D is to the EU's own narrow economic interests, the lower is the effectiveness of the CS3D, and the stronger are unwelcome collateral effects. Indeed, higher fixed costs per supply link make a withdrawal of EU buyers from risky markets or a concentration on fewer but

larger suppliers more likely. This would jeopardize the EU's goals to foster development in poorer countries and to diversify its own supplier base. So, for an array of reasons, any national implementation of the directive should focus on minimizing such costs.

Therefore, we advocate a certification scheme at the supplier level that could shift liabilities and reduce costs while improving local production conditions. However, residual risks, particularly in concentrated upstream market structures, persist. The system offers an opportunity to extend EU values beyond EU-based production networks, promoting broader compliance with sustainable practices. By effectively pooling the costs of due diligence, a certification approach increases the efficiency of the monitoring system and enhances the EU's influence on global supply chains. Obviously, our proposal achieves maximum effectiveness and efficiency only if all member states cooperate on the proposed certification mechanism. To guarantee this, adjustments to the Directive's legal text may be needed.

The Directive represents a significant step toward ensuring that EU companies uphold high ethical, environmental, and labor standards throughout their operations. While challenges remain, particularly in balancing costs and benefits, the CS3D provides a framework for promoting sustainable and responsible business practices.

Its success will depend on careful implementation, ongoing evaluation, and the ability to adapt to evolving global dynamics. The CS3D has the potential to set a global benchmark for corporate sustainability, driving positive change across industries and regions.

The EU should not do this alone. In the United States, similar policies are being passed, and policies in the EU and the US should be aligned so that they jointly create social and environmental standards that are internationally binding for trading partners with both blocs.

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Thomas Weck

EU Competitiveness at a Crossroads: Why the Draghi Report Falls Short, and the EU Treaties Offer a Solution*

KEY MESSAGES

- **The EU Treaties rely on an open market economy – the Draghi Report does not**
- **The EU's lag in cutting-edge tech is known, and Draghi's state-driven response is unconvincing**
- **EU overregulation is an issue particularly in the strategic areas identified by Draghi**
- **Large-scale public funding distorts markets and burdens the population**
- **The Draghi Report advocates reducing dependencies, but lacks global trade strategy**

On September 9, 2024, Mario Draghi delivered what the President of the European Commission, Ursula von der Leyen, had asked him to do in March 2023. The "Draghi Report" (Draghi 2024) recognizes that the EU economy has grown more slowly than the US economy and in particular has failed to contribute to the "digital revolution." The Union is weak in the economic use of advanced technologies. Given Europe's ageing population, this economic weakness is an "existential challenge."

In its analysis, the Draghi Report holds no surprises. It should be common knowledge by now that the EU, as Draghi writes, needs to digitalize and decarbonize its economy and, given the wars surrounding it, also increase its defense capabilities. To meet the identified challenges, the Draghi Report advocates institutional and economic measures. These measures should focus on "giving Europeans the skills they need to benefit from new technologies," using "decarbonization [as] an opportunity" to boost "competitiveness and growth," as well as "increasing security and reducing dependencies" (Draghi 2024, 2–3). In that respect, the Draghi Report may be read as an "action plan" for the Commission.

What the Draghi Report does not do, however, is advocate for changes to the EU's legal architecture. The existing framework, established by the Treaty on European Union (TEU) and the Treaty on the Functioning of the European Union (TFEU), is designed to "achieve the strengthening and the convergence" of the member states' economies and "to promote economic and social progress for their peoples."[1] Thus, the question is: How do the recommendations in the Draghi Report compare with that framework? The short answer: the EU economy would probably gain more from fully implementing the existing Treaty framework than from following the recommendations of the Draghi Report.

SUBSTANTIAL DEVIATIONS FROM THE SINGLE MARKET CONCEPT OF THE TREATIES

Competition – From Success Factor to Obstacle

The EU Treaties mandate the establishment of an internal market characterized by "undistorted competition," supporting a market-driven economy.[2] Most EU competences can be seen as reinforcing this market economy.

While the European Court of Justice (ECJ) has never strictly defined "competition," it has clarified that "competition on the merits" benefits consumers through lower prices, better quality, and greater choice.[3] Competition, as an open-ended process, guarantees all market participants – suppliers and consumers – their fair share and drives innovation as long as it remains undistorted.

According to the ECJ, competition is distorted when equality of opportunity no longer exists.[4] The EU Treaties safeguard the internal market from two threats to competition: one threat arises from the collective or unilateral exploitation of market power by companies, which harm consumers to their own advantage (Art. 101–102 TFEU). The other threat arises from distortive measures adopted by EU member states. In that regard, the Treaties view state action to remedy market failures less critically than sovereign interventions when markets might operate better absent state intervention or when member states use

* The author declares that the Frankfurt Competence Centre for German and Global Regulation (FCCR) receives regular funding by companies that have been or are involved in competition proceedings at EU and/or national level, although it is independent vis-à-vis funding partners.

[1] Preamble of the TEU.
[2] Art. 3(3) sentence 1 TEU in conjunction with Protocol No. 27.
[3] ECJ, Judgment of 12.05.2022, C-377/20 – *SEN*, ECLI:EU:C:2022:379, para. 85.
[4] ECJ, Judgment of 13.12.1991 18/88 – *RTT/GB-Inno-BM*, ECLI:EU:C:1991:474, para. 25.

subsidies, so-called state aid (Art. 106, 107 ff. TFEU). Additionally, EU competition rules aim to prevent market fragmentation along state borders, thereby supporting the EU's fundamental guarantees for the free movement of goods, services, persons, and capital (Art. 34 ff. TFEU). Exceptions from all these rules exist for areas like agriculture and fisheries (TFEU, Title III).

While the Treaties promote the competitiveness of the EU industry as a whole, competition rules restrict industrial policies by member states that could lead to the creation of national champions.[5] Moreover, Article 173(3) TFEU specifies that measures of the EU to promote competitiveness "shall not […] lead to a distortion of competition" or infringe on rights relating to employment or taxation.

The Draghi Report highlights valid concerns that EU companies struggle to "translate innovation into commercialization" and to scale up to compete with advanced technologies. However, Draghi also notes that "EU competition enforcement [is] possibly inhibiting intra-industry cooperation." Moreover, he criticizes that "the EU and member states have tended to view mergers in the sector negatively" (Draghi 2024, 26–27).

This suggests a shift in competition policy toward supporting suppliers and industrial policy, aligning with the agenda for the next Commission. Ursula von der Leyen made clear in her candidate speech to the European Parliament that "we need a competition policy that supports companies to scale up" (von der Leyen 2024a). This was also reflected in her Mission Letter to the designated Competition Commissioner, which includes a push for "modernizing" competition rules, particularly regarding state aid, and calls for the fast-tracking of Important Projects of Common Interest (IPCEIs).

Internal Market Regulation – Overburdening the Market Instead of Removing Barriers

In an internal market characterized by undistorted competition, consumer demand typically drives the adoption of new technologies. If this process stalls, one major reason – discussed at length by Draghi – is the interference of regulation, which may slow down market activities.

To address this potential obstacle, the EU Treaties grant the Union broad legislative powers to harmonize laws when national regulations act as market barriers (Art. 114 ff. TFEU). The Treaties also limit member state taxes that could hinder the free movement of goods and services (Art. 110 ff. TFEU). Moreover, the EU is tasked with reducing regional disparities by strengthening economic, social, and territorial cohesion between member states (TFEU, Title XVIII).

However, EU competences in environmental protection and energy are more limited (TFEU, Titles XX and XXI). Environmental policy focuses on risk and resource management, while energy policy centers on supply security and efficiency. EU legislative powers in these areas are largely restricted to promoting energy market interconnection, savings, and renewable development – without promoting specific industrial sectors. Where competences are not conferred to the EU, they remain with the member states, which can complicate cross-border challenges such as energy supply security (Art. 5(1)–(2) TEU). Here, the Treaties distinguish between EU risk management and member-state-led economic development, both subject to EU competition rules.

Additionally, the Treaties allow the EU to develop guidelines, standards, and funding mechanisms for trans-European networks in transport, telecommunications, and energy infrastructure, complementing its internal market competencies and fostering competitive markets (TFEU, Title XVI).

The Draghi Report correctly identifies regulation as a barrier fragmenting the single market. What it does not discuss in detail is that particularly onerous EU legislation exists in the areas it deems strategically important – finance, the digital economy, and sustainability. EU laws in these areas often pursue multiple, unclear objectives, duplicating national rules (e. g., product liability), and some member states add their own rules ("gold-plating") (Draghi 2024, 26 and 65). This regulatory overload hampers both existing businesses and new market entrants, particularly in financing.

Meanwhile, the EU Capital Markets Union, which was intended to create resilient and efficient capital markets and to facilitate operation on these markets (by way of harmonized listing and insolvency rules), remains incomplete.

Internal Market Regulation – Eurocratic Targets Instead of Open Market Development

Fostering a dynamic market and promoting innovation is challenging, given the uncertainty of future consumer demand and competitive developments. Moreover, the EU's diverse cultural and historical landscape complicates a one-size-fits-all approach.

The EU Treaties take a measured approach to education as well as research and development (R&D), acknowledging their importance for the internal market but leaving policy development largely to the member states. The EU's role is primarily to promote cooperation in education and support R&D initiatives that strengthen its scientific and technological foundations (TFEU, Title XII). In contrast, the EU has very limited competences in the area of culture. This system strikes a balance between fostering coop-

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[5] See Art. 173(1) TFEU (*re* the promotion of competitiveness).

eration (EU competence) and allowing competition in knowledge development (member state competence).

The Draghi Report takes a more direct approach, highlighting shortcomings in academic excellence and the weak pipeline from innovation to commercialization. It attributes these issues to fragmented private financing and insufficiently focused public R&D spending (Draghi 2024, 24–25 and 29). Draghi specifically warns that inadequate investment in computing and connectivity could lead to bottlenecks, hindering the development of technologies like AI and foundation models (Draghi 2024, 27).

Notably, the Draghi Report emphasizes outcomes over the development of the EU's "scientific and technological bases." It treats academic and research output as measurable by EU institutions, paving the way for large funding programs aimed at commercialization. However, this focus on results does not guarantee future consumer demand for the products developed.

Funding – Arguing for Subsidies, Stepping Back from Calls for Necessary Reform

The EU Treaties provide for the establishment of an economic and monetary union to regulate the finances of the Union, its member states, and their economies (TFEU, Title VIII). The EU and the member states submit to obligations to coordinate their economic policies and to contribute to the establishment of the internal market (Art. 119(1), 120 TFEU). Public and private finances must be kept separate, and both the EU and member states are bound by sound budgetary policies to avoid deficits (Art. 123–126 TFEU).

The European Central Bank's monetary policy plays a supporting role (Art. 127 TFEU). However, this framework proved incomplete during the financial and debt crises of 2007–2014. The EU lacked express competences to stabilize the financial system, and the absence of a fiscal union hindered monetary policy efforts to stabilize the euro.

The Draghi Report does not call for fiscal reform. However, it retains one of its elements in isolation and advocates "the issuance of a common safe asset."[6] This is meant to improve the funding of innovative projects and make the Capital Markets Union "easier to achieve and more complete" (Draghi 2024, 59–62). The common safe asset would be part of an overall funding volume of EUR 750–800 billion annually. According to Draghi, this funding would consist of public and private funding as "the private sector will need public support to finance the plan" (Draghi 2024, 59). The sheer volume of proposed funding reveals that financial measures form the centerpiece of the recommendations in the Draghi Report.

The assumption regarding the public funding component seems to be that EU institutions can effectively identify projects deserving of funding. In this context, the concerns expressed above with regard to knowledge resources apply *mutatis mutandis*.

The External Relations – EU Self-Deprecation Instead of Promoting the EU's Attractiveness

Under the EU Treaties, the EU seeks to promote market economy principles in its international relations. To this end, the EU institutions are empowered to negotiate measures for progressive abolition of restrictions and have broad exclusive competences regarding external trade (Art. 206–207 TFEU). Restrictive measures for the protection of the EU economy should be the exception (Art. 207, 215 TFEU). In addition, the EU has competences regarding development, economic, financial, and technical cooperation with third countries and in relation to humanitarian aid (Art. 208 ff., 212–213, 214 TFEU). The EU is also competent to enter into international agreements (Art. 216 ff. TFEU).

International relations are governed by the principle of reciprocity. In view of an increasingly difficult international environment, the EU must seek to reduce dependencies, but also to strengthen its own negotiation position. In the trade context, this means that trade policy should not only prevent supply chain disruptions, but also identify economic areas where the EU is able to bring indispensable assets to the negotiation table.

The Draghi Report stresses repeatedly the necessity of "increasing security and reducing dependencies" (Draghi 2024, 3, 13 and 50). That said, it is notable that the Report does not discuss what, if anything, the EU could (and should) offer in return for an attractive trade deal.

POLICY CONCLUSIONS

At the presentation of the Draghi Report, Ursula von der Leyen said that Mario Draghi and the Commission both "shared analyses of the economic situation and [had already] started shaping solutions" (von der Leyen 2024b). This suggests that, despite the Report's call for policy reassessment, the Commission is not seeking a broader debate on its findings. Still, it can be assumed that the Report will influence EU policymaking. As noted before, von der Leyen's priority is currently to make European companies "scale up."

In economic terms, however, the implementation of Draghi's recommendations would require enormous resources, which would ultimately be passed on to the European population. While von der Leyen is pushing for a reform of the EU budget, including the creation of a European Competitiveness Fund, this approach is meant essentially to reallocate existing EU funds (von der Leyen 2024a). Member states have not shown any willingness to contribute additional resources so far. Meanwhile, the US continues to leverage private investment on a scale Europe is unprepared to match.

[6] See critically on this Koch (2024).

Beyond financial concerns, Draghi's recommendations also highlight the need for investment in education and research – areas requiring more than just money to address. These are complex issues that demand thoughtful, sustained attention.

Legally, it is remarkable that the Draghi Report does not occupy itself a lot with the division of competences between the EU and its member states. It frames solutions from an EU-centric perspective, emphasizing the removal of obstacles, harmonization of laws, and policy coordination. The report calls for stricter application of the subsidiarity principle but fails to specify in which areas and how member states may be better placed than the EU to contribute to European competitiveness.[7]

In any event, the EU will have to choose: Does it want to create "European Champions" (like von der Leyen does) to keep up with the US and China in competition at global scale, or does it chiefly want to focus on the development of its internal market? Creating European Champions will require not only massive subsidies but also the vigorous enforcement of EU competition rules toward the beneficiaries in order to rein in the harm to the internal market. However, strict adherence to the Treaties and confidence in the EU internal market may contribute to Europe's success in global competition as well.

Both options moreover require that the EU tackle the challenge of overregulation effectively and that it involve member states in its efforts to boost competitiveness. EU policy should mainly focus on these two issues – to boost its competitiveness and for multiple other reasons – in the coming years.

[7] See Draghi (2024, 64), (only) calling for an investigation why member state parliaments remain passive vis-à-vis "excessive" legislative activity by the "Commission" (i. e., EU legislative bodies).

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Oliver Falck, Yuchen Mo Guo and *Christian Pfaffl*

Lost Economic Output Due to High Bureaucratic Burden

KEY MESSAGES

- **This study examines the overall economic costs arising from high levels of bureaucracy. We also shed light on whether and to what extent the digitalization of administrative processes can reduce the economic costs of bureaucracy**
- **The results of our international analysis show that a fundamental reduction in bureaucracy is accompanied by a 4.6-percent average increase in real GDP per capita**
- **If Germany had implemented a fundamental reduction in bureaucracy in 2015, GDP per capita would have been EUR 2,449 higher in 2022. On average for the years 2015 to 2022, this would have corresponded to an annual increase in real GDP per capita of EUR 1,766, or EUR 146 billion in total per year**
- **Our results also show that a digitalization push in public administration can increase the level of real GDP per capita by 2.7 percent while maintaining the same level of bureaucracy**
- **The positive impact of digitalization is particularly strong in countries with high levels of bureaucracy**

BUREAUCRACY IS ON THE RISE

Bureaucracy describes a form of organization that is characterized by decisions based on clear guidelines and planned administrative action within defined structures. Bureaucracy thus provides a uniform, transparent framework for all citizens and companies. Decisions, such as administrative approvals, are made according to uniform rules. In general, this is a positive feature, the core of a constitutional state, and a prerequisite for fair competition.

However, the term “bureaucracy” has negative connotations when citizens and companies have the impression that too much regulation imposes unnecessary burdens on them. In addition, the term “bureaucracy” is often used to refer to inefficient, non-service-oriented administrative processes. Public debate in Germany has long called for a reduction in bureaucracy, usually arguing that the bureaucratic burden pushes actual economic activity into the background and imposes additional costs that negatively affect Germany's economic competitiveness. In a recent survey of economic experts conducted by the ifo Institute, excessive bureaucracy was by far the most frequently cited obstacle for Germany as a business location (Dörr et al. 2024).

To examine the bureaucratic burden impact, the first question is how it has evolved in recent years. One possible way of measuring it is the so-called compliance cost, which includes the time required and the direct costs incurred by citizens, businesses, and public authorities in complying with a legal requirement. Figure 1 shows a significant increase in compliance costs since 2021, with the main burden being borne by businesses.

Compliance costs are an indicator of the direct bureaucracy costs for firms. However, they do not take into account the total economic costs that can arise as a result of high bureaucracy, such as when firms leave the market or invest abroad due to excessive bureaucracy. Or a low start-up dynamism because firms do

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not even enter the market due to excessive bureaucracy-related barriers to entry. In addition, there is a risk that firms will no longer be able to focus on their actual business activities, i. e., the production of the best possible goods and services, focusing instead on making the best possible use of regulations. The goal of maximizing profits (rent creation) is then replaced by rent seeking, which is inefficient from an economic perspective. Rent seeking describes the goal of generating income without making a productive contribution.

The aim of this study is to draw a macroeconomic picture of the costs of bureaucracy. In a first step, the relationship between bureaucracy and economic performance is estimated econometrically using a cross-country empirical analysis. We quantify the macroeconomic costs of bureaucracy by calculating how much higher real GDP would be if Germany were to reduce bureaucracy. The second step focuses on the question of whether digitalization can help reduce the bureaucratic burden in order to generate higher economic output.

BUREAUCRACY AND ECONOMIC OUTPUT

Data

We aim to empirically explore the relationship between bureaucracy and economic performance. For the main variable, real GDP per capita, we use data from national accounts, sourced from the World Bank, which allows for analysis up to 2022 using internationally comparable macroeconomic indicators.

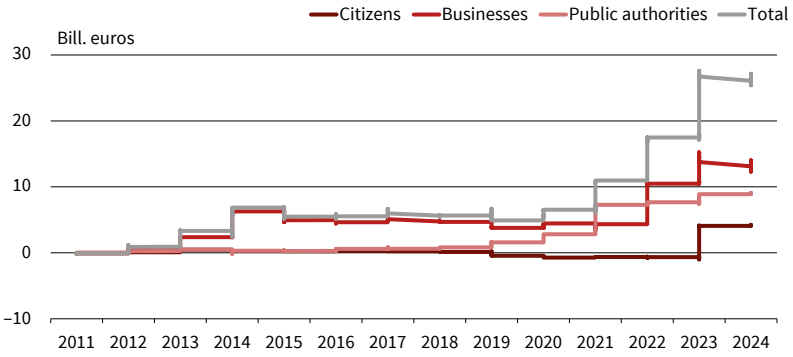
Additionally, we use data from the World Bank's "Doing Business" Index (2006–2020), one of the most extensive surveys on business regulation and business friendliness. It reflects the general business environment based on data from annual surveys of 12,500 experts across 190 countries on topics such as the cost of starting a business, access to electricity, and investor protection. It also provides direct information on compliance costs for companies, such as the time required for tax returns, obtaining building permits, or importing and exporting goods.

For our analysis, we focus specifically on the "Doing Business" aspects most relevant to bureaucracy. We use the survey data to construct a "bureaucracy" subindex, emphasizing compliance costs caused by bureaucratic regulations. This subindex helps directly assess the impact of bureaucratic burdens on economic performance.

Our bureaucracy index is made up of the following dimensions, which reflect the bureaucratic burden in the "World Bank Doing Business" data set: effort to obtain a building permit (days and number of bureaucratic processes), effort to register property (days and number of bureaucratic processes), effort to file tax returns (hours per year and frequency per year), and effort to import or export goods and services (number of documents required, days needed for customs clearance[1]). Our combined bureaucracy index is standardized to have a mean value of 0 and unit standard deviation,[2] thus allowing for negative values and the lower the value of the index, the lower the measured bureaucracy burden.

Figure 1

Development of Annual Compliance Costs (Federal Laws)



Source: Normenkontrollrat. © ifo Institute

Figure 2 shows the development of this bureaucracy index over time for various OECD countries. In an international comparison, Germany is just below the OECD average, but well above Sweden, the country with the lowest bureaucracy index. In addition, Germany's bureaucracy has stagnated over the last 15 years, in contrast to other OECD countries that have seen a significant reductions over time, such as France around 2006, when a broad reform of public administration was initiated under Nicolas Sarkozy's government ("Révision générale des politiques publiques (RGPP)").

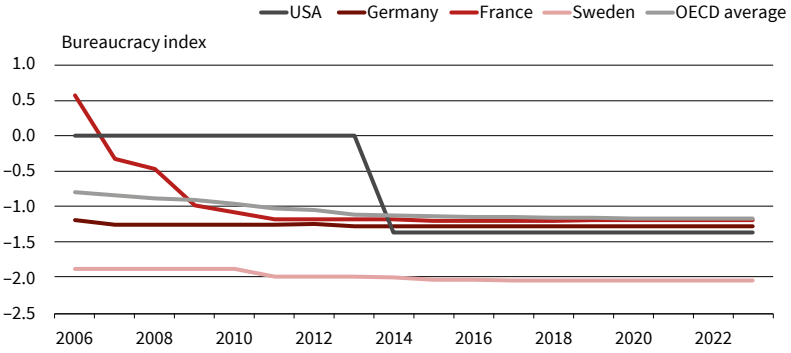
Methodology: Identification of Broad-Based Reforms to Reduce Bureaucracy

In order to estimate the relationship between the bureaucratic burden to companies and a country's economic performance, we use a data-driven approach to identify broad-based public administration reforms in the data. Broad-based public administration reforms aim to solve structural inefficiencies in a coordinated manner. Accordingly, the greatest effect on the economy is to be expected from a broad-based reform and

[1] Between 2005 and 2006, the survey methodology and the unit of measurement for the import and export variables were changed. Until 2005, the time spent was measured in days, after 2006 in hours, although there is no clear correspondence between hours and years for all countries. However, the data for 2006 contains both variants of the variable. When calculating our index, we equate the variables measured in days with the new variables measured in hours. In this way, the hours surveyed can be converted into days on a country-specific basis to harmonize the variables between the survey methods up to 2005 and after 2006. Our results are invariant to alternative approaches with the break.

[2] The index is formed by first standardizing each of the variables so that all variables have a mean value of 0 and a standard deviation of 1 (i. e., the so-called z-score is formed). The summarized bureaucracy index then consists of the sum of the standardized variables, each of which depicts the aforementioned dimensions of bureaucracy. The index is again standardized to a mean value of 0 and a standard deviation of 1 by dividing the sum of the individual dimensions by the standard deviation of this sum.

Figure 2
Development of the Bureaucracy Index in Selected OECD Countries, 2006–2022



Source: World Bank; authors' calculations. © ifo Institute

not from an isolated reform of individual measures. After all, companies are confronted with bureaucracy and public administration in many areas. These include, for example, employee payroll taxes, turnover and profit taxes, work permits, operating permits, building permits, and import and export permits. Reforms addressing just one of these areas would cover only a small part of the overall bureaucratic burden, whereas comprehensive, broad-based reforms covering a large number of bureaucratic areas and dealings with authorities offer a far better chance of providing noticeable relief for companies.

Accordingly, our empirical analysis focuses on cases of broad-based bureaucracy reduction. We use so-called "spikes" in bureaucracy reduction, such as in the case of France in 2006: the bureaucracy index for France fell by 0.89 index points from 2006 to 2007[3] from 0.57 to −0.32 (Figure 2). We define a broad-based reduction in bureaucracy as the largest 1 percent of all annual reductions in the bureaucracy index across all countries. Our dataset contains 27 countries with "spikes" in bureaucracy reduction, including EU members Croatia (2006), France (2006), Poland (2012), and Portugal (2010).[4]

Empirically, we use these broad-based bureaucracy reduction events in a difference-in-differences approach. This estimation approach compares the development of real GDP per capita in countries with broad-based bureaucracy reduction with countries without such reductions in order to isolate the effect of the reforms. By taking into account differences before and after the reform in both groups, we can eliminate distortions due to other, simultaneously occurring influences and trends, such as a general tendency towards less bureaucracy and higher GDP for all countries over time. This approach also eliminates initial differences in levels between countries with and without broad-based bureaucracy reductions.

[3] Or 0.89 standard deviations, as one index point corresponds to one standard deviation in the bureaucracy index's unit of measurement.
[4] If a country shows several spikes in bureaucracy reduction in succession, we take the first spike as a fundamental reform. Subsequent declines in the bureaucracy index are presumably to be regarded as subsequent effects in the wake of those initial fundamental reforms.

This results in the estimation equation:

$$GDP_{it}=\eta_i Country+\theta_t Year_t+\beta Reform_{it}+e_{it},$$

where GDP_{it} is the logarithmized level of real GDP per capita in country i at time t. $\eta_i Country$ are fixed country effects that adjust for general differences in bureaucracy and GDP between countries. In OECD countries, for example, GDP is higher on average and bureaucracy is lower, or they differ from non-OECD countries in the probability of implementing a broad-based reduction in bureaucracy. Not taking these country-specific differences into account would overestimate the effect of a broad-based reduction in bureaucracy on GDP. $\theta_t Year_t$ are fixed annual effects that absorb general trends over time that affect all countries equally. Thus, the general trend in GDP is rising over time in all countries. Bureaucracy reforms occurring more frequently in later years would also lead to overestimating the effect of a broad-based reduction in bureaucracy on GDP. $Reform_{it}$ is an indicator of whether a fundamental bureaucracy reform has taken place in country i at time t. For example, France introduced a broad-based bureaucracy reform in 2006. In this case, the indicator $Reform_{it}$ would be 0 for France before 2006 and 1 after 2006. For a country without a bureaucracy reduction, such as Germany, $Reform_{it}$ assumes the value 0 for the entire period. Thus, the coefficient β is the estimated average percentage effect of broad-based bureaucracy reduction on the level of GDP per capita. e_{it} is an error term that picks up differences in GDP that are not captured by the explanatory variables in the model. The coefficient β in the estimation equation represents the classic difference-in-differences estimator.

Data on GDP and the bureaucracy index is generally available for 184 countries for the period from 2006 to 2022.[5] For some countries, however, this data is not available from 2006 onward, but only from a later date. This ultimately results in 2,910 country x year observations that can be used for the empirical estimation.[6]

Results: Broad-Based Reduction in Bureaucracy and Economic Performance

Table 1 shows our estimates for the percentage correlation between broad-based bureaucracy reduction and the level of real GDP per capita. The conventional difference-in-differences estimator shows that a broad-based reduction in bureaucracy is associated with an average increase of 3.7 percent in real GDP

[5] The "World Bank Doing Business" data is available from 2006 to 2020. For our identification strategy, we assume that the index does not change from the 2020 value in 2021 and 2022. As this leaves potential countries with bureaucracy reforms after 2020 in the control group, this leads to an "underestimation" of the "true" effect. Our results are invariant to alternative approaches.
[6] Our results remain robust regardless of whether we keep or exclude countries without data over the entire period in our estimation sample.

per capita. However, this may be biased if reforms were introduced at different times in different countries. Therefore, we focus on the results based on the alternative and robust difference-in-differences estimators. The effects from these estimates are consistently above the conventional difference-in-differences estimator, at between 4.6 percent and 5.3 percent, but are not statistically significantly different from the conventional difference-in-differences estimator. We therefore take the most conservative estimate from the robust estimators of de Chaisemartin and D'Haultfœuille (2020) as our preferred estimate. According to this estimate, real GDP per capita in the period after a broad-based reduction in bureaucracy is on average 4.6 percent higher than before. We interpret this as the net macroeconomic gains in real GDP per capita associated with a broad-based reduction in bureaucracy.

The 4.6-percent effect reflects the average impact across all years following a reform, but it may start small and grow over time. Figure 3 shows the percentage difference in real GDP per capita between countries with and without a broad-based reductions in bureaucracy, relative to the reform (time t=0). Up to four years before the reform, the difference is not significant, indicating similar GDP trends between the two groups. This suggests that our estimates are not biased by initial GDP differences. After the reform (from time t=1), significant differences emerge, with the effect growing from 1.6 percent in the first year (t=1) to 8.3 percent after ten years (t=10). Thus, the positive impact of reducing bureaucracy develops gradually over time.

Figure 4 shows the hypothetical development of real GDP per capita in Germany if a broad-based reduction in bureaucracy had occurred in 2015. In this scenario, such a reform would have increased real GDP per capita by EUR 673 in the first year and by EUR 2,449 in 2022. On average, this would amount to an additional EUR 1,766 per year in real GDP per capita from 2015 to 2022. In total, the costs of bureaucracy due to lost economic output for Germany amount to a total of around EUR 146 billion per year. Existing estimates by the Normenkontrollrat (German National Regulatory Control Council) put the direct costs of bureaucracy due to compliance costs alone at EUR 65 billion. As the costs of bureaucracy in this study include both the direct and indirect costs of bureaucracy for the economy, they are more than double the direct costs alone.

The average reduction in bureaucracy in our data is 0.85 index points, similar to the gap between Sweden (−2.04) and Germany (−1.28) in 2015. For German GDP per capita to reach the levels shown in Figure 4, its bureaucracy burden would need to match Sweden's. For comparison, compliance costs for tax returns are nearly double in Germany (218 hours) compared to Sweden (122 hours). Registering real estate in Germany involves six procedures (52 hours), while Sweden requires just one (7 hours). Significant reforms would be needed for Germany to catch up with Sweden, but our estimates suggest that the potential GDP gains would well justify the effort.

Digitalization of Administrative Processes to Reduce Bureaucracy

One of the most effective tools for reducing the bureaucratic burden of existing regulatory density appears to be the digitalization of public administration, as indicated by the development of the bureaucracy cost index published by the German Federal Statis-

Table 1

Broad-Based Bureaucracy Reduction and Real GDP per Capita

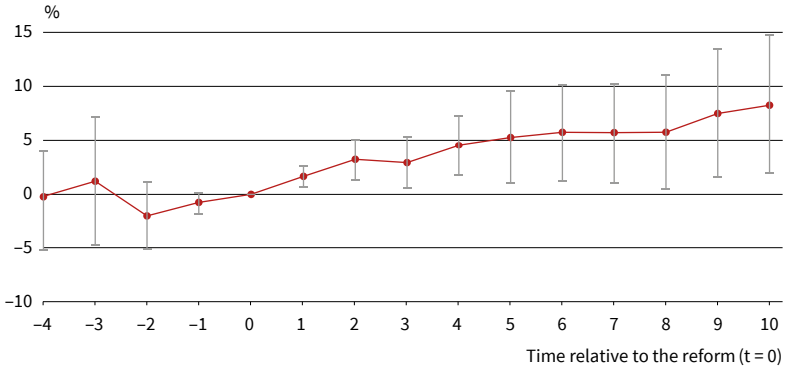
	Log GDP per capita
Difference-in-differences estimator	0.0370*** (0.0135)
de Chaisemartin and D'Haultfœuille (2022)	0.0463*** (0.0150)
Borusyak, Jaravel and Spiess (2023)	0.0530*** (0.0192)
Callaway and Sant'Anna (2021)	0.0533*** (0.0166)
Countries	World Bank Sample
Period	2006 – 2022
Observations	2,910

Robust standard errors in brackets, * p < 0.10, ** p < 0.05, *** p < 0.01

Source: Own calculations.

Figure 3

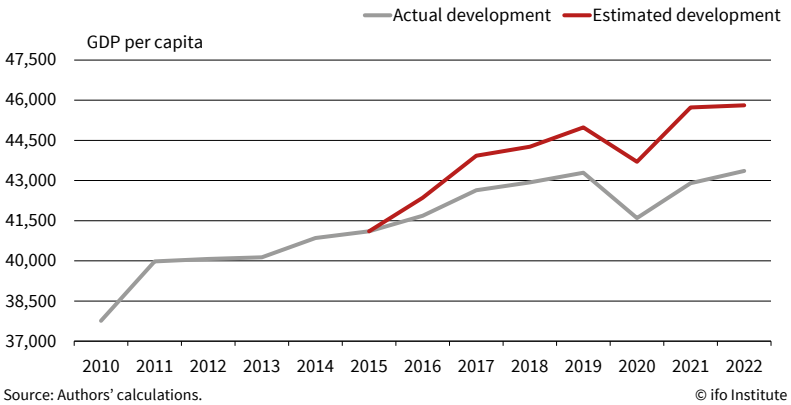
Estimated Effect of a Broad-Based Reduction in Bureaucracy on Real GDP per Capita



Note: We cut off the value of green firm retail postings to improve the graph's readability.

Figure 4

Lost Output Due to Bureaucracy in Germany



Source: Authors' calculations.

tical Office (Figure 5). It measures the direct costs incurred by companies because of traditional "paperwork," such as submitting applications or providing supporting documents.[7] According to the bureaucracy cost index, direct bureaucracy costs for businesses have fallen by around five index points since 2012. The abrupt drop in bureaucracy costs at some points in time is striking. The German Federal Statistical Office argues that the resolution of improvements in digital administration has led to a reduction in bureaucratic costs. These decisions include, for example, the introduction of electronic certificates of incapacity for work or the introduction of electronic invoicing in the business-to-business (B2B) area. Can the digitalization of administration also help reduce the economic costs of bureaucracy?

To investigate this empirically, we use data from Eurostat's Digital Economy and Society Index (DESI), covering digitalization in the 27 EU countries from 2014 to 2020. One subindex, "digital public services for businesses," measures the percentage of public services available online for starting a company and conducting business activities, such as tax processes and changing a company's legal form.

Figure 6 shows the index's development for selected countries over time, ranging from 0 (low digitalization) to 100 (high digitalization). Denmark, Estonia, and Ireland led with scores of 100 in 2019, while Germany is positioned mid-range among EU countries in the digitalization of public administration, particularly concerning key bureaucratic processes for companies.

Analogous to the procedure for identifying significant bureaucracy reforms, we use spikes in the degree of digitalization through large spikes in the sub-indicator "digital public services for companies." In this way, we identify nine countries with a digitalization spike: Belgium (2014), Bulgaria (2016), Croatia (2014), France (2014), Germany (2014), Greece (2015), Latvia (2015), Slovakia (2016), and Sweden (2014).[8]

We estimate a similar model to quantify the relationship between digitalization pushes and real GDP per capita, controlling for the bureaucracy index to assess the impact of digitalization under a given bureaucracy level. We also interact the digitalization boost with the annual bureaucracy index to study if the effect differs between countries with low and high levels of bureaucracy.

We estimate the following model:

$$GDP_{it} = \eta_i Country_i + \theta_t Year_t + \alpha Digitalization\ Push_{it} + \gamma Bureaucracy\ Index_{it} + \delta Digitalization\ Push_{it} \times Bureaucracy\ Index_{it} + e_{it},$$

whereby fixed effects for countries ($\eta_i Country_i$) and years ($\theta_t Year_t$) are taken into account. α is the effect of a digitalization push in public administration on the level of real GDP per capita. With $\gamma Bureaucracy\ Index_{it}$ we control for the annual level of the bureaucracy index, i. e., the compliance costs for bureaucracy. $\delta Digitalization\ Push_{it} \times Bureaucracy\ Index_{it}$ is an interaction term between the digitalization push and the value of the bureaucracy index for country i in year t. The greater δ is, the higher the effect of a digitalization push in public administration for a country with a high bureaucracy burden compared to a country with an average bureaucracy burden in relation to the countries in our analysis.

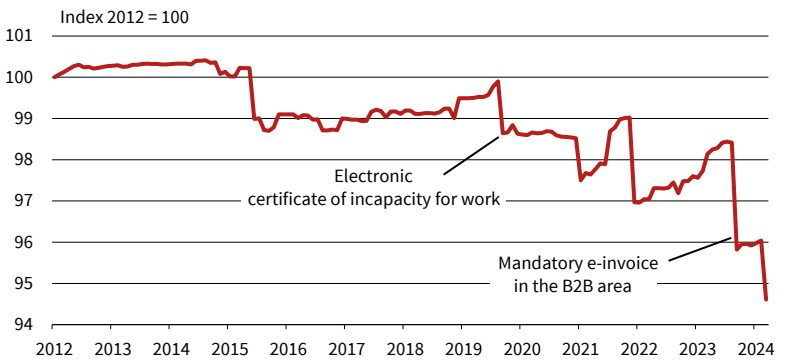
Table 2 shows that a digitalization spike in public administration is linked to a 2.7 percent increase in real GDP per capita at a given level of bureaucracy. An average digitalization spike is 14.3 index points, similar to the gap between Denmark (98.3) and Germany (83.7) over the observation period. If Germany reached Denmark's digitalization level, its real GDP

[7] The administrative costs are part of the compliance costs (Figure 1), which comprise the total measurable time and costs incurred in complying with federal regulations. The compliance costs therefore also take into account costs arising, for example, from monitoring measures, adjustments to internal processes, and the procurement of goods and services.

[8] France, for example, improved its digitalization index by 1.2 index points in 2014. This brought France from 23rd place in a European comparison, far below the European average in 2014, to 17th place in 2015. This is related to the Conseil national du numérique (National Digital Council), which was initiated in France in 2012 and set itself the goal of accelerating the digitalization of the economy and society which led, for example, to a comprehensive national digitalization strategy being adopted between 2014 and 2015.

Figure 5

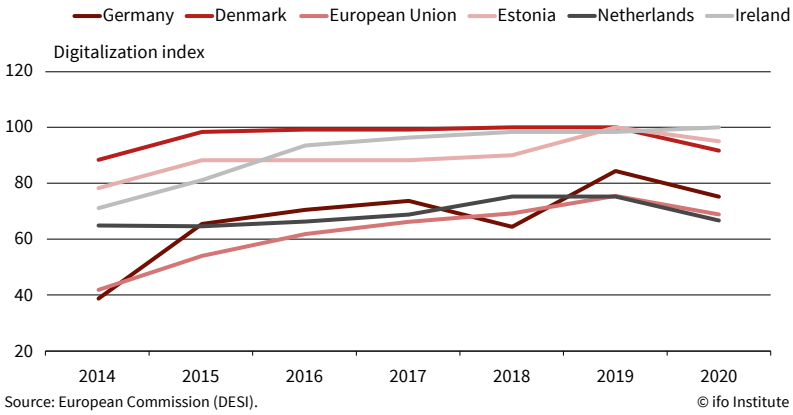
Bureaucracy Cost Index and Digital Administration



Note: If the federal government introduces legal regulations that will relieve companies of bureaucracy costs in the future, the bureaucracy cost index decreases. If it passes regulations that create new bureaucratic burdens for companies, this leads to rising bureaucracy cost index values.
Source: German Federal Statistical Office. © ifo Institute

Figure 6

Development of the Digitalization Index in Selected Countries



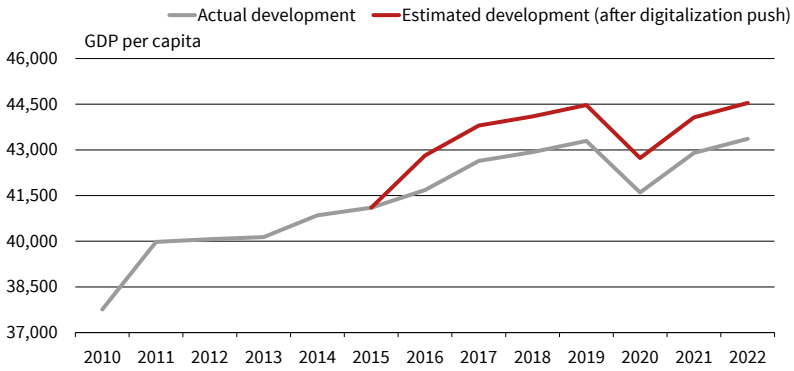
Source: European Commission (DESI). © ifo Institute

per capita could be about 2.7 percent higher. Figure 7 illustrates the development of real GDP per capita for Germany with a hypothetical digitalization boost in 2015: a digitalization boost would increase real GDP per capita by an average of 2.7 percent, or EUR 1,159, per year after the reform.

The first row of Table 2 shows the correlation between a digitalization push and log GDP per capita for a country with an average bureaucracy index. The second row shows the additional effect for a country with a bureaucracy burden one standard deviation above average: in such countries, a digitalization boost is associated with an additional 5.2–percent increase in GDP per capita. Therefore, the digitalization of public administration has a positive effect on GDP, particularly in countries with a high bureaucratic burden.

Figure 7

Lost Output Due to Insufficient Digitalization of Public Administration in Germany



Source: Authors' calculations. © ifo Institute

Table 2

Bureaucracy and Digitalization

	Log GDP per capita
Difference-in-differences estimator	0.0272** (0.0123)
Digitalization push × Bureaucracy index	0.0520** (0.0229)
Bureaucracy Index	−0.0566 (0.0431)
Countries	EU countries
Period	2014–2020
Observations	162

Robust standard errors in brackets, * p < 0.10, ** p < 0.05, *** p < 0.01

Source: Authors' calculations.

POLICY CONCLUSIONS

The results of our empirical analysis confirm the presumed benefits of a lean bureaucracy, showing that a comprehensive reduction in bureaucracy is associated with economic benefits. Germany's high bureaucratic burden for companies, thus, leads to its missing out on economic performance. The role of digital administration is also confirmed by our analysis, making plain that digitalization can help turn bureaucratic processes more efficient, generating economic growth in the process. However, processes should be streamlined overall and aligned with digital capabilities. New regulations, administrative procedures, and funding programs should be reviewed for digital feasibility.

In view of these results, politicians should focus on a comprehensive reduction in bureaucracy. Although a major reforms are needed to catch up with countries with a low bureaucracy burden, the expected benefits should justify the effort.

A two-pronged strategy is needed to benefit from lean bureaucracy. On the one hand, bureaucracy must be made fundamentally lean and efficient, while on the other, essential bureaucratic processes must be streamlined and fully digitalized. The digitalization of administrative processes is also a matter of great urgency due to the increasing labor shortage caused by demographic change. Staff members tied up in handling administrative processes are no longer available to the economy. In addition, digitalization is needed to maintain government administrative tasks in the face of growing staff shortages: without sufficient digitalization, administrative procedures are likely to take even longer in future.

Decisive political action is required to achieve a broad-based reduction in bureaucracy. However, this often poses a political economy incentive problem: if a government implements far-reaching reforms in the current legislative period, it will usually be associated only with the negative, immediate effects of the reform (e. g., job losses). However, as in the case of administrative reforms considered here, the positive effects of a reform often appear only after some delay, i. e., possibly only after another government has already been elected. The new government can then claim the positive effects for itself, being insulated from the negative, immediate effects at the time of the reform. This incentive problem complicates the implementation of necessary reforms and makes it clear that a successful reform toward a lean and efficient bureaucracy can be achieved only as a long-term political goal. Our findings clearly illustrate both the economic costs of delayed bureaucracy reform, and the potential benefits of deep reforms and digitalization efforts.

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Ukrainian Refugees' Return Intentions and Integration in the Course of Time

KEY MESSAGES

- **Most Ukrainians plan to return, but the share of Ukrainian refugees planning to settle outside of Ukraine has gradually increased and reached 25 percent by mid-2024**
- **By June 2024, 12 percent of Ukrainian refugees had returned to Ukraine and 7 percent had moved to another host country compared to 2022**
- **Liberation of certain districts in late 2022 increased the probability of people from there returning to Ukraine by 5 percentage points**
- **Local conflict in home municipality has redirected return to other parts of Ukraine, without reducing the overall probability of returning**
- **The EU should encourage Ukrainian refugees to return once the conflict is over, but also help them to find work while under temporary protection**

More than four million Ukrainians are currently staying in the EU with temporary protection status. The return of these refugees is vital for Ukraine's reconstruction, as many would bring with them essential skills and resources that are crucial for rebuilding their country. Moreover, their return can help relieve the economic, social, and political pressures experienced by host countries – pressures such as overburdened public services, increased job competition, and social cohesion challenges. However, it is unrealistic to expect that all refugees will return, and it is in the interest of refugees and their host countries to help those who do not return to Ukraine to integrate as well as possible into their new homes.

Little is known about how refugees' intentions to return change over time, how intentions predict actual return, and how they are affected by conflict in their home regions. This article uses eight waves of survey data to examine the case of Ukrainian refugees across Europe. Ukrainian refugees initially had exceptionally high return intentions, and most of them are still planning to return at the latest once it is safe. However, over time, fewer refugees say they would return when it is safe and more refugees plan to settle outside Ukraine. The liberation of their home district significantly increases the likelihood of an individual returning home, while more intense conflict in the home municipality makes refugees less likely to return to their home municipality, but not to Ukraine altogether.

Previous literature suggests that although many refugees, particularly those in countries neighboring their own, initially intend to return when conditions are safe, a substantial number ultimately choose to remain in their host countries (Alrababa'h et al. 2023; UNHCR 2023). However, there is a lack of systematic evidence on how refugees' intentions to return change over time, how accurately these intentions predict actual return, and the impact of conflict in refugees' home regions on their return plans, actual return, and integration. This evidence gap arises from the limited availability of longitudinal data that tracks refugees over time and across countries. The analysis of cross-sectional data is often insufficient to determine the causal effect of conflict on return (intentions), as unobserved heterogeneity among individuals may depend on the intensity of conflict prior to departure.

In Adema et al. (2024), we address these issues through a longitudinal survey of Ukrainian refugees. We launched this survey in partnership with Verian (formerly Kantar Public) across Europe in June 2022. This initiative was born in response to Russia's full-scale invasion of Ukraine on February 24, 2022, which caused the largest refugee crisis in Europe since World War Two. We repeatedly ask respondents about their current location, return plans, and integration outcomes, and link this information to time-stamped and geocoded data on conflict intensity in their home municipality from ACLED and UCDP and on the current occupation status of their home district based on frontline maps from ISW. By exploiting conflict intensity between interviews, we estimate the causal effect of local conflict on actual return, return plans, and integration outcomes. In addition, by collecting refugees' expectations about the duration and resolution of the war, we examine how changes in these expectations affect the same set of outcomes. Here are some key takeaways from our research.

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THERE IS A STRONG DESIRE AMONG UKRAINIANS TO RETURN HOME

Our descriptive findings reveal a strong desire among Ukrainians to return home. Figure 1 shows how individual responses to the questions on refugees' current place of residence and return plans have changed over time, between different survey waves, among those respondents who participated in the survey in at least two waves. Initially, around two-thirds of Ukrainian refugees intended to return either soon or once it becomes safe, and one in ten planned to settle permanently abroad. Return plans strongly predict actual return among those responding at least twice: 35 percent of those who initially intended to return soon did so by June 2024, whereas none of those who planned to settle permanently outside Ukraine have returned. By June 2024 (wave 8), 12 percent of respondents had returned to Ukraine. Among those that returned, more than 80 percent went back to the same municipality they resided in before leaving Ukraine. Nevertheless, the share of Ukrainian refugees planning to settle outside Ukraine is gradually increasing. Across Europe, around 25 percent of refugees indicated that they want to settle abroad by mid-2024.

Figure 2 shows how the share of respondents that returned to Ukraine and those with different return plans has developed over time. We incorporate individual fixed effects, so changes in the levels are driven by within-individual changes in residence of return plans. Until June 2024, the realized return rate was 2.0 percentage points per 100 days while the net increase in plans to settle outside Ukraine was 1.9 percentage points per 100 days. As a flip side of actual return and gradual increase in plans to settle outside Ukraine, the number of individuals who said they would return when it was safe to do so has decreased sharply over time (4.5 percentage points per 100 days). In 2024, return has largely stagnated, with the share planning to return soon and the share planning to return when safe remaining stable. At the same time, there has been a steady increase in the share planning to settle outside Ukraine.

LIBERATION OF HOME DISTRICT INCREASES RETURN WHILE INTENSIVE LOCAL CONFLICT REDIRECTS RETURN

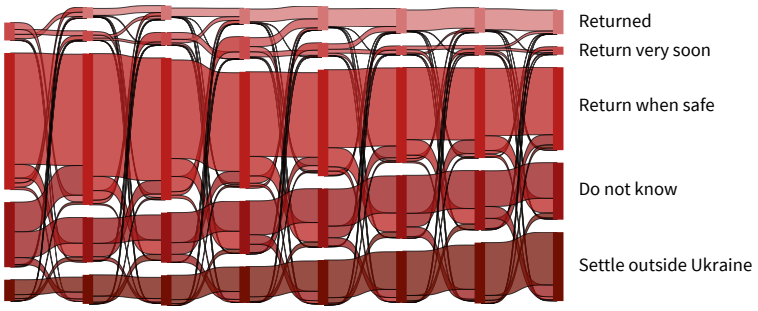
Figure 3 presents results on the effect of conflict and other predictors on changes in return and return intentions between the first (wave 1) and last answered wave. We find that the liberation of their home district significantly increases the likelihood of an individual returning to Ukraine and simultaneously reduces the propensity to make new plans to settle outside Ukraine. Conversely, continued occupation does not have a statistically significant impact on any of the outcomes.

Turning to the effect of conflict intensity, we find that more intense conflict in one's home municipality reduces return there, but less strongly to Ukraine in general. A one standard deviation higher conflict intensity reduces return to one's home municipality by 1.8 percentage points but return to Ukraine altogether by only 0.7 percentage points. The difference between these two suggest that the small share of respondents returning to other regions of Ukraine are individuals from high-conflict areas. However, more intense conflict in the home municipality does not make it more likely that refugees start planning to settle outside Ukraine.

We also examined additional predictors of return and plans to settle outside Ukraine in Figure 3. Having a partner left behind in Ukraine increases the likelihood of return by 9 percentage points. Tertiary education does not correlate with return or return plans. Surprisingly, proficiency in English increases

Figure 1

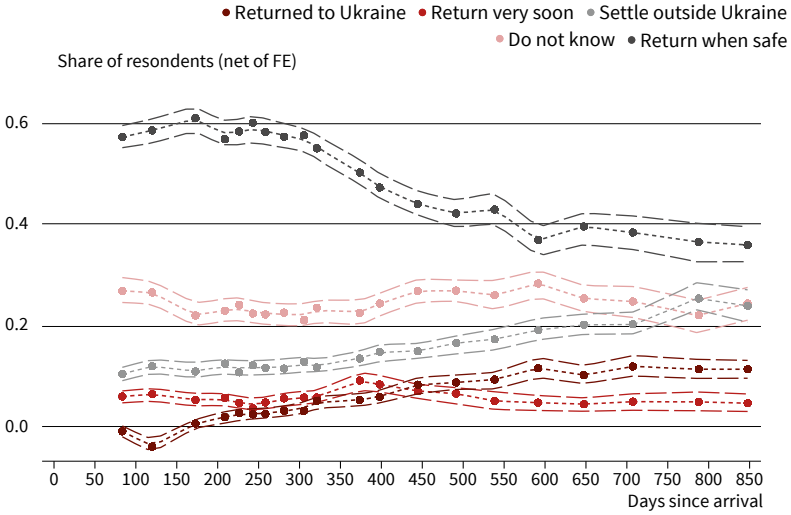
Sankey Diagram of Changes in Return Intentions and Behavior over Time



Note: This Sankey diagram shows how return intentions have evolved over time. As we move from one column to the next, we move from one survey wave to the next. The time difference between each wave is approximately three months.
Source: Adema et al. (2024). © ifo Institute

Figure 2

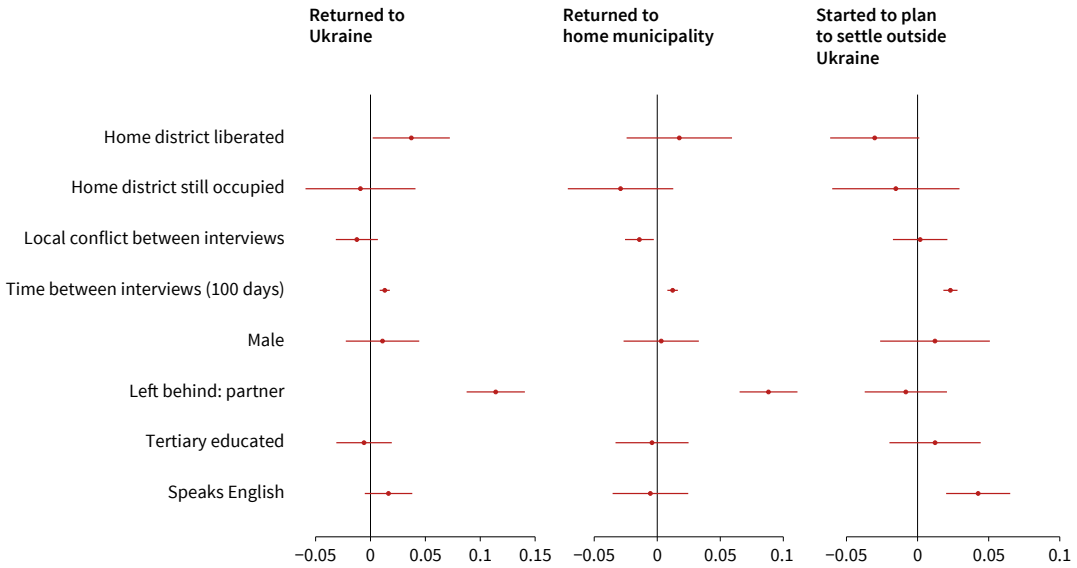
Within-Individual Return Intentions and Return over Time since Arrival



Note: Binned scatterplot with non-parametric trend for levels of return intentions over time since arrival in the destination country, net of individual fixed effects, with 90% confidence interval. For each level of return intentions, we perform the following procedure. First, we assign all observations to 20 equally sized bins over the number of days since arrival in the destination country of residence in the baseline survey. We residualize the outcome by regressing it on individual fixed effects and the number of days since arrival in the first destination country. We perform this procedure for 100 bootstrap samples to obtain smoothed 90% confidence intervals. We draw markers for (i) the mean for each of the 20 equally sized bins, (ii) a predicted mean for each bin of the number of days since arrival, and (iii) a 90% confidence interval around the predicted mean. N = 11,115.
Source: Adema et al. (2024). © ifo Institute

Figure 3

The Effect of Conflict and Predictors of Changes in Return and Starting to Plan to Settle Outside Ukraine



Note: This figure shows coefficient plots of three multivariate OLS regressions. The outcomes (from left to right) are 'returned to Ukraine', 'returned to home municipality', and 'started to plan to settle outside Ukraine' on conflict-related variables and personal characteristics. 95% confidence intervals are based on standard errors clustered at the district level. 'Home district liberated' and 'Home district still occupied' are binary indicators for full liberation of one's home district and whether one's district is at least partially occupied during both survey waves. The reference category consists of districts continuously under Ukrainian control. 'Local conflict between interviews' is the standardized first PCA of the number of events and number of casualties in both UCDP and ACLED. Baseline controls are initial levels of return intentions, age bins (18–24; 25–34; 35–44; 45–54; 55–59; 60–64; 65 and older), the number of days elapsed between the two waves, the population of one's home municipality, population squared, and binary indicators for gender, partnership status, tertiary education, speaking English, originating from an urban area in Ukraine, being accompanied by children, having a partner left in Ukraine, having children left in Ukraine, continuing one's Ukrainian job remotely, having left Ukraine before 24 February 2022, originating from a territory that was occupied by Russia or allied forces before 24 February 2022, and answering the survey in Russian. For simplicity of exposition, not all control variables are shown in the figure.
Source: Adema et al. (2024).

the likelihood of return to Ukraine. At the same time, English speakers are also more likely to start considering settling outside Ukraine. These findings suggest that, if anything, return migrants are not negatively selected from the available sample of migrants.

As we ask for their current place of residence in every wave, we can study onward migration between different countries outside Ukraine. Figure 4 shows a Sankey diagram for residence in Ukraine and main destination countries (Germany, Poland, Czechia, rest of Eastern Europe, and rest of the world – mostly countries in Western and Southern Europe, except Germany). The main migration flows in each wave are directed to Ukraine, Germany, and the rest of the world. Most of these secondary migrants come from Poland and the rest of Eastern Europe. There is very limited return migration or onward migration from Germany and Czechia. In June 2024, 7 percent of Ukrainian refugees resided in a different host country outside Ukraine compared to 2022.

INTEGRATION OUTCOMES

Theory suggests that refugees who do not intend to return invest more in acquiring host-country-specific human capital, such as language skills, and integrating into the local labor market (Chiswick and Miller 1994). Figure 5 displays regression coefficients for four key measures of economic, subjective, and linguistic integration using the same specification as Figure 3. Our results suggest that the three conflict-related variables have no significant effect on whether refugees are employed. The liberation of one's home district appears to make refugees less likely to participate in any kind of training, which aligns with a higher likelihood of return reducing incentives to invest in integration in the host country (Cortes 2004; Adda et al. 2022). Conversely, if one's home district remains occupied for the duration of our surveys, refugees report a positive change in their subjective integration and a somewhat increased likelihood of starting a language course. This can be attributed to the lower return intentions among this group, which encourages investment in integration. Conflict intensity in the home municipality does not appear to systematically affect integration

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outcomes. Individuals from regions with higher conflict intensity are slightly less likely to have started a language course.

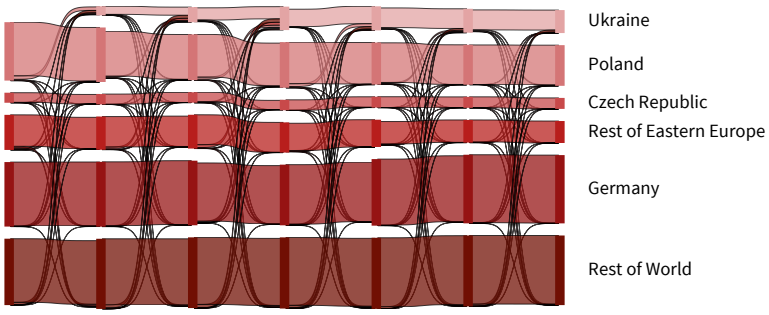
SOME POLICY IMPLICATIONS

The success of post-war reconstruction and development efforts in Ukraine will depend crucially on the quantity and quality of the available human capital. The Ukrainian population had been declining even before the Russian invasion, with deaths outnumbering births every year since 1991 (Djankov and Blinov 2022). Furthermore, pervasive corruption and low confidence in the judiciary – underscored by Ukraine's ranking of 104th out of 180 countries in the 2023 Corruption Perceptions Index – act as deterrents to return migration. A critical challenge for Ukraine will be to leverage the common purpose fostered by the war to drive broader institutional changes. By addressing these challenges, Ukraine can enhance the appeal of returning for refugees and effectively utilize their human capital in the post-war rebuilding process.

From the perspective of EU countries, there is a tension between swift integration of Ukrainian refugees into host societies and the successful reconstruction of Ukraine after the war. From a purely national perspective, successfully integrating Ukrainian refugees can help host countries mitigate skill shortages and address the challenges of an aging population. However, European countries also have a strong interest in the successful post-war reconstruction of Ukraine. Therefore, European countries should encourage Ukrainian refugees who are willing to return to do so, including through the provision of financial assistance to returnees. Of course, those Ukrainian refugees with a prospect of return should also be helped to find employment during their stay abroad. Ideally, the experience they gain in EU countries could improve their productivity upon their return to Ukraine and help build bridges between their host country and Ukraine.

Figure 4

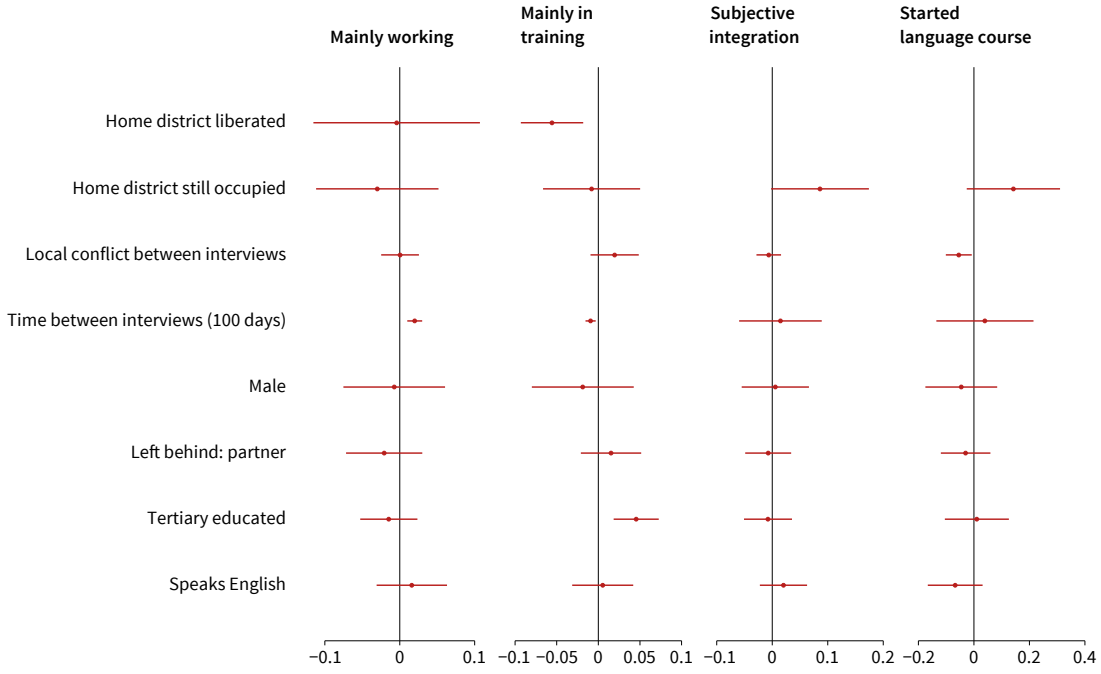
Migration Between Main Host Countries and Country Groups, and Ukraine



Note: This Sankey diagram shows how migration between different regions has evolved over time. As we move from one column to the next, we move from one survey wave to the next. As not all respondents in all host countries recruited in the baseline wave were asked to respond in the second wave, this figure omits the second wave.
Source: Adema et al. (2024). © ifo Institute

Figure 5

Conflict and Four Integration Outcomes



Note: This figure shows coefficient plots of four multivariate OLS regressions. 95% confidence intervals are based on standard errors clustered on the district level. We restrict the sample to all respondents 25–59 years old. The outcomes in the first two columns are in levels on the long differences sample, and control for initial levels of started working or not in wave 1. N = 2,120 for both. The last two columns are changes on the sample of long differences between the earliest response in waves 2 and 3 and the response in wave 6. N = 503 and N = 544, respectively. The latter two do not include estimates for 'home district liberated', as no district was liberated during the sample period. All other regressors are identical to those in Figure 3.
Source: Adema et al. 2024. © ifo Institute

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Armenak Antinyan and *Zareh Asatryan*

Nudging for Tax Compliance

KEY MESSAGES

- **Governments around the world increasingly use nudges to improve tax collection**
- **Our meta-analysis evaluates the evidence gained from around 70 recent randomized trials**
- **We find that simple reminders, tax morale, and deterrence nudges all increase tax compliance**
- **The effectiveness of these interventions varies by nudge type and also depends on the context**
- **We formulate policy recommendations as to who, when, and how to nudge**

THE DEFINITION OF A NUDGE AND ITS APPLICATIONS

Policymakers are increasingly relying on nudging interventions with the aim of improving individual decisions. These are interventions that respect freedom of choice, leave economic incentives intact, are easy and cheap to implement, and can be easily avoided by nudge recipients (Thaler and Sunstein 2009).

Nudges have become widespread in the last decade across many policy areas. For instance, automatic or default enrollment in retirement savings plans can help save more (Thaler and Benartzi 2004). Reminders sent by health authorities can increase the uptake of health screening programs (Antinyan et al. 2021b). Informing consumers that their water or electricity consumption exceeds that of their neighbors can reduce consumption (Allcott and Rogers 2014).

Nudging has also been applied to increase the compliance of individuals and firms in paying taxes. This is not surprising given that tax collection is a central task of any government. Tax compliance is relevant not only for ensuring efficient and fair taxation but also for safeguarding appropriate levels of public goods provision.

How effective are these interventions in reality? The recent review paper by Antinyan and Asatryan (2024) answers this question.

RATIONAL AND BEHAVIORAL MOTIVES OF TAX COMPLIANCE

The starting point behind these interventions is the presumption that tax compliance depends on rational considerations, such as the fear of being caught and punished, moral considerations, such as concerns for fairness or public good provision, and behavioral fallacies, such as limited attention.

The proposition of moral considerations for compliance is needed to address the observation that agents in practice comply with taxes much more than what the workhorse model of income tax evasion in economics would predict (Allingham and Sandmo 1972). This is driven by the fact that the observed audit rates in practice are much less frequent than the level one would need for a rational agent with a reasonable level of risk aversion to have the same expected payoff to reach the observed levels of compliance. To justify the model without moral considerations, one would need that either the taxpayers are extremely risk averse (such that they care very much even about very unlikely audits), or that the audits are ineffective (such that audits do not increase the probability of being caught by too much), or that the taxpayers do not have opportunities to evade even if it is rational to do so.

The last explanation, that of the inability to cheat, has been documented by Kleven et al. (2011) and Pomeranz (2015). The main argument is that third-party reporting – such as of workers' wages by employers or of firms' revenues by the downstream firms who want to deduct those revenues as their costs – has substantially reduced the ability of agents to under-declare their true tax liability because the tax authority has reliable information about true liabilities anyway. While technological developments and policy initiatives that reduce such information asymmetries are promising avenues in increasing tax compliance even further, self-reporting is still prevalent for certain activities, leaving the opportunities to cheat open.

NUDGES IN THE CONTEXT OF TAX COMPLIANCE

A typical nudge in the context of tax compliance is communication sent on behalf of tax authorities through various physical channels, such as letters, tax bills, and in-person visits, and digital channels. Nudges complement rather than substitute the usual enforcement activities implemented by tax authorities.

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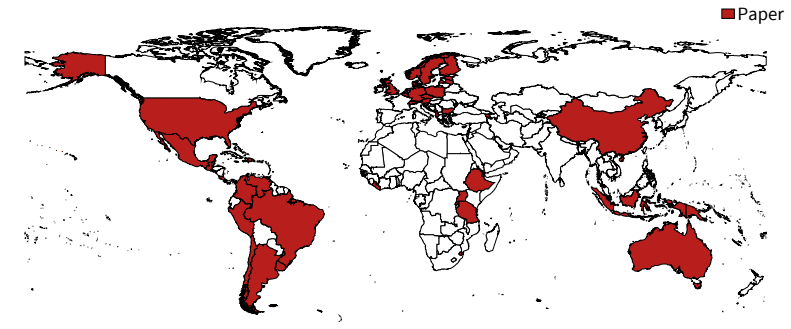
Figure 1

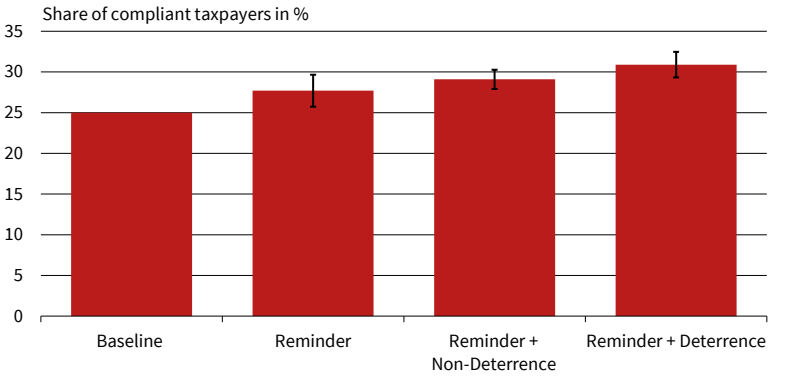
Country Coverage of Nudging Interventions



Source: Authors' compilation. © ifo Institute

Figure 2

The Effects of Nudges on Extensive Margin Tax Compliance



Source: Authors' calculations. © ifo Institute

There are three main types of nudges that appeal either to rational or moral considerations of tax compliance, or to the behavioral fallacy of limited attention.

Deterrence nudges emphasize the rational considerations for tax compliance such as audit probabilities and penalties. The deterrence nudges do not change taxpayers' financial incentives.

Tax morale nudges emphasize the moral considerations for tax compliance, such as the unfairness of not paying taxes, the importance of tax compliance for the provision of public goods, and the prevailing social norm of majority compliance.

Lastly, reminder nudges address taxpayers' limited attention bias, increasing the salience of taxes due.

Before sending a nudge to the entire population of taxpayers, tax authorities usually evaluate the impact of these nudges in relatively small-scale experiments (nudging experiments henceforth). In a nudging experiment, taxpayers are randomly divided into one or several treatment arms that receive a nudge, and a control arm that receives either no communication or neutral communication. These experiments can vary in the length of the time horizon over which tax compliance is measured, types of nudges sent, the exact compliance measure under consideration (e. g., probability to pay, the amount of taxes paid), the type of tax under scrutiny (e. g., income tax, property tax), and the population of taxpayers receiving the nudge (general sample vs. non-compliers), among other parameters.

THE METHOD OF META-ANALYSIS

Antinyan and Asatryan (2024) analyze nudging intervention in a meta-analysis, a method that quantitatively reviews the available body of evidence. The literature is composed of up to about a thousand treatment-effect estimates of nudges obtained from up to 71 interventions. The nudging interventions of De Neve et al. (2021) in Belgium, Dwenger et al. (2016) in Germany, or Hallsworth et al. (2017) in the UK are examples of some of the better-known studies.

The field is however much larger, as seen in the map of Figure 1, so far mainly covering countries of North and South America and Europe, and it is growing. For recent literature reviews, see Mascagni (2018) for a discussion of tax experiments, and Slemrod (2019) for a review of the more general literature on tax compliance.

Of course, these experiments may arrive at different and sometimes opposing findings. The aim of a meta-analysis is to arrive at a consensus estimate of the size of the effects or to show that there is no consensus in the literature. Additionally, meta-analysis makes it possible to study the main reasons behind potential heterogeneities in the estimates.

THE EFFECTS OF TAX COMPLIANCE NUDGES

Our meta-analysis yields precise estimates of the three main types of nudges on tax compliance.

We find that simple reminders increase the probability of compliance by 2.7 percentage points relative to the baseline, where about a quarter of taxpayers are compliant. Nudges that commonly refer to elements of tax morale increase compliance by another 1.4 percentage points. Deterrence nudges, which inform taxpayers about enforcement parameters, increase compliance the most, amounting to an additional 3.2 percentage-point increase on top of reminders. These effects are summarized in Figure 2.

A closer examination of different types of non-deterrence nudges – public good, moral appeal, and social norm types – does not suggest that any of these types stand out as being more effective than the others. In fact, all three types of non-deterrence nudges have statistically smaller effects on tax compliance than deterrence nudges.

DESIGN ASPECTS THAT MAKE NUDGES EFFECTIVE

Additional findings of the meta-analysis highlight the design aspects of experiments that make the nudges more, or less, effective.

Three findings stand out as being important drivers of nudges. First, the choice of the groups of taxpayers targeted by the nudge matters; in particular, nudges tend to be more effective when focusing on non-compliers such as late payers. Second, the effects of nudges are likely to be bound to the short run,

rather than being permanent. Third, nudges enacted in low-income countries seem to be less effective than the ones enacted in middle- or high-income countries.

POLICY CONCLUSIONS: WHO, WHEN, AND HOW TO NUDGE?

Policy interventions that nudge taxpayers with the aim of increasing compliance have become a popular tool among many governments owing to their ease of implementation and low monetary costs. This easy adoption of the policy is demonstrated, for example, by Hjort et al. (2021), who inform randomly selected Brazilian mayors about research on the positive tax compliance effects of reminder letters and find that the treated jurisdictions, even relatively small municipalities with limited capacities, are more likely to implement nudging interventions.

While our analysis demonstrates that there are gains to be made from the application of nudges in the context of tax compliance, the wide adoption of nudging as a policy tool is not straightforward. In order to be able to implement nudges effectively, tax authorities need to understand who to nudge, when to nudge, and how to nudge.

In terms of who to nudge, according to our results, nudges work best when they target noncompliant taxpayers, such as those late in paying taxes. Thus, an optimal strategy for tax authorities will be to think about ways to find noncompliant taxpayers or noncompliant taxbases of certain taxpayers, and then target these through nudges. Making extensive use of third-party information can be promising here (Kleven et al. 2011) in two ways. First, more and better digital infrastructures help tax authorities process large amounts of data and cross-check its validity by comparing different sources, which would lead to flagging suspicious taxpayers who can then be targeted by nudges. Potentially suspicious taxpayers can be identified, for example, by matching the same transaction reported by the buyer and by the seller (as in Almunia et al. 2022), or by using satellite data to uncover unreported properties (as in Casaburi and Troiano 2016). Second, policy initiatives that make new information available, such as on foreign sources of income and wealth, can similarly help identify potentially noncompliant taxpayers and nudge them. The recent work of Boas et al. (2024) shows – in the context of newly made available data on income and wealth parked offshore account thanks to reforms of automatic exchange of information – that such targeted nudges can be very effective, even when noncompliance consists of potentially very large amounts of income or wealth that are hidden from the tax authorities using sophisticated techniques.

In terms of when to nudge, as we have shown, nudges work in the short term, that is, in the horizon of a couple of months. Beyond that, they become ineffective on average. One strategy for tax authorities would be to nudge taxpayers once again around the time the nudge effect is predicted to vanish. The timing of these repetitive nudges can be anchored to be some time before major tax filing deadlines. The work of Antinyan et al. (2021a) illustrates that repetitive nudging can be beneficial for tax compliance.

In terms of how to nudge, although we have shown that deterrence nudges work the strongest, tax morale nudges work, too, but just less powerfully than deterrence ones. It is, of course, plausible, if not likely, that rational motives are more important drivers of tax compliance than morale motives. However, a competing hypothesis is that morale factors are deep-rooted parameters that are very important drivers of compliance, yet they are difficult to change in general and through nudges sent by tax authorities in particular. This argument would suggest that, to be credible, governments need to make real changes in those elements that affect the morale of taxpayers, such as in the provision of public goods or in making sure a just and appropriate level of compliance is reached across the whole population. Our finding that nudges do not work as well in low-income countries as in middle- and high-income countries is consistent with this explanation.

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Lena Abou El-Komboz and *Moritz Goldbeck*

International Collaboration in Digital Knowledge Work: A Production-Side Assessment of Europe's Digital Single Market*

KEY MESSAGES

- **Low market integration is a major barrier to European competitiveness in the digital economy**
- **International collaboration of knowledge workers could help to harness market size advantage**
- **Data from the largest coding platform reveals digital collaboration in Europe drops by 16.4 percent at borders**
- **This border effect is 73 percent larger than between US states**
- **Organizations and cultural proximity facilitate international collaboration**
- **European digital single market policymaking should address production-side barriers to support the digital economy**

Europe's digital economy is lagging behind global competition, especially the US, despite comparable market size and human capital availability. The largest US tech companies – the "magnificent seven," i. e., Alphabet (Google), Amazon, Apple, Meta, Microsoft, Nvidia, and Tesla – generate around ten times more revenue than the EU's largest seven (Foucart 2024). At the same time, the digital economy is becoming increasingly indispensable for productivity and economic growth. Fostering market integration to further deepen the digital single market is crucial to advancing Europe's competitiveness as an attractive location for firms pursuing digital business models.

Digital business models typically require high upfront fixed-cost investments in product development, large parts of which are personnel costs for knowledge workers, before scaling on low (sometimes even close to zero) marginal cost becomes possible. With such production technologies, a market environment that allows firms to efficiently organize and coordinate available human capital is paramount. Existing evidence emphasizes the crucial role of collaboration in knowledge worker teams for productivity (Jones 2009; Wuchty 2007). With a geographically disproportionately distributed workforce in Europe (Wachs et al. 2022), increasing international collaboration is an important lever to facilitate digital business.

However, border effects (i. e., reductions of economic exchange across the EU's many national borders) could constitute a significant barrier to international collaboration. Border effects are one of the most robust and consistent empirical findings in international economics (McCallum 1995; Anderson and van Wincoop 2003). Yet, in the digital economy, many of the traditional explanations for border effects do not apply, such as transportation costs (Blum and Goldfarb 2006). Still, other frictions to economic exchange along intra-European national borders, e. g., cultural or language differences, are potentially significant barriers to international collaboration.

Hence, a production-side assessment of digital markets with a focus on collaboration is crucial to inform digital single market policymaking. In this article, which is based on Abou El-Komboz and Goldbeck (2024b), we contribute to this question by asking if there is a border effect in virtual collaboration of knowledge workers and explore potential remaining frictions along national borders within Europe.[1]

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DATA

We investigate software developers as a prime example of highly digitalized knowledge work with the potential for fully virtual collaboration (Emanuel et al. 2023). To measure interregional collaboration, we tap data from *GitHub*, by far the largest online code repository platform for collaborative software development. We extract the activity of around 144,000 European and 191,000 US software developers in 10,735,071 public repositories (projects) from *GHTorrent*, a project that mirrors the content available through the official GitHub REST API and structures it in a relational database (Gousios 2013). Users' self-reported location allows us to elicit spatial collaboration patterns via a geocoding procedure. We measure interregional collaboration by the number of user pairs with joint projects in each NUTS2 region pair of 34 countries from 2015 to

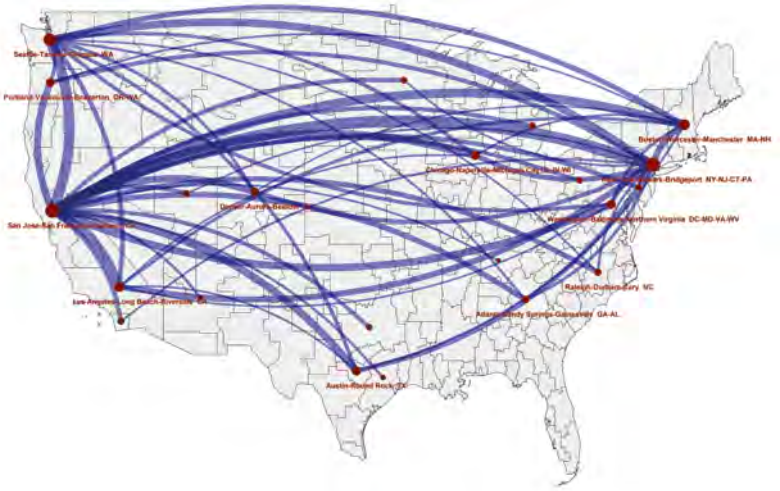
[1] In this article, we use Europe and the EU interchangeably, as our results apply mostly to EU policymaking, but our data extends to non-EU member states in Europe, e. g., Switzerland.

Figure 1

Inter-regional Software Developer Collaboration, 2015–2021

Panel A: Europe

Panel B: United States



Note: Panels A and B map the structure of the inter-regional software developer collaboration network for Europe and the US, respectively. Regions in Europe are NUTS2 and BEA Economic Areas in the United States. Important edges of the network, defined as inter-regional links above 25,000 connections, are shown in blue and their width is scaled logarithmically. Regions are shown in gray. Bold (thin) black lines represent national (regional) borders. Regions with important edges feature their centroids as nodes in red, scaled by their logarithmic sum of inter-regional connections. Ireland, Hawaii, and Alaska are not shown.

Source: GHTorrent, Bureau of Economic Analysis, World Cities Database, authors' compilation.

2021. To this end, we define joint projects of two users as repositories that receive at least one commit (code contribution) by each of the users in the observation period. Figure 1 maps the most important nodes and edges of the interregional collaboration network and contrasts the pattern in Europe and the US.

We complement the data for Europe by combining it with data on cultural proximity and other cross-country differences. Importantly, we tap the measure of cultural proximity of Obradovich et al. (2022), who use data on online behavior from the Facebook marketing API to compute a bottom-up, data-driven, and granular assessment of interest overlap between populations. The authors show that this measure aligns with traditional measures of cultural differences while improving on granularity and representativeness. We further add data on genetic distance from Spolaore and Wacziarg (2009), a well-established proxy for cultural factors associated with ethnicity, as well as common language, shared colonial or same-country history, and religious distance from the *CEPII Gravity Database* (Conte et al. 2022). Note that differing availability of these metrics for European countries impacts the sample.

EMPIRICAL APPROACH

We estimate a parsimonious gravity equation following the canonical model by McCallum (1995) to identify border effects:

$$\ln(y_{i,j}) = \beta_0 + \beta_1 \text{crossborder}_{i,j} + \beta_2 \text{coloc}_{i,j} + \beta_3 \ln(\text{dist}_{i,j}) + \delta_i + \delta_j + \varepsilon_{i,j}$$

where $y_{i,j}$ represents the number of bilateral collaborations between regions i and j, including domestic collaborations $i=j$. The dummy variable $\text{crossborder}_{i,j}$ indicates if region i is located in a different country than region j, and $\text{dist}_{i,j}$ denotes the geographic distance between the regions. We further add a colocation indicator, $\text{coloc}_{i,j}$, to account for strong colocation effects in collaboration (Goldbeck 2023). Origin and destination fixed effect δ_i and δ_j account for unobserved regional determinants of collaboration common across all partner regions. The coefficient β_2 captures the elasticity of collaboration with respect to geographic distance, which we expect to be negative from theory. The border effect is given by our coefficient of interest β_1.

DIGITAL BORDER EFFECT

Table 1 reports our main regression results. The first two columns present baseline estimates of the border effect at European and US state borders, respectively. The border effect in Europe is −16.4 percent, i. e., software developers collaborate, on average, 16.4 percent less with developers located in other countries as compared to national developers. Importantly, this is after controlling for geographic distance, collaboration potential, and other unobserved regional factors through origin and destination fixed effects. Comparing this result to the border effect found in similar models for international trade (Havranek and Irsova 2017; Santamaría et al. 2023a and 2023b), we find that the digital border effect is about five to six times smaller. This reflects the generally lower barriers for interregional collaboration in the digital economy compared to brick-and-mortar industries.

In contrast to the EU, the border effect in the US, which naturally features higher market integration and lower cultural and language barriers, is only

−9.5 percent. This is 6.9 percentage points or 73 percent lower compared to the border effect in Europe, a sizable difference. Notably, colocation in same region is much less relevant for collaboration in Europe compared to the US while geographic distance has a stronger effect. The more equal spatial distribution of Europe's population is likely the main reason for this result. Additionally, most interregional collaboration in the US is happening between the large cities on the east and west coasts, resulting in a higher share of long-distance relative to short-distance collaboration.

PRODUCTION-SIDE BARRIERS TO COLLABORATION

To investigate what explains the higher border effect in Europe, we account for factors commonly associated with being a barrier to economic exchange in columns three and four of Table 1. In column three, we add cross-country cultural and ethnic differences. Cultural differences are strongly significantly and consistently related to collaboration, while ethnic differences are economically insignificant but still statistically significantly related to international collaboration. In column four, we include further cross-country differences related to specific potential barriers. Religious differences and colonial history are not associated statistically significantly with collaboration. In contrast, a common language is related to 8.2 percent higher collaboration, significant at the five percent level. A shared history as same country is negatively related to collaboration, reflecting disrupted relations due to the history of the former Yugoslavia and Austria-Hungary. Importantly, once these factors are included in the model, the estimate of the border effect becomes statistically insignificant with point estimates close to zero. This implies that the digital border effect in Europe can be entirely explained by cultural proximity and language barriers.

A decomposition of the measure of cultural proximity by Obradovich et al. (2022) into subindices of interest overlap yields the largest association for the category "non-local business." This result suggests organizations or at least shared professional interests enable international collaboration. This is in line with evidence in literature suggesting that organizations often facilitate exchange and are therefore well-suited to overcoming external barriers to collaboration. Also using the data from GitHub, Goldbeck (2023) shows, for example, that developers from the same, large firm engage disproportionately in remote collaboration.

Our results in Abou El-Komboz and Goldbeck (2024b) further demonstrate that the border effect is systematically related to the number of countrywide users. We show the border effect roughly doubles when a small country is involved, defined as hosting an below-median number of users. The effect does not differ depending on whether both countries are small or just one, implying there is a smaller border effect among large countries. This points to substantial difficulties for developer communities in small countries to make connections to the hubs, which are mostly located in large countries.

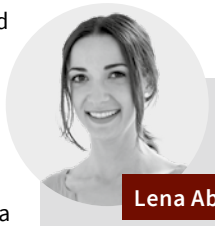
Table 1

Digital Border Effect

Collaboration	EU	USA	EU	EU
	(1)	(2)	(3)	(4)
Cross-border	−0.180***	−0.100***	−0.009	−0.014
	(0.014)	(0.033)	(0.037)	(0.037)
Colocation	0.862***	2.191***	1.485***	1.476***
	(0.068)	(0.073)	(0.069)	(0.070)
Geographic distance [log]	−0.129***	−0.060***	−0.016**	−0.018**
	(0.007)	(0.011)	(0.008)	(0.008)
Cultural distance			−0.097***	−0.081***
			(0.016)	(0.017)
Genetic distance			−0.001**	−0.001*
			(0.000)	(0.000)
Common language				0.082**
				(0.034)
Religious distance				−0.005
				(0.020)
Same country history				−0.071**
				(0.028)
Colonial history				0.011
				(0.016)
Origin fixed effects	x	x	x	x
Destination fixed effects	x	x	x	x
Observations	84,100	32,041	55,169	55,169
Adj. R^2	0.922	0.922	0.947	0.947

Notes: The outcome variable is the natural logarithm of collaborations between region-pairs plus one. Colocation indicates collaboration between users in the same region. Robust standard errors are reported in parenthesis. *** p < 0.01, ** p < 0.05, * p < 0.1.

Source: GHTorrent, Bureau of Economic Analysis, World Cities Database, CEPII, Obradovich et al. (2022), Spolaore and Wacziarg (2009), author's compilation.



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POLICY CONCLUSIONS

The EU market features several disadvantages for digital business relative to its closest global competitors, the US and China. Scalability is generally lower not only due to administrative and bureaucratic barriers along national borders, but also because of soft factors like differences in language, preferences, or culture. Existing digital single market policymaking focuses on the consumer side of digital markets and is predominantly targeted at ensuring equal market access for consumers, e. g., by harmonizing VAT regimes and data protection law. While some business needs, like improving investment through a deepening of the capital market or interoperability and data access, are increasingly recognized, the production side is currently not sufficiently considered.

Especially the need to address inherent production-side challenges of the EU market due to a geographically distributed and multinational workforce is largely overlooked. A lower geographic concentration of knowledge workers is beneficial for regional cohesion, but at the same time requires more interregional collaboration to exploit the size of the EU's labor market. Our results show that international production in the digital economy is generally easier than in brick-and-mortar industries. However, a significant border effect of on average −16.4 percent still exists. For international collaboration of knowledge workers, soft factors like cultural and language differences are relatively more important. Since countries hosting only small knowledge worker communities exhibit higher border effects, a desirable side effect of policies fostering international collaboration is a potential decrease in regional inequality.

For the software industry, a well-known blind spot of studies based on patent data (see, e. g., the discussion in Abou El-Komboz et al. 2024), our results highlight the embeddedness of the industry in open-source communities. As we observe public activity of developers, our findings indicate significant positive effects on production in open innovation ecosystems through professional connections formed in and facilitated by organizations. As open innovation ecosystems produce valuable public goods (Korkmaz et al. 2024; Abou El-Komboz and Goldbeck 2024a), such interconnections potentially induce significant positive spillovers. In addition, the focus of the data on public activity, together with organizations playing a crucial role in connecting developers across national borders, suggests the effectiveness of measures to increase international collaboration and reduce the border effect might be even higher for non-public activity of private organizations.

Multinational production in the digital economy is not only a challenge but offers opportunities as well. International teams are likely better positioned to develop digital products that serve the diverse consumer base of the European market (Bahar et al. 2023). This advantage might extend to scaling digital business models effectively beyond any national border. Our findings suggest that international collaboration might be best facilitated through organizations and shared professional interests that connect people across borders. Thus, European policy aimed at a lasting increase in international collaboration among knowledge workers should consider targeting organizations rather than individuals.

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The Slow End of the ICE Age in Germany: Insights from Job Postings on the Automotive Industry's Trajectory

KEY MESSAGES

- **The debate on phasing out internal combustion engines (ICE) has resurfaced in Germany amid an economic downturn; whether this is smart appears questionable**
- **To monitor in real time where the industry is headed, analyzing job postings provides reliable insights into the ongoing strategic shifts in the automotive sector**
- **From mid-2019, postings of EV-focused firms have consistently exceeded those of ICE-focused firms, eventually being about twice as high by the end of 2023**
- **However, this gap in postings between EV- and ICE-focused firms has shrunk by 60 percent since December 2023, indicating a slowdown of the transition to e-mobility**
- **EV-focused firms scale back job ads for production-related roles disproportionately while ICE-focused firms decrease hiring to a greater extent for transformation-related occupations**

As the German economy grapples with a downturn in the wake of the pandemic and compounded by years of geopolitical upheaval, the transition to e-mobility within the automotive industry, Germany's largest manufacturing industry, is facing increasing pushback.[1] The enthusiasm for electric vehicles (EVs), which surged after the "Dieselgate" scandal of 2015, has waned among politicians, industry, and the public alike. The fear of losing well-paying jobs tied to the internal combustion engine (ICE) – a technology where Germany remains a global leader – is pervasive. In September 2024, Germany's largest carmaker, Volkswagen, revoked job guarantees and is now openly considering domestic plant closures. There seems to be a growing clamor for delaying the "end of the ICE age" in order to benefit from the attractive margins of the legacy technology for a few more years, especially in view of the fierce competition in the EV market and the industry-wide weakness in consumer demand. This weakness is also evident in global markets, an unsettling situation given that three-quarters of cars produced in Germany are exported.[2]

The phase-out of the combustion engine is a central element of the EU's "Fit for 55" climate policy initiative of 2021, which includes legislation passed in spring 2023 mandating that only zero-emission vehicles be sold in the EU from 2035 onward. Additionally, the emission standards introduced in the 1990s and progressively tightened thereafter are to be updated, with the strict Euro 7 norm set to be enforced from 2025 onward. In 2021, the German government declared the ambitious goal of having 15 million EVs on the road by 2030. Recently, however, with the national election approaching in 2025, concerns about the economic impact of regulatory pressures are being voiced not only by opposition leaders such as Friedrich Merz (see Footnote 1), but also by members of the governing coalition that has now broken apart over differences in economic policy. Just before the recent state elections, the Free Democratic Party (FDP), which held both the transport and finance ministries, released a transport policy roadmap explicitly condemning the ICE ban.[3] At the EU level, President Ursula von der Leyen, re-elected this summer for a second five-year period, has promised to review the ICE ban in 2026. At a meeting with industry representatives in September, Robert Habeck, Germany's Minister of Economic Affairs and Climate Action, promised to lobby in Brussels for an earlier revision (and possibly relaxation) of the fleet carbon emissions targets, which the industry will likely fail to meet, facing multi-billion-euro fines. These political signals cast doubt on whether the existing regulation on the phase-out of ICE vehicles will stay in place, increasing uncertainty among both industry and consumers.

There is widespread agreement that a successful transition to e-mobility is essential in the medium term

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1 See, e. g., Statement by Friedrich Merz, chairman and chancellor candidate of the German Christian Democratic Union (CDU), currently opposition leader, on X, August 21, 2024: "The combustion engine ban was a serious strategic mistake that the Federal Republic of Germany unfortunately agreed to. This was wrong and must now be corrected." (Translated from German: "Das Aus des Verbrennermotors war ein schwerer strategischer Fehler, dem die Bundesrepublik Deutschland leider zugestimmt hat. Das war falsch und muss jetzt korrigiert werden."), https://x.com/_FriedrichMerz/status/1826301024816005126.

2 VDA Statistics for 2023, available at https://www.vda.de/en/news/facts-and-figures/annual-figures/exports.

3 Strategy paper titled "Roadmap Future – Policy for the Car" (in German: "Fahrplan Zukunft – Eine Politik für das Auto") from August 12, 2024, https://www.fdp.de/fahrplan-zukunft-eine-politik-fuer-das-auto.

to maintain competitiveness vis-à-vis the global automotive industry and, in particular, against all-electric manufacturers such as Tesla and BYD (Dechezleprêtre et al. 2023; IEA 2024; Wingender et al. 2024). Yet, the short-term economic impact of such a transition is the subject of intense debate, particularly with respect to job creation in the German labor market. EV production is not only less complex, but batteries, the key component, are largely sourced from abroad. Furthermore, Germany no longer seems to be the preferred production location for automotive firms, especially for the compact EV models required for the mass market. For example, Volkswagen announced it will produce its flagship electric compact car, the ID.2, in Spain, and Ford decided to close a production plant in the German state of Saarland in favor of a site in Spain.

Outside Europe, important markets for German car producers such as China and the US are becoming more and more competitive, especially as the share of EVs in automotive sales increases and all-electric producers claim a large portion of those markets. This is especially true for China, where German automakers have been producing more cars than in Germany since 2018 (Falck et al. 2023). With the shift toward EVs and ICE sales declining, German car producers are currently losing market share (Yang 2023; Global Trade Alert 2024). Considering all these factors, some argue that sticking to ICE vehicles would be beneficial for short-term labor market outcomes.

That is why the employment effects of the ongoing structural shift in the automotive industry are in the focus of policymakers. Demand for new hires is particularly well suited for the analysis of workforce dynamics, as firms' hiring patterns provide key insights into the type and amount of human capital that they require to implement their latest strategic priorities (Elfenbein and Sterling 2018; Ployhart and Kim 2014). As firms typically expand their knowledge base disproportionately through new hires, demand for new workers is especially valuable in tracking the latest trends in the labor market.

Firms' demand for new hires also offers insights into the trajectory of the automotive industry more broadly, since hiring is a highly reactive parameter of firms' decision-making. Hiring is how companies obtain the personnel needed for the coming years, if not decades, and is therefore inherently forward-looking (Gutiérrez 2020). Demand for new hires reflects firms' latest market assessments and strategic guidelines, which embody long-term expectations. As such, hiring demand is ahead of other indicators such as production when it comes to revealing structural shifts and is therefore well suited to understanding the current and likely future development of the industry.

Unfortunately, evidence-based insights into the green transition of the automotive industry are limited, as they require company-level data that distinguishes between companies that are driving the transition and those that continue to rely on traditional technologies. The survey data that is available tends to be at the industry level, not the company level, and relies on firms' stated plans and typically a small sample size. While there is work on measuring greenness at the occupational level by classifying the task content of jobs (Consoli et al. 2016), there is little empirical evidence at the firm level that assesses firms' decision-making with regard to technological specialization.

In this article, we build on our previous work (Fackler et al. 2024a and 2024b) to analyze recent labor market developments in the German automotive industry. To this end, we use data on online job advertisements (OJA) as a measure of hiring patterns, a major component of firms' labor demand. OJA trends provide valuable insights into workforce adjustments at the extensive margin in real time. By combining the near universe of OJA with patent data, we track hiring trends for firms with an EV focus versus those with an ICE focus. Our approach dynamically assesses demand for new hires from January 2018 through October 2024, capturing recent shifts in parallel to the evolving economic, political, and regulatory developments. Additionally, our data examines the structural

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transformation in the occupational composition of active postings, focusing on differences between EV- and ICE-focused firms.

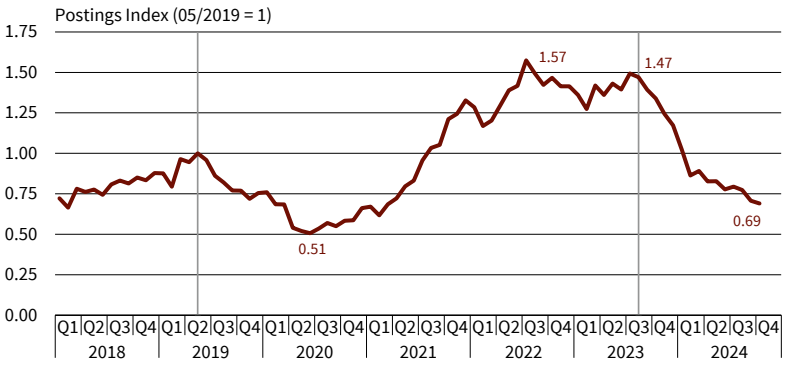
DATA

Our analysis is based on the combination of two data sources. First, we use patent data to determine which companies are more active in the field of green powertrain technologies. Second, we measure firms' demand for new workers using online job postings from Indeed, one of the world's largest online platforms for jobseekers.

We extract the patent portfolios of companies active in powertrain technology since 2000 from the *Patstat* database of the European Patent Office (EPO). To classify powertrain technologies, we rely on the established methodology of Aghion et al. (2016), which categorizes powertrain-related patents by their technology class based on expert interviews. *Green* technologies comprise mainly battery-electric vehicles (BEV), but also include plug-in hybrids (PHEV) as well as fuel-cell electric vehicles (FCEV). Conversely, we generally classify technologies related to internal combustion engine (ICE) vehicles technologies as *brown*.[4] Based on their patent portfolios, we define companies as green (or *EV-focused*) if they have filed an above-median share of green patents. These are companies that have applied for more green patents relative to all classified propulsion technology patents (green and brown) than the median company. Companies with a below-median share of green patents are referred to as brown (or *ICE-focused*).

We combine this data with firms' demand for new hires, measured using online job ads from Indeed, through a name-matching procedure. The Indeed OJA data covers the near universe by indexing postings from company career websites and supplementing them with job postings directly published on the platform. Job postings are not only captured quantitatively at the company level, but also differentiated by harmonized occupational categories through text-based analysis. This allows us to study differences in the structure of active postings. We consider 2,383 companies for which both patent and job posting data are available. With this approach, we capture automakers and suppliers of all sizes, as well as other companies that are active in propulsion technology patenting. On average, green companies are smaller and less technologically specialized in the automotive and propulsion sectors than brown companies, measured by the size of their patent portfolios and the number of job postings. We track active postings on a monthly basis from January 2018 through October 2024, normalized to May 2019. During this period, our dataset gathers 1,598,894 unique published online job postings.

Figure 1
Job Postings of Automotive Firms



Source: Indeed; Patstat; authors' calculations. © ifo Institute

Building our analysis on OJA data implies that we regard demand for new hires as one of the main components of overall labor demand. We do not study other components of workforce adjustment, such as shifts due to reskilling or changing task content, layoffs, and (early) retirement. Note that although layoffs often dominate the public debate, they rarely occur and consequently represent only a small fraction of overall workforce adjustment. Further, looking at patent-active firms in Germany excludes firms that do not file patents or file patents only elsewhere. This implies that our focus is on firms innovating in Germany. Thus, our approach excludes postings of staffing agencies, which are usually not patent-active. Labor demand through staffing agencies is generally easier to adjust, making it more responsive; therefore, our estimates are likely conservative. Similarly, our data does not capture foreign companies conducting research and development outside Germany, which are mainly either firms with foreign headquarters or recent entrants.

[4] Aghion et al. (2016) identify an additional category (grey) for combustion technology that primarily aims at improving efficiency. A more in-depth analysis of the development of individual green, grey, and brown technologies can be found in Falck et al. (2023).

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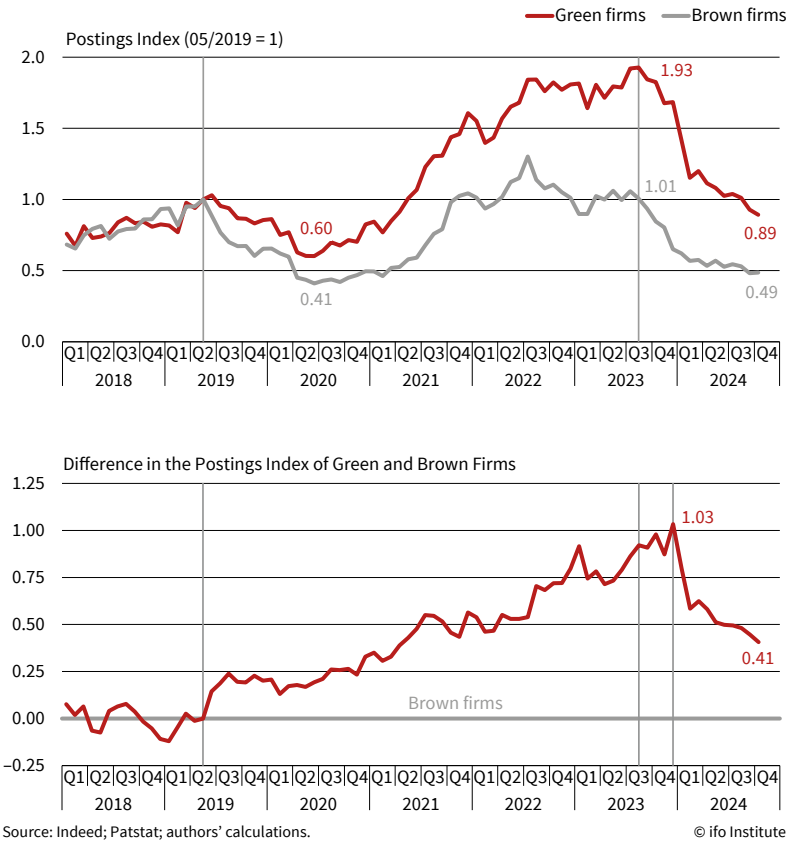
WEAK HIRING IN THE GERMAN AUTOMOTIVE INDUSTRY

Figure 1 shows job postings of automotive firms in Germany over time as a postings index normalized to May 2019 (left vertical gray line). Generally, the overall volume of automotive postings follows the broader economic cycle. After a peak in job postings in mid-2019, there is a sharp decline through mid-2020, coinciding with the supply-side economic contraction during the pandemic. Starting in early 2021, job postings rebound, reaching a new peak by mid-2022. This high level persists for about a year. During this period, firms worked through the significant backlog in their order books built up during the pandemic and the subsequent supply chain disruptions. August 2023 marks the start of a pronounced contraction, indicated by the right vertical gray line in Figure 1. By October 2024, job postings decreased by 53 percent, in line with the economy-wide downturn in Germany and further exacerbated by industry-specific factors such as weak consumer demand for cars and a slowdown in leading export markets. As of October 2024, the overall level of job postings in the industry is still higher than the trough experienced during the pandemic but shows an unbroken downward trend.[5]

[5] Note, however, that this comparison is conservative, as research indicates that the number of actual jobs behind online job ads has been declining over time – see https://www.reveliolabs.com/news/macro/ghost-job-postings/.

Figure 2

Job Postings of Green and Brown Automotive Firms



Source: Indeed; Patstat; authors' calculations. © ifo Institute

SLOWING TRANSITION TO E-MOBILITY

Figure 2 distinguishes postings of green and brown firms. The upper panel shows job postings relative to May 2019 (marked by the left vertical gray line), which is when the two groups begin to diverge. Note that the median split in greenness leads to similar overall job posting volumes prior to this divergence, since both groups also have a comparable size distribution.[6] Since May 2019, the number of postings of green firms has been significantly and consistently higher than that of brown firms. During the pandemic, the number of postings for brown firms dropped by about 60 percent and remained low for nearly a year, while demand for new hires by green firms declined by only around 40 percent and began rising shortly thereafter. Importantly, postings of green firms recovered much faster, reaching an 84 percent increase in job postings compared to the May 2019 peak and sustaining that level until August 2023. In contrast, postings of brown firms only began to recover in late 2020, briefly surpassing their previous peak in early 2022.

Starting in August 2023, marked by the right vertical gray line in the upper panel of Figure 2, the number of postings of both green and brown firms dropped sharply by 54 percent for green and 52 percent for brown firms until October 2024. Currently, in October 2024, the number of job postings by green firms is about 10 percent lower than in May 2019, while postings of brown firms are about 51 percent lower. This suggests that green firms have been responsible for the bulk of demand for new hires in recent years, driving the industry's transformation toward e-mobility.

The lower panel of Figure 2 illustrates this development by showing the difference in normalized job postings between green and brown firms. The gap in postings between green and brown firms steadily widens from May 2019 until December 2023. Recall that in May 2019, overall job posting levels for both green and brown firms were comparable. By 2020, postings of green firms were already 20 percent higher than those of brown firms. This difference grew to about 50 percent by the summer of 2021 and remained at that level until July 2022. After that, the gap widened further, reaching its peak in December 2023, when demand for new hires of green firms was about double that of brown firms. This pronounced shift in the job postings volume toward green firms underscores the rapid transition toward e-mobility that the German automotive industry showed during this period.

Since December 2023, indicated by the right vertical gray line in the lower panel of Figure 2, with postings of green firms twice as high as those of brown firms, we observe a drastic reversal of this trend. The difference in job postings between green and brown firms has narrowed by 60 percent, dropping by 62 per-

[6] In May 2019, job postings by green firms were at 101.94 percent of the level of brown firms.

centage points. Currently, in October 2024, the number of job postings for green firms is only 41 percent higher than that of brown firms. This means that green firms still demand significantly more new workers compared to brown firms, but the pace of the transition has decelerated considerably. The narrowing gap between green and brown firms is in line with recent developments in the industry. Amid the general downturn and weak demand for electric vehicles, both firms and policymakers have scaled back their commitments to the transition to e-mobility.

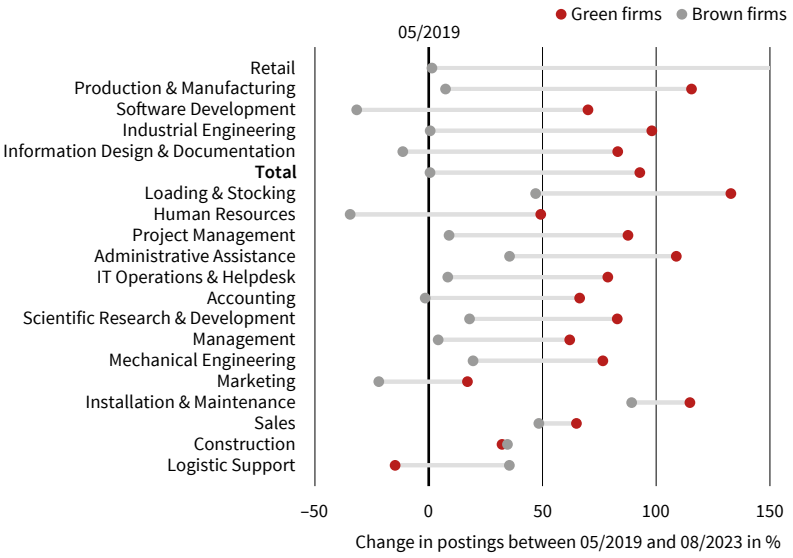
HIRING SHIFTS TO DIFFERENT OCCUPATIONS FOR GREEN AND BROWN FIRMS

We further investigate shifts in the occupational composition of postings. To this end, we distinguish two phases. We call the period from May 2019, when postings of green and brown firms started to diverge, until August 2023, the start of the contraction, the *transformation phase*. Conversely, we call the period from August 2023 until October 2024 the *contraction phase*. Figures 3 and 4 highlight postings trends for the 19 largest occupational categories in the automotive industry during the transformation and contraction phases, respectively. Specifically, the graphs depict the change in the number of postings during each phase by occupation separately for green and brown firms. This means that, for each occupation, Figure 3 depicts the change in postings between May 2019 and August 2023 (the transformation phase). Dots on the zero line represent no change in postings during this period. Similarly, Figure 4 depicts the difference in postings between August 2023 and October 2024, with the zero line indicating no change during the contraction phase. Occupations are sorted by the difference between green and brown firms (depicted by gray bars), ranked by descending differences.

During the transformation phase, the number of overall postings of green firms almost doubled, while postings of brown firms are roughly at the level of May 2019 (see "Total" row in Figure 3). The number of postings of green firms grew in all occupations except logistics, which is consistent with fewer components needing to be sourced for EV production. The highest growth rate is observed for retail jobs, which capture occupations related to direct consumer sales. Importantly, there is a large expansion of demand for new hires by green firms in manufacturing-related jobs such as production workers, technicians, and warehousing. The above-average expansion of postings for administrative and engineering roles for green firms in parallel to production reflects firms' expectation at the time to continue to expand production, triggering the need to adjust overhead and product development capacity.

The change in postings across occupations during the transformation phase is notably different for brown firms. Specifically, the decline in postings for

Figure 3
Change in Job Postings during the Transformation Phase, 05/2019–08/2023



Note: We cut off the value of green firm retail postings to improve the graph's readability.
Source: Indeed; Patstat; authors' calculations.
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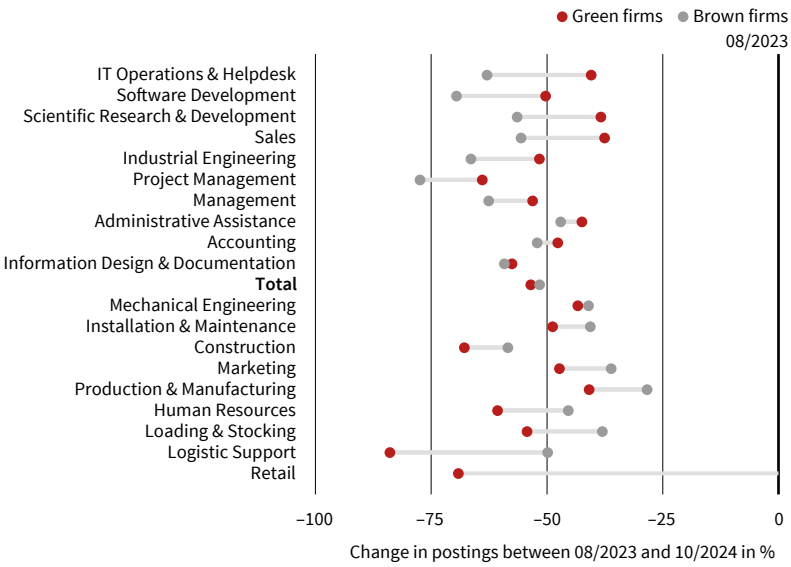
human-resources roles signals persistently lower overall labor demand by brown firms. Tellingly, postings of brown firms for software developers, a key occupation for the transformation, decline markedly. This development might be related to ICE-focused firms' increased outsourcing of the software stack to large tech companies and consultancies, as well as to decreased efforts in the area of autonomous driving. A higher number of brown firm postings is observed for technicians, logistics, and sales. This is linked to the still high demand for ICE vehicles during this time, the order backlog after the pandemic, and the need to manage international supply chain disruptions.

A pronounced difference in the shift of the occupational composition of postings between green and brown firms is also evident during the transformation phase, with retail roles showing the largest postings growth difference. This is in line with the minimal need for dealership networks in EV distribution compared to ICE vehicles, due to simpler maintenance and increased viability of over-the-air updates as well as more direct and online sales. In addition, there was stronger growth in the postings for production and manufacturing roles for green compared to brown firms, reflecting the shift of the overall production share toward EVs during this period. Note that green firms' postings for traditional production roles such as technicians (captured by the Installation and Maintenance occupational category) also grew faster than those of brown firms, but the difference is not as high. Further, the gap in posting growth is disproportionately large for software and information technology roles, with green firms increasing their search in these occupations much faster than brown firms. This suggests that automotive firms that are more engaged in the green transformation tend to drive the digital transformation of the industry as well.

Figure 4

Change in Job Postings during the Contraction Phase, 08/2023–10/2024



Note: We cut off the value of brown firm retail postings to improve the graph's readability.
Source: Indeed; Patstat; authors' calculations.

BROWN FIRMS SCALE BACK TRANSFORMATION-RELATED HIRING MORE AGGRESSIVELY

Figure 4 depicts the development of postings in the contraction phase after August 2023, when industry-wide hiring started to decline rapidly. The contraction is evident across all occupations and for both green and brown firms, except for an increase in the number of retail postings for brown firms, which is consistent with the renewed interest in ICE vehicles. While the average percentage decline until October 2024 is similar for green and brown firms (see "Total" row), there are considerable differences in the occupational composition. The strongest decline can be observed in the demand of green firms for roles in logistics and retail as well as technicians and construction, suggesting that activities related to the expansion of production are being scaled back. Likewise, postings for administrative roles and human resources also shrink disproportionately. This points to a permanent downward adjustment of green firms' expectations regarding consumer demand and, as a result, slower expansion of EV production.

The occupational structure of postings of brown firms changed in a significantly different manner during the recent contraction. The occupations showing the largest reductions are mostly related to the transformation and product portfolio development. For example, brown firms scale back hiring for roles in information technology and software development disproportionately, with research and development as well as engineering also experiencing below-average postings reductions. Similarly, postings for occupations in management decline strongly. This suggests a reorientation of ICE-focused firms toward existing products and business models.

Gray bars represent the differences in the contraction of postings by occupation between green and brown firms during the contraction phase. While demand for new hires by green and brown firms declines to a similar extent on average, there are significant differences across occupational categories. Green firms scale back to a lesser extent their postings for roles in information technology, software development, research and development, as well as engineering, all crucial for a continued transformation. The difference in the magnitude of posting contraction between both groups of firms emphasizes that brown firms reoriented their workforce toward existing technologies and business models in the past year while green firms continued to prioritize transformation-related hiring. Likewise, green firms cut back demand for new hires less for sales and management roles, consistent with plans to counteract the consumer demand weakness and navigate the increased complexity of the transformation.

Conversely, postings of green firms decline more strongly during the contraction phase compared to brown firms in occupations related to production. This reflects the stronger decline in EV compared to ICE vehicle sales during the recent contraction and a readjustment of expectations about future consumer demand in the EV industry. Faster declines in postings for logistics and retail roles for green relative to brown firms underscore this development. Overall, the data during the recent labor demand contraction suggests that ICE-focused firms are prioritizing production and scaling back on transformation-related hiring. This is consistent with brown firms readjusting their expectations toward a continued slowdown or even a halt in the industries' transformation while green firms continue to prepare their workforce for sustained transformation, albeit at a much slower pace than in the previous years.

POLICY CONCLUSIONS

German carmakers and their suppliers have built up a commanding global lead in internal combustion technology, which has earned them an enviable reputation as premium manufacturers as well as industry-leading margins. But then the reality of global warming triggers the need for a green transition that includes phasing out ICE vehicles in favor of electric ones, upending a business model that has served the manufacturers splendidly so far and opening the market to new competitors. This presents both company leaders and policymakers with a conundrum: the decision of whether to stick with still highly profitable ICE vehicles for now, or to switch to electric ones that yield low margins today but are the market of the future.

Not surprisingly, automotive managers are reluctant to ditch their ICE vehicles just yet and policymakers are wary of the potential negative labor market ef-

fects of a quick shift to e-mobility. Although the transformation toward EVs accelerated after "Dieselgate," it has lost momentum amid the current economic downturn. The resulting corporate and political signals reflect a weakened commitment to transitioning to e-mobility, compounding the effects of the recent dip in consumer interest in EVs. Are these concerns pointing in a future-suitable direction?

Our research suggests that, on the labor market, extending the ICE era is unlikely to foster new job creation. A resurgence of ICE technology is increasingly improbable, with all major global markets firmly committed to e-mobility. Our analysis shows that firms focused on EVs feature consistently higher demand for new workers, while ICE-focused firms are not catching up to EV-focused firms in terms of workforce adjustments related to green and digital jobs. Interestingly, this has remained true even during the recent slowdown, which hit EV manufacturers disproportionately hard, challenging the view that a decelerated transition provides ICE-focused firms with the time and resources needed to prepare their workforce for the EV era.

Our most recent data shows that ICE-focused firms are markedly decreasing postings in transformation-related roles, suggesting that they are restructuring their workforce back toward ICE production. This deceleration of the transformation since December 2023 is worrisome, given that the trend toward EVs had shown positive labor market outcomes in the past years.

In our opinion, regulatory and strategic uncertainty adds unnecessary barriers to the transformation, dampening both demand and the adoption of EV-related technologies. This creates a challenge for policymakers struggling to implement evidence-based regulation and industrial policy against the headwind of consumers currently leaning toward sticking to ICE vehicles, at least until they see clearer signals regarding e-mobility. Navigating these political pressures, particularly in pre-election periods, requires a reliable regulatory and policy path and, most critically, forward-looking communication about likely economic and societal outcomes.

Our job posting data shows that while domestic employment is a crucial societal goal, firms will necessarily aim to balance economic opportunity and available resources, including human capital. This calls for regulators and policymakers to recognize the discrepancy between public and private objectives and design policies accordingly. For the automotive industry in Germany, this requires upholding the regulatory phase-out of ICE vehicles to incentivize the continued shift toward EVs, thus ameliorating the risks of the industry cashing out on legacy technology while leading the workforce into a technological and economic dead end. An effective tool to accomplish this is to integrate the transportation sector into a reliable and sufficiently high intersectoral CO_2 pricing scheme in the medium term.

Additionally, supporting short-term policies are needed to guide the sector through a transition that entails abandoning highly profitable ICE vehicles in favor of low-margin EVs. This includes beefing up the electricity grids to accommodate the rollout of the required charging infrastructure and, crucially, cutting the red tape that slows down and increases the cost of the energy transition. It is undoubtedly a delicate balancing act, pitting societal needs for rapid infrastructure expansion against individual influence over local infrastructure construction, but the current speed of infrastructure build is too slow. Given the importance of the European market for the German automotive industry, especially in the premium segment, infrastructure is an important lever to benefit both domestic firms and consumers in a targeted way.

For labor market policymaking, regulators should keep in mind the implications of the significant shifts in the workforce's occupational composition associated with the transition toward EVs, as our data shows. In general, information technology and software roles have become more important, while postings for traditional automotive occupations such as mechanical engineers and technicians are declining. EVs' reduced product complexity also leads to a significantly lower number of postings for administrative and support roles. Labor market policy can help facilitate the transition by incentivizing labor mobility both in general and for brown-green job transitions in particular. The provision of evidence-based information about labor market prospects for different occupations would be an effective first step, while identification of skill gaps and supporting reskilling initiatives would further lead to improved workforce readiness. Fostering labor market efficiency by enabling worker migration both within and into the EU can help to alleviate skill shortages.

Generally, our data implies that policymakers should be careful not to slow down or even block structural change since shutting the door on such change seems neither economically beneficial nor effective. This is true when designing mitigation policies to soften individual negative or locally concentrated effects of the transition, but also when considering firm exit and entry. Specifically, the most economically sound policies will likely lead to brown firms shrinking or exiting the market and to the entry and growth of green firms. To further boost domestic employment, trying to attract foreign companies to establish production within the EU would be a good offsetting strategy, since from a global perspective, the natural tendency of the automotive industry is toward regional production. European economic policy should therefore embrace global competition: it is not only a catalyst for innovation and transformation of domestic firms, but also a chance to lure foreign carmakers to set up shop in the EU.

For firms, shifting to EVs is merely the ticket to participate in the future automotive market. The sec-

tor is undergoing a deep transformation, as reflected by the ongoing reshuffling in the described occupational composition of the automotive workforce and a fundamental redefinition of the product "car." Yet, the industry is still in search of a viable new business model. This race being open is a huge opportunity for the European automotive industry and a major incentive for change, calling for a thorough rethink of old business models. Corporate innovation is therefore of paramount importance and should be incentivized, for instance through tax benefits for research and development. In addition to strengthening the labor supply in occupations related to the transition, innovation policies that promote disruptive innovation and entrepreneurship as well as greater labor market flexibility can help the automotive sector remain a competitive global player.

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