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From Unemployment Struggles to Labour Market Shortages?

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Europe's Cognitive Dissonance

The world has entered an age of permapolycrisis, where numerous interrelated crises and transformations occur simultaneously and severely block the resolution of common global challenges. Climate change continues to pose an existential threat to humanity, and war is back as an instrument of politics, with even the risk of thermonuclear apocalypse back in the realm of the possible. To say it in Thomas Hobbes' words, we face a real risk of a world with "No arts; no letters; no society; and which is worst of all, continual fear, and danger of violent death; and the life of man, solitary, poor, nasty, brutish, and short." While it is true that the world has faced many difficult periods in the past, that should not distract from the enormity of the current challenge and the significant risks we are facing in the years to come.

To some, this might seem overly alarmist. But Europeans especially should know better, having lived through an age of permacrisis over the past 15 years or so: the financial and economic crisis, the European sovereign debt crisis, Brexit, Trump, Russian aggression in Crimea and Georgia, migration, terrorism, a pandemic and so on.[1] At the same time, Europe had to contend with major transformations – climate, technology and demography – in a domestic and global political environment that is increasingly characterised by fragmentation and polarisation.

Within that context, Russia's invasion of Ukraine was a watershed moment,[2] ushering in a *Zeitenwende*, the beginning of a new era, where European security, prosperity and democracy are directly under threat. The war in Gaza only serves to highlight the level of global instability, while also increasingly pitching the West against the rest, accelerating the demise of the global rules-based order.

While lip service has been increasingly paid to the challenges of this new era, actions are falling far behind what is needed. This is in part because Europe is suffering from a collective progress illusion, where the (positive) actions taken have not come close to addressing the scale and scope of Europe's challenges. In other words, while Europe is facing exponential challenges, policy is still trying to respond with linear solutions.[3]

There is also a wilful denial of reality, often for contradictory reasons. On the one hand, some are arguing that Europe grows with crisis, that we have found solutions to fundamental challenges in the past and we will do so again when our backs are against the wall. They point to what has been done already, for example, in support of Ukraine or in response to the pandemic, and the unprecedented nature of these actions. In part, this is an illustration of the progress illusion but it is also ignoring what has not been done and the significant risks that poses.

There are also those who have fallen prone to despair, who believe that it is impossible for Europe to address these challenges and that we are doomed to live in a period of decline, where future generations face even worse constraints on their ability to shape the envi-

1 https://www.epc.eu/en/Publications/Europe-in-the-age-of-permacrisis~3c8a0c.
2 https://www.epc.eu/en/publications/A-watershed-moment-in-European-history-Decision-time-for-the-EU~4628f0.
3 https://www.epc.eu/en/Publications/Overcoming-the-European-Progress-Illusion~505c44.

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ronment in which they live and to defend their values and interests. There is much truth in this point of view; if we do not act, this will likely be the future that coming generations will face. But this should be a rallying call, not an excuse for despair and inaction. It is a moral imperative that we do all we can to change these dismal outcomes for future generations.

But why are we not doing what needs to be done, actions that many decision-makers deem necessary? At the heart of the problem lies democracy itself. The choices that we have to make will be painful and costly, in part because they directly affect our economic model and prosperity. The EU has to distribute the costs rather than the gains from further integration. While these costs are lower than they would be if every country would have to act alone, politically this is a far more challenging proposition, magnified by the cross-border nature of these costs and their distributional consequences. The common refrain from decision-makers is that the necessary actions are politically impossible, i.e. the dilemma that Jean-Claude Juncker summarised succinctly when he said, "We all know what to do, but we don't know how to get re-elected once we have done it." In other words, the rise of populism and nativism and the more challenging and contested environment is undermining the political economy of common political action and forward-looking strategic decisions.

In part, this is a trap we have created ourselves. Rather than acknowledging that the world we are facing will entail making difficult and painful trade-offs, and that such systemic and structural action will require sacrifices that will constrain our lifestyles, we have told populations that governments will protect them from these mega-trends. When it comes to Russia's threat, politicians, at least in Western Europe, were quick to assure the public that our lifestyle would not be impacted fundamentally after the initial adjustment period, emphasising that, in essence, it is not our war. No wonder the realistic appreciation of danger present in many populations gave way to a more complacent attitude. Even worse, when it comes to climate action, populations were told that green policies would contribute to Europe's competitiveness, almost inevitably leading to a backlash when climate action starts to hurt the pockets of households directly.

All of this adds up to a fundamental threat to democracy. Modern democracies will have to prove that they work in bad times, not just in good, and not only in the EU but across the world. The elections this year will provide a marker for how strong the essentially undemocratic and populist forces have become, including in the European parliamentary election and in the US presidential election. Negative outcomes can lead to vicious downward cycles, as democratic politicians feel increasingly unable to defeat the populist challenge and try to avoid controversy but at the same time undermine democracy by failing to meet the expectations of citizens.

The first step towards getting us out of this dilemma is brutal honesty. James Baldwin said, "Not everything that is faced can be changed, but nothing can be changed until it is faced." Citizens want to see integrity and honesty in their leadership, and this is the only choice that will encourage populations to make the necessary sacrifices. But for that, European leaders have to stop acting according to the environment they would like to live in and start to live in the real world, which is becoming more challenging and contested, not less.

Rather than copying some of the policies from the populists, our political leaders need to provide a forward-looking vision that provides a feasible but painful path to protect the values and interests of future European generations. This needs to be underpinned by cross-border strategic thinking, first defining common objectives and then adjusting the means to achieve them. This also entails changing the European integration process, not for its own sake but to deliver common solutions that match the scale and scope of the global permapolycrisis we are facing.

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From Unemployment Struggles to Labour Market Shortages?

After decades marked by struggles to combat high unemployment, today's main challenge is labour market shortages. Since the aftermath of the COVID-19 pandemic and despite the economic slowdown driven by Russia's invasion of Ukraine, EU labour markets have demonstrated remarkable resilience. Employment reached a record high in 2022 and the trend is expected to continue. Most companies, in the EU and beyond, are now struggling to fill vacancies. Labour and skill shortages in several sectors are the new problems to overcome. What are the reasons behind these shortages? Are these only temporary issues? Has unemployment ceased to be a burning issue? What policy options could address these challenges? Based on their presentations at the 2024 edition of the Centre for European Policy Studies' flagship conference, Ideas Lab, the contributors to this Forum attempt to answer these questions, discussing recent shifts in the labour market and policy solutions to address the different sources of shortages.

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Tomorrow at Work: The Age of Shortages

Labour shortages have become pervasive, across occupations, sectors and countries (ILO, 2024). What was once dubbed the "global war for talent" has now affected large swaths of labour markets across advanced economies. This is a significant change in sentiment following high un- and under-employment during the pandemic years 2020-21. It does seem, however, to follow a trend that emerged in the second half of the 2010s in which employers increasingly hinted that it was becoming more difficult to find suitable workers, regardless of the sector or occupation.

Labour shortages do not only affect high-income countries. Their impact is also felt in countries that still have an abundance of labour, as indicated by high unemployment or informal employment, mostly in the Global South. For one, labour shortages in the Global North might induce further brain drain, a long-standing issue for sending countries. Moreover, supply bottlenecks due to labour shortages are likely to slow global growth and trade while also inducing higher global inflation. Together, this will affect developing and emerging countries more severely than advanced economies.

This article presents an assessment of the origins and extent of labour shortages, focusing on Organisation for Economic Co-operation and Development (OECD) countries. In particular, it distinguishes between three sources of labour shortages: first, demand-driven temporary shortages; second, supply-driven long-term shifts in the size and composition of the labour force; and third, shortages driven by ineffective labour market adjustments that result in skill or geographical mismatches. We start by presenting our assessment before turning to some policy solutions to address the different sources of shortages.

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Labour shortages: Where and why

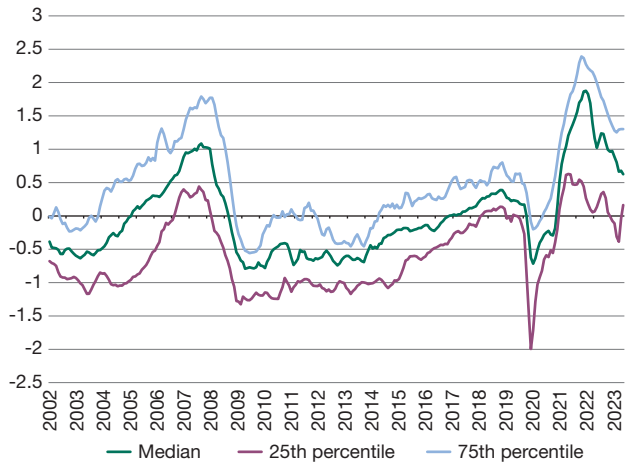
There is no commonly accepted definition of what constitutes labour shortages. Most analysis uses survey-based evidence (e.g. Gallup, 2023) or heuristics such as the number of (unfilled) vacancies or the vacancy-to-unemployment ratio. Others use a model-based assessment of inefficiently tight labour markets as a baseline for shortages (Michaillat and Saez, 2023). For our purposes, and considering that there is no internationally agreed upon definition of what constitutes a vacancy, we compare the evolution of national-level vacancy data to a 10-year moving average over the last two business cycles for countries with available data (see Figure 1).

As the figure illustrates, following the initial pandemic shock, during which vacancies collapsed as businesses faced the uncertainty of a dawning economic crisis, job openings recovered to levels above historical averages by 2021 and peaked in 2022. Afterwards, the curves show a steep recovery but remain elevated compared to the long-term average, and variation within the panel is larger than before the pandemic. Both the median and the 75th percentile curves remain well above their maxima of the decade preceding the pandemic.

Much of the short-term fluctuations over the last four years can be attributed to government support in reaction to the COVID-19 pandemic. Indeed, in most high-income countries, fiscal support packages were put in place to provide relief for lost economic activity due to lockdowns and other health-related measures (Ernst, 2020). What helped stabilise incomes and production also led to a booming labour demand, indicated by vacancy rates well above the historical average, including in sectors and occupations not directly affected by the pandemic. Four years later, even though many countries have moved to realign their public budgets, labour markets have started to cool down but remain supported by strong consumer demand as households continue spending their additional savings accumulated during the pandemic years.

With the cyclical boost to labour demand now fading, structural imbalances start playing a larger role, as sectoral shifts in demand persist and create bottlenecks in specific sectors and occupations. The health sector, for

Figure 1
Vacancies in high-income countries, January 2022 - May 2023
Standard deviations from the mean



Note: The figure shows the median, 25th and 75th percentiles of the three-month moving average of vacancies for 18 mostly advanced economies, expressed in standard deviations from a 10-year moving average. Countries included in the panel: Austria, Cyprus, Czechia, Estonia, Finland, France, Germany, Japan, New Zealand, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, Thailand, United Kingdom, Unites States.

Data source: tradingeconomics.com, calculations by the ILO.

example, experienced extraordinary strain during the pandemic, exacerbating already difficult working conditions. This added to existing hiring difficulties, as demand for health care services is on a constant rise in ageing societies while many practitioners reach the age of retirement (WHO, 2022). As a consequence, the health sector is one of the sectors with the most pressing shortages in the EU (European Labour Authority, 2023). Further sectors with widespread and severe shortages include the construction sector, IT, transportation, hospitality and manufacturing (ILO, 2024).

There are marked differences across countries regarding their labour force participation rates, but almost all countries saw a return to pre-pandemic participation overall, with the exception of the United States (see ILO, 2024; Feist, 2024). Depending on national contexts, pockets of lowered participation remain due to cultural and institutional differences, such as retirement ages and childcare provision systems. Moreover, health-related issues continue to linger in the background as regular waves of infections continue to depress labour force participation at least temporarily. In 2022, for example, the number of sick days in numerous advanced economies was still significantly higher than in 2019 (ILO, 2024; Colijn, 2023).

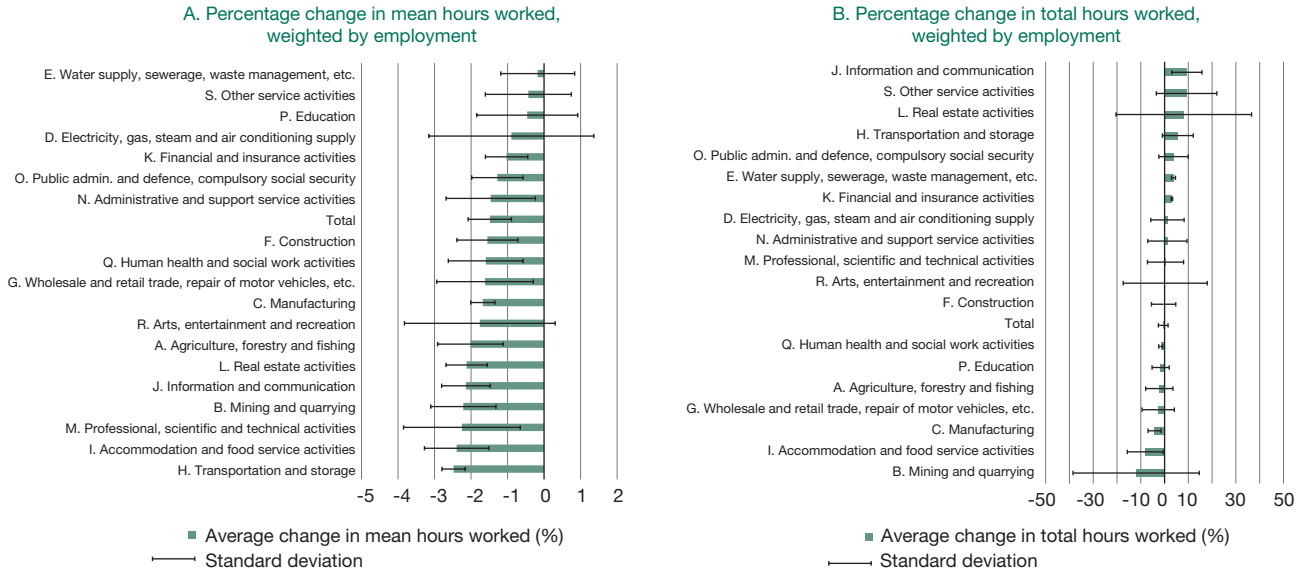
Even though labour force participation might have recovered, the labour supply is depressed as average hours worked continue to decline, especially in Europe, a long-term trend that is unlikely to reverse. Indeed, Astinova et al. (2024) find that this decline is, for the most part, driven by structural rather than cyclical factors and matches an alignment of actual towards desired working hours. They also conclude that the decline in average hours is driven by changes within worker groups rather than compositional changes. This would point towards changes in preferences and, to some extent, increased bargaining power for some worker groups. The current decline in working hours can thus likely be partly attributed to shifts in preferences and a one-time trigger towards less strenuous activities (Causa et al., 2022).[1]

This is reflected in the marked sectoral differences in the decline of hours worked. Figure 2 shows that between 2019 and 2022, average hours have decreased across all sectors, but not uniformly. Instead, they declined rather markedly in some of the very sectors beset by shortages, such as transportation and storage, accommodation and food service activities, and information and communication. Moreover, based on a comparison of average and total hours worked, different forms of shortages arise across sectors between those with rising total hours but falling average hours and those where both total and average hours fall, which suggests that workers are leaving these sectors, possibly due to working conditions.

Labour shortages can also arise because of a failure of labour markets to adjust to sector- or occupation-specific shocks. Indeed, empirical studies show that young workers tend to be more mobile in terms of job-to-job transitions than prime-age workers (Causa et al., 2021). As the share of younger workers declines due to population ageing, job-to-job transitions, which are an important adjustment channel with respect to labour imbalances, are likely to decrease in the long run (Hyatt, 2015).[2] As a consequence, fewer job switchers will be available to fill open jobs than in the past. This also has implications for wage growth, as (voluntary) job-to-job transitions are empirically linked to salary increases (Faberman and Justitiano, 2015; Berson et al., 2020).

1 Looking into the relationship between hours worked and productivity, Cette et al. (2023) find that both are negatively correlated in the long run – that is, an increase in productivity leads to a decrease in average hours worked over longer periods. This relationship can reverse in the short run for certain sub-periods and sets of countries.
2 Job-to-job transitions are procyclical in nature but have been subject to a long-term decline since the beginning of the millennium, at least in the United States (Bosler and Petrosky-Nadeau, 2016).

Figure 2
Changes in hours worked by economic activity, in selected countries, 2019-2022



Notes: Classification of economic activities is based on ISIC Rev. 4 (categories T, U and X are excluded). Countries included: Australia, France, Germany, Japan, United Kingdom, United States.

Source: ILOSTAT, authors' calculations.

Besides an ageing workforce, rising labour market concentration can also be blamed for slower labour market adjustment. Indeed, monopsony – the capacity of firms to set wages and working conditions – is widespread across OECD economies and has increased over the past decades (Araki et al., 2022). This matters because labour market concentration leads to worse labour market outcomes, such as lower wages and employment (Araki et al., 2022; Azar et al., 2022; Bassanini et al., 2024). Monopsonistic markets, in which employers have disproportionate wage-setting power, are also associated with lower labour mobility. When workers are unlikely to switch jobs as a response to worsening working conditions or low wage growth, employers are less compelled to compete for them by improving these elements (OECD, 2022; Manning, 2003). Bassanini et al. (2024) also find that labour market concentration is associated with lower job security, as it reduces the probability of being offered permanent employment.

In addition, labour market concentration leads to a skewed productivity distribution and the development of superstar firms (Fernández-Villaverde, 2021). This creates a scenario in which productivity gains are not shared widely throughout the economy, and job polarisation increases (ILO, 2023). Both have been observed in the current era of low productivity growth. Considering data from 15 OECD countries, Araki et al. (2022) find that some of the occupations facing the most concentrated labour markets are handicraft and printing workers, health and health associate professionals. Incidentally, the occupations experiencing the lowest levels of labour market concentration, are ICT professionals, sales workers, business and administration professionals, cleaners and helpers, as well as mining, construction, manufacturing and transport labourers. Looking back at Figure 2, several of the latter occupations are considered shortage occupations and are located in sectors that have experienced a stronger-than-average decline in working hours.

Certain pandemic-related labour market policies might also have impaired labour market adjustment. Heavy duty employment retention and broadened unemployment benefit schemes during the pandemic helped smooth incomes and salvage livelihoods during the health crisis. At the same time, the strong policy responses likely helped keep firms afloat that would have otherwise gone insolvent as part of a normal process of creative destruction and productivity-enhancing reallocation. Andrews et al. (2021) find that productivity-enhancing reallocation continued to take place during the pandemic in Australia, but *not* in New Zealand where the policy response was more geared towards job retention.

Labour market shortages might also result endogenously from employers' reluctance to refrain from laying off workers as they fear a tiresome subsequent hiring process if additional personnel are needed again (Doornik, 2023). Indeed, labour hoarding appears to be more prevalent among firms in the EU since 2021 than before the pandemic (European Commission, 2023). While job retention usually adds resilience to labour markets during recessions and has helped smooth incomes during the pandemic in the form of subsidised labour retention schemes such as short-time work policies in the EU, it also tends to reduce labour productivity and, as a corollary, slow down the efficient allocation of workers to better-fitting jobs in persistent shocks (Giupponi and Landais, 2023).

Finally, macro-economic conditions prior to the pandemic – in particular highly accommodative monetary conditions – might have created additional labour market fragilities that contribute to current shortages. Indeed, research shows that credit booms, measured as domestic credit to the private sector in percent of GDP, tend to induce labour reallocation towards low-productivity growth sectors (Borio et al., 2015).[3] While the immense effort of governments to sustain their economies can hardly be called a credit "boom", the vast credit support and forbearance programmes helped firms across all sectors access cash more easily, by relaxing lending conditions for borrowers (Hong and Lucas, 2023). Credit expansion in non-tradable sectors thus adds to sectoral imbalances by reallocating labour towards non-tradable sectors, hampering future productivity growth (Müller and Verner, 2023). Further research is needed to see whether such an inefficient reallocation towards lower-productivity sectors has indeed taken place in Europe. Apart from these cyclical developments, the long-term relationship between job reallocation and productivity has weakened in several countries (Decker et al., 2020; Andrews and Hansell, 2021).

Policies to address imbalances

Labour shortages resulting from excess demand are likely to be transitory only, either because macroeconomic policies adjust over time or – as regards pent-up demand from additional savings that built up during the pandemic – households will eventually return to their desired savings-consumption pattern. Indeed, tighter monetary policy as a result of high and rising inflation rates has already shown effects, for instance as regards construction activity. Similarly, policymakers have started to focus their attention on bringing sovereign debt rates back to more sustainable levels by lowering fiscal spending and increasing taxes. This leaves the supply side and labour market adjustment mechanisms as the two main areas where policy interventions are needed. Our assessment points to three areas where policymakers should focus their attention: first, mobilising untapped potential of the labour supply, including through international migration; second, strengthening skill and competence development; and third, improving productivity, especially by accelerating digital and green transitions.

The first policy area follows naturally from our assessment of a quantitative lack of workers in certain occupations and sectors. In many countries, labour force participation rates for specific groups, women in particular, continue to trail behind partly as a result of inadequate support to integrate the labour market. Even in those countries where labour force participation has increased, the number of working hours often fall short of a full-time occupation. Here, support for successful and full-time participation should be ramped up, either in the form of additional care facilities to elevate participation of women with care responsibilities or by strengthening workplace regulations that help, for instance, people with disabilities to participate fully. Moreover, many countries have high tax burdens for second earners or discouraging implicit tax rates for low-income earners. Smoothing out these disincentives to work by making the tax-benefit system more neutral would also help encourage an increase in participation and hours worked. Finally, as longevity is set to increase further, with many people staying healthy late in life, mandatory retirement ages and other barriers to participation for older workers should be removed or phased out. In this regard, limiting the use of early retirement schemes and raising mandatory retirement ages has provided encouraging evidence on the impact of labour force participation and employment rates of older workers. Quite naturally, the effectiveness of such policies face a natural limit as average hours worked (and participation rates) follow a long-term declining trend as households become richer and can afford to lower their labour supply (Astinova et al., 2024).

Where national labour resources have been exhausted, countries might want to consider increasing the number of international labour migrants. Such policies do require, however, a careful balancing act regarding the domestic capacity to absorb an additional inflow of people as pressure on housing markets and the use of (public) infrastructure can quickly eliminate the benefits of international migration. Moreover, except for very few occupations, most do require that migrants have a minimum of language and

3 In several advanced economies the size of domestic credit to the private sector has increased during the pandemic. See the development of the indicator in the World Bank Database: https://data.worldbank.org/indicator/FS.AST.PRVT.GD.ZS.

technical competences before they move. In this sense, current Global Skills Partnerships such as those set up by Germany or Belgium could provide interesting avenues for a win-win situation; so far, the evidence is scarce, and these programmes should be closely evaluated to provide policy insights (ILO, 2024).

Second, skills shortages should be addressed with a range of policy initiatives, not only targeting young people. School-to-work transition rates have improved in recent years in advanced economies and youth unemployment rates have significantly declined since the peaks observed during the mid-2010s, especially among European countries (Schmid et al., 2023). Nevertheless, there are still around 10% of young adults not in employment, education or training (NEET). Moreover, adult and continued education has still proven to be challenging, and lifelong learning continues to be more of an aspiration than a concrete policy tool. As a consequence, large parts of the adult workforce remain at the skill level inherited from their young school years without continuous upgrading. This has become particularly visible with the digital transition where digital literacy is significantly lacking among older workers, preventing them from successfully transitioning to alternative occupations or re-integrating employment in case of job loss (Keslairi and Paccagnella, 2020).

Our assessment also identified that not only are skills lacking, but there is a significant mismatch of skills across sectors and occupations. This calls for additional support for employees to transition to new areas where their competences are in high demand. Occupational mapping such as that provided by Skills Future Singapore can be a good first step. In this case, public employment services not only provide support for re-integration but also essential information to help workers navigate an increasingly complex web of occupations. Tools such as those suggested by NESTA can fine-tune such mapping by providing granular information regarding the overlap of skills and competences across occupations and suggesting appropriate pathways for transitions. Such information is also relevant for employers as it can indicate to them new pockets of labour supply outside traditional pipelines for candidates. Occupational mobility can be further enhanced through proper certification schemes. Indeed, on-the-job learning is rarely properly documented despite the fact that it often offers valuable competences that are relevant across a number of jobs (McKinsey, 2022). This type of implicit life-long learning grows with a person's career, but the lack of proper documentation and certification often makes it less valuable for job transitions. In this regard, micro-certification schemes are an important step in helping experienced workers to document their competences for the next transition.

A third area concerns the slowdown in productivity growth, which in our sense is a key indication of failing labour market adjustment and the most important policy lever to improve upon labour shortages. Indeed, as discussed by Cette et al. (2023), traditionally falling hours worked go hand-in-hand with increasing labour productivity. The fact that this time seems to be different requires particular policy attention. For one, low and skewed productivity growth is preventing a large swath of companies from being able to offer more attractive pay and working conditions. Part of it is a direct consequence of slowing business dynamics (Bundesbank, 2024).[4] Another, related reason lies with the rising concentration of market power, resulting to a large extent from concentration tendencies in the digital economy and the prevention of faster diffusion of new technologies through the market (Eeckhout, 2021; Ernst, 2022).

Faltering business dynamics have long been a concern for policymakers but remedies often focused exclusively on financing support for start-ups. However, it is not so much a lack of investment but rather the type of investment and the specific sectors that should concern policymakers. Indeed, since the end of the last decade, total investment rates have increased almost everywhere – or remained high where they had been strong before, such as in East Asia (ILO, 2024; IMF, 2024). Much of this investment, however, went into residential buildings, in part financed through ultra-low interest rates that allowed larger household segments to access ownership. Low interest rates might also have prevented unproductive firms from exiting the market, leading them to stay in business longer than necessary (Banerjee and Hofmann, 2022). Indeed, as part of the response to the global financial crisis, central banks were required to keep interest rates low for a long period of time to prevent financial markets from drying out. While this might have been necessary from a financial stability point of view, it did have a negative consequence: many firms that would have been unprofitable at higher capital costs continued to operate, thereby preventing the shifting of resources to other, potentially more productive uses. The current increase in interest rates might indeed bring about a reallocation of resources to more productive uses, in particular the high investment in residential housing triggered by high house prices that is partly to blame for sluggish and falling productivity growth.[5]

4 https://publikationen.bundesbank.de/publikationen-de/berichte-studien/monatsberichte/monatsbericht-maerz-2024-926690?article=zur-entwicklung-der-unternehmensdynamik-im-euroraum-926696.

5 https://www.economicsobservatory.com/how-might-house-prices-affect-workers-productivity-in-oecd-economies.

There is great hope that artificial intelligence (AI) as a new general-purpose technology can help lift falling productivity growth. Indeed, many current applications seem to specically target those occupations that are in high demand and where shortages are particularly pressing (Pizzinelli et al., 2023; Gmyrek et al., 2023; Septiandri et al., 2023). Nevertheless, productivity continues to slide despite the significant potential to both automate and augment jobs, both of which should be expected to accelerate productivity growth. A key factor preventing AI from playing a bigger role in this process and thereby relieving labour shortages is the large concentration of market power that the industry has experienced (Bessen, 2020; Ernst, 2022). On the one hand, this reduces the number of potential applications being developed, as newcomers will have difficulties entering a market facing higher entry barriers and the potential threat of being priced out or bought off the market. On the other hand, and more importantly, diffusion processes will take much longer, preventing new, productivity-enhancing tools from becoming widespread quickly. Taken together, rapid technological progress in AI goes hand in hand with low and decelerating productivity growth, thereby preventing labour shortages from being absorbed. Policymakers, therefore, need to focus on both innovation and competition policies in order to allow the full potential of AI to materialise.

One way of addressing this puzzle is to support the digital transformation through appropriate public (digital) infrastructure investment, public procurement and industrial policies to stimulate new, productivity-enhancing digital applications. In particular, applications in low-productivity sectors such as construction and personal care as well as utilities such as energy production and waste management can help to generate major social returns while addressing labour shortages (Ernst, 2019).

Conclusions

Labour shortages will continue to affect labour markets, in particular in countries in the Global North. Trend headwinds are unlikely to disappear, as populations age, skilled migration remains insufficient and education levels have likely maxed out. Policymakers need to focus on those measures that are likely to provide more effective relief, in particular with a renewed focus on productivity growth. In contrast, a unique focus on stimulating labour supply is unlikely to mobilise additional sources of labour given that labour force participation rates have reached historic levels, in particular among European countries, and that hours worked are likely to continue to fall in line with the long-term trend. Productivity growth is expected to accelerate somewhat as the macroeconomic environment has started to normalise following the end of a low-interest rate environment. In addition, productivity-enhancing policies need to address the specific challenges resulting from the current digital transformation. Considering the long-term drop in the working-age population in advanced economies, for which higher migration rates will only be a partial answer, productivity policies need to be the central focus of economic policymaking for the foreseeable future.

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Ciresica Feyer*

Reinventing Skills – Changing Paradigms and the EU Response

The shift towards a climate-neutral Europe and rapid advancement of new technologies, coupled with the effects of the COVID-19 pandemic, have severely impacted our working and learning patterns. Millions of Europeans have either lost their jobs or were forced to adapt to new job paradigms. Approximately 95% of small and medium-sized businesses in Europe report that it is very or moderately important for their business model to have workers with the right skills. This situation holds nearly two-thirds (63%) of companies back in their general business activities, as reported by a recent Eurobarometer (European Union, 2023).

The responsibility related to education and training is now being shared between both individuals and organisations, involving several national, regional, public and private sector actors. The concept of learning has also evolved and is no longer limited to school years but spans the whole lifetime of an individual, starting with early childhood education, to adult life and old age. Moreover, it is multifaceted, including formal, non-formal and informal learning, and combining the more traditional paths with micro-learning experiences that are cumulative and transferrable.

The COVID-19 pandemic had particularly harsh consequences on less advantaged categories, rendering them even more vulnerable. Low-skilled adults and less favoured groups (women, youth, people with disabilities, migrants) needed to reinforce their efforts to have access to the labour market and maintain their skills, albeit updated to new realities. Skills became the new currency, impacting the productivity, resilience and competitiveness of European economies.

These trends are expected to continue in the near future, with severe impacts on our job markets. First, the population ageing is expected to increase, which will place a bigger burden on the working-age population. A higher share of elderly individuals will also put more strain on healthcare and social protection services. The EU's working-age population is projected to decline (by 57.4 million until 2100) and the old-age dependency ratio to increase (from 33% to 60% by 2100).[1] This will intensify the pressure on public budgets and will have a profound impact on investment, productivity and entrepreneurship, forcing small and medium enterprises to upskill and reskill their staff to remain viable.

Second, the rapid pace of technological developments, including the emerging AI technologies and the digitalisation imperative, both in terms of infrastructure and skills, will require a fast adaptation of human capital. These developments will generate new job profiles and skills, in areas completely embryonic some years ago: cloud computing, cybersecurity, robotics, data analytics, etc. Several studies show that 75 to 375 million people around the world may change their professional category by 2030 due to the new job market scenarios (Manyika et al., 2017), and 8%-9% of the 2.66 billion people in the workforce will have new occupations by 2030 (Lin, 2011).

In this digitalised world, certain categories of the population (such as elderly or low-skilled adults) will have difficulties keeping up. The Digital Economy and Society Index shows that four out of ten adults and every third person who works in Europe lack basic digital skills (European Commission, 2023b). This is particularly relevant for women, who are under-represented in tech-related professions and studies, with only one in five ICT specialists and one in three science, technology, engineering and mathematics (STEM) graduates being women. Massive investments in digital skills and incentives to render the STEM professions more attractive to women will therefore be needed.

Third, climate change will generate major mutations in jobs patterns, with many jobs related to carbon-reliant economies likely to disappear, and new jobs in green industries likely to be created. The risks and hazards associated with environmental degradation will affect vulnerable workers the most. The International Labour Organization (2018) estimates that between 2000 and 2015, 23 million working-life years were lost annually at the global level as a result of such hazards. However, the transition to a low greenhouse gas economy is expected to lead to a net creation of jobs. New occupations will emerge in areas related to green professions and technologies, for example, in energy, agriculture, manufacturing, R&D and service activities aimed at

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1 European Commission (2023a, 2).

substantially preserving or restoring environmental quality (Iberdrola, n. d.). Evidence suggests that in Europe around 500,000 additional jobs will be directly and indirectly created by 2050 as a result of the increase in adaptation-related activities.

What is the EU response to these challenges? The EU institutions have jointly designated 2023 as the European Year of Skills, an initiative aimed at pursuing four main objectives: promoting investment in training and upskilling; ensuring that skills match the needs of employers; matching people's aspirations and skill sets with opportunities on the job; and attracting people from outside the EU with needed skills. The Year of Skills has helped companies, in particular small and medium-sized enterprises, to address skills shortages in the EU and to promote a mindset of reskilling and upskilling. This involved the participation not only of EU institutions, but also of member states, social partners, employment services, chambers of commerce and industry, education and training providers, workers and companies to the common goal of upskilling and reskilling workers.

Moreover, the EU adopted various legal and policy documents in order to enhance upskilling and reskilling and to encourage private-public partnerships. It also mobilised massive resources and technical support to help boost skills and enable access of vulnerable groups to the labour market.

As regards legal and policy coordination, the European Pillar of Social Rights agreed in 2017 at the Gothenburg Summit on 20 key principles for a strong and inclusive social Europe. This was complemented in 2021 by an action plan that set up ambitious headline targets for 2030, such as at least 78% of the population aged 20 to 64 in employment and at least 60% of adults participating in training every year. The efforts were pursued with the European Skills Agenda,[2] a five-year plan helping individuals and businesses develop more and better skills, by strengthening competitiveness, ensuring social fairness and building resilience to crises based on the lessons learnt during the COVID-19 pandemic.

The Pact for Skills,[3] one of the flagship actions of the agenda, has supported public and private organisations with upskilling and reskilling through shared knowledge, partnership opportunities and advice on relevant funding instruments to boost the skills of adults in their regions and countries. The Pact has currently 1,000 members and involves 14 large-scale partnerships in strategic sectors, with pledges to help upskill up to 6 million people. This will help the EU industry to thrive and become more competitive on a global scale.

The EU legislation in the area of skills was also strengthened. The Council Recommendations on individual learning accounts and micro-credentials adopted in 2022 aim to help people to update or complete their skill-sets in a more flexible and targeted way (Council of the European Union, 2022a, 2022b). For example, micro-credentials certify the learning outcomes following a small learning experience (e.g. a short course or training), offering a flexible way to help people develop the knowledge, skills and competences they need for their personal and professional development. The recommendation seeks to make micro-credentials work across institutions, businesses, sectors and borders, ensuring that everyone has access to relevant training opportunities tailored to their needs.

Moreover, the Council Recommendation on vocational education and training for sustainable competitiveness, social fairness and resilience[4] adopted in 2020 defines key principles for ensuring that vocational education and training is agile in that it adapts swiftly to labour market needs and provides quality learning opportunities for young people and adults alike. It places a strong focus on the increased flexibility of vocational education and training, reinforced opportunities for work-based learning and apprenticeships and improved quality assurance.

As far as funding is concerned, the European Social Fund Plus (ESF+)[5] allocates more than €99 billion for 2021-2027 to investing in people. In addition, the Recovery and Resilience Facility[6] will disburse €723.8 billion in both grants and loans to member states in order to mitigate the economic and social impact of the COVID-19 pandemic. The purpose is to support member states' reforms and investments, including in the area of skills and jobs.

As regards the technical support, the Technical Support Instrument (TSI) is an EU programme managed by the European Commission's Directorate-General for Structural Reform Support (DG REFORM), which provides tailor-made technical expertise to EU member states to design and implement reforms in line with the European or their national priorities. With a budget of €864 million for the period 2021-2027, the TSI provides demand-driven support and does not require co-financing from the EU member states.

The technical support includes, for example, strategic and legal advice, studies, training and expert visits on the ground and can cover any phase in the reform process, from

2 https://ec.europa.eu/social/main.jsp?catId=1223.
3 https://pact-for-skills.ec.europa.eu/index_en.
4 https://www.cedefop.europa.eu/en/content/council-recommendation-24-november-2020-vocational-education-and-training-vet-sustainable.
5 https://european-social-fund-plus.ec.europa.eu/en.
6 https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/index.html?lang=en.

preparation and design to development and implementation of the reforms. The assistance is provided in a wide range of policy areas, including education, training, skills, climate action, digital transition and health.

What examples of support from the Technical Support Instrument have proven successful so far in tackling the triple challenge of ageing societies, rapid technological developments and climate change? Let us consider the challenge of an *ageing population*. Support measures that were effective in mitigating the impact of the phenomenon were related to: lifelong learning strategies, activation of the young people not in employment, education or training (NEET), attraction and retention of talents from third countries, recognition of formal and informal learning and qualifications or active ageing strategies.

For example, the Italian Ministry of Education received technical support to strengthen the capacity of the Provincial Centres for Adult Education (CPIAs) in developing guidelines to harmonise the process of assessment and recognition of qualifications. Key activities included consultations with stakeholders to identify strengths and weaknesses of the services provided by CPIAs; review of EU good practices in skills evaluation and recognition; guidelines for CPIAs to improve skills recognition and development of individual learning paths. The project supported CPIAs in conducting a consistent, transparent and uniform process of assessment and recognition of competences. In the long term, this should lead to increasing accessibility and outreach of CPIAs and promote lifelong learning opportunities for all.

Another example refers to the support provided to Denmark to develop more successful, future-oriented talent retention policies ensuring that skilled international talents would stay longer or permanently in the country. The support also fostered talent mobility across the EU by promoting better cooperation between EU member states, such as Germany, Spain and Estonia. The measures included an analysis of the relevant legal framework for labour migration, best practices for attracting and retaining skilled and highly skilled international talent, recommendations for enhancing the regulatory and legislative frameworks, as well as capacity-building and training. The project is expected to address challenges such as excessive administrative red tape in processes linked to work and residence permits, the validation of credentials and recognition of skills/qualifications, and discrimination in recruitment processes.

In addition, Greece provided technical support for the design and implementation of a lifelong learning framework of quality and labour market relevance, as well as of related evaluation tools. The support entailed recommendations for the development of a skills and competence framework for primary and secondary education in line with the needs of the market; the development of an evidence-based jobseeker profiling system and of feedback mechanisms to integrate labour market information into active labour market policy (ALMP) design; and a proposal for a performance-based evaluation system for non-formal learning providers. The measures are expected to increase the capacity of the Greek authorities to design and implement reforms on skills acquisition, with an emphasis on upskilling and reskilling.

As regards the challenge of *fast technological development* and digital upskilling/reskilling, support measures that proved successful referred to: strategies to assess and increase digital maturity of education institutions at various levels; digital transformation embedded in curricula reforms; strategies to upskill/reskill the digital needs of various categories of the population, including low-skilled adults; strategies and roadmaps for increasing the uptake of digital technologies, including monitoring and evaluation mechanisms.

As an example, Cypriot authorities benefitted from support to improve the digital literacy of adults, with a particular focus on low-skilled adults. The support included: an analysis of the current situation regarding the digital needs of low-skilled adults and barriers to digital upskilling; examples of good practice from other EU member states on digital upskilling pathways; recommendations on improving the digital skills of low-skilled adults; career guidance and upskilling pathways for low-skilled adults; improving the adult educators' skills to better support the target group; and design and delivery of online/blended training to adult educators/trainers to enhance digital skills of low-skilled adults. The project led to a better understanding of the barriers faced by low-skilled adults when it comes to the acquisition of digital skills, as well as to the adoption of policy measures and tools that improved the digital literacy of the adult population in Cyprus.

In the Netherlands, various universities have jointly expressed the ambition to give Automated Vulnerability Research (AVR) a more prominent place in their cybersecurity curricula, and to organise yearly student challenges as a means to engage students. AVR is a technology used for identifying software vulnerabilities in an automated, scalable way. The Dutch authorities received technical support to implement their national AVR roadmap, promote collaboration between universities and industry, and embed AVR in the cybersecurity curricula of various universities. Investments in cybersecurity skills and technology are expected to provide a technological advantage to the Netherlands and indirectly, to the EU, strengthening their strategic autonomy in digitalisation.

Finally, as regards the *green transition challenge*, technical support has proved successful for designing or supporting the implementation of strategies and roadmaps for a better identification of the green skills needs and gaps; reviewing industrial strategies to include green development measures; supporting green and circular economy transition through standardisation of product data in digital and automated processes; and providing measures to support the greening of SMEs and green entrepreneurship.

For example, Flanders was assisted in steering the transition to a low-carbon, resource-efficient and green economy. This included the development of a high-level Green Skills strategy and of a Green Skills Roadmap for the whole economy, based on an assessment of the skills needs, good practices and consultations with stakeholders. The results enabled the Flemish authorities to improve their understanding of the green skills needs and gaps and deploy relevant measures within the Flemish economy.

In addition, Portugal's capacity to stimulate the greening of SMEs and green entrepreneurship was enhanced through TSI support. The project focused on the manufacturing and construction sectors and aimed to boost the number of green start-ups through incubation and acceleration. The authorities were supported in: strengthening their industrial ecosystems through the development, implementation and evaluation of national, regional and sectoral industrial strategies; and upskilling and reskilling for the green transitions through the mapping of training and education needs for workers and entrepreneurs, with a specific focus on digital and green skills. This will lead to an increased green capacity and improved tools of the SMEs ecosystem in Portugal, which will render its industry more competitive.

Conclusions

The labour market is currently experiencing unprecedented shifts, with new skills emerging and others becoming obsolete. Employers and employees need to adapt fast, embrace change and build new competences, both technical, but also socio-emotional in order to remain viable on the market. The learning process needs to be a co-owned endeavour involving a multitude of actors, including employees, employers, national and regional governments, industry, training providers, social partners and the community at large.

The triple challenge of an ageing society, rapid technological developments and climate change exercises multiple pressures on the human capital. Governments across the EU need to render this transition socially just for everyone, stimulating the participation of disadvantaged categories to the labour market and expanding the range of upskilling and reskilling opportunities in parallel with social protection measures.

Skills strategies and related implementation plans built upon solid political ownership and broad stakeholder engagement should guide the way to enhancing skills and employment prospects. They should rely upon accurate skills anticipation tools, functioning in conjunction with evidence-based monitoring and evaluation mechanisms to match the labour market needs with the existing offers.

Social dialogue should become a crucial tool to "take the pulse" of the labour market and foster partnerships. This is the spirit of the Val Duchesse summit, when the European Commission and its partners announced the signature of a "Tripartite Declaration for a thriving European Social Dialogue", in a bid to support European businesses, boost staff retention and equip professionals with the skills they need for the future.

In conclusion, Europe needs to take into account this "variable geometry" of paradigms, enablers and constraints, blending funding instruments with technical support and fostering partnerships if it intends to remain competitive and facilitate a smooth digital and green transition without leaving anyone behind.

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Michael J. Handel

Labor Shortages: What Is the Problem?

The COVID-19 pandemic produced widespread disruption in labor markets in the United States and elsewhere. In the U.S., an abrupt and unprecedented economic shutdown was followed by fiscal stimulus payments to households, surging consumer demand, worker withdrawal from the labor market due to safety concerns and family responsibilities resulting from childcare and school closures, and high quit rates (Gittleman, 2022). Many employers, particularly in retail, food service, and hospitality and leisure, experienced unusual difficulties maintaining normal staffing levels. The problem of labor shortages became a common subject of discussion (e.g. Bhattarai and Penman, 2023; Society for Human Resource Management, n. d.; U.S. Chamber of Commerce, 2024).

Given the level of recent concern, it seems appropriate to consider both general issues surrounding the concept of labor shortages and the specific circumstances of the post-COVID-19 labor market. This article considers the question, *What is the problem?* in a double sense. It discusses the definition, measurement and drivers of labor shortages, which are subject to considerable debate, but also questions whether all shortages, including the current one, should be considered problems at all.

Labor shortages: What are they and is there a shortage currently?

There is no official, generally accepted or standard definition of a labor shortage, and the term is not widely used within labor economics. A reasonable definition is "a sustained market disequilibrium between supply and demand in which the quantity of workers demanded exceeds the supply available and willing to work at the prevailing wage and working conditions at a particular place and point in time" (Barnow et al., 2013). These conditions are anomalous for most of economics, which assumes disequilibria are temporary and more or less easily resolved through changes in prices and quantities, like a commodity market. When prices rise, shortages vanish because supply grows and some buyers withdraw.

Empirical evidence of persistent disequilibria might include a simultaneous rise in wages and employment or job vacancies, suggesting growth in labor demand is outpacing growth in supply. Alternatively, an increasing number of hard-to-fill vacancies or increasing average duration of vacancies might be used to measure shortages. However, determining whether a shortage exists would require drawing a line separating ordinary labor market tightness from shortage conditions. In addition, much discussion regarding labor shortages relates to specific kinds of jobs, which would require data on job vacancies by occupation, which are rare. In practice, much of the evidence for labor shortages relies on overall job vacancy data.

In the U.S., job vacancies, as well as hires, resignations and layoffs, are tracked by the monthly Job Openings and Labor Turnover Survey (JOLTS) conducted by the U.S. Bureau of Labor Statistics beginning in December 2000. This survey samples approximately 21,000 establishments from a sampling frame of 11 million establishments covering all employers except farm-related and private household sectors. JOLTS collects information on industry, establishment size and region, but not occupation, so it can only measure the general state of the labor market – not specific shortages. The reference period for the number of vacancies is the last business day of the month and a vacancy is defined as an open position that can start within 30 days for which the employer is actively recruiting outside the establishment using help wanted ads, Internet posts, signs, word of mouth or other outreach.[1] "These data serve as demand-side indicators of labor shortages at the national level...The availability of unfilled jobs—the job openings [vacancy] rate—is an important measure of the tightness of job markets, parallel to existing measures of unemployment" (U.S. Bureau of Labor Statistics, 2022).

Figure 1 shows the vacancy rate from December 2000 to January 2024. JOLTS calculates the vacancy rate based on the number of vacancies divided by the total employment plus the number of vacancies, that is $\frac{vacancies}{(employment + vacancies)} * 100$. Prior to 2018, the vacancy rate fluctuated within a narrow band of 2%-4%, drifted up somewhat in 2018-19, and shot up at an unprecedented rate from 4.5% in Decem-

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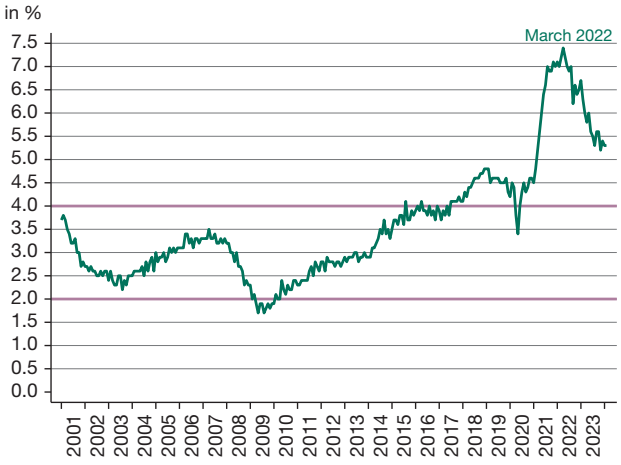
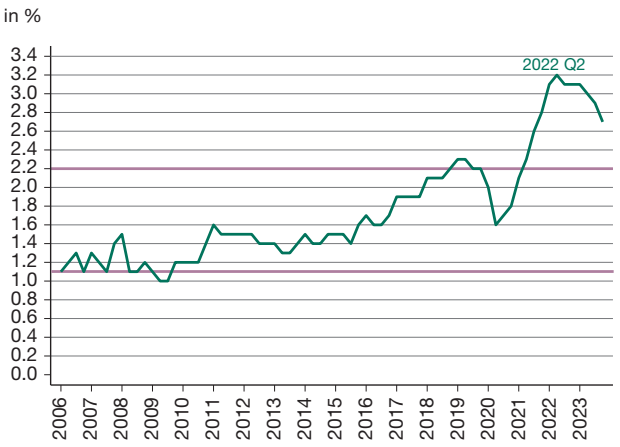
1 https://www.bls.gov/jlt/jltdef.htm.

Figure 1
US monthly jobs opening rate, December 2000-January 2024



Source: U.S. Bureau of Labor Statistics.

Figure 2
Euro area quarterly job vacancy rate, 2006 Q1-2023 Q4



Note: Euro area 20 (fixed composition).

Source: ECB Data Portal.

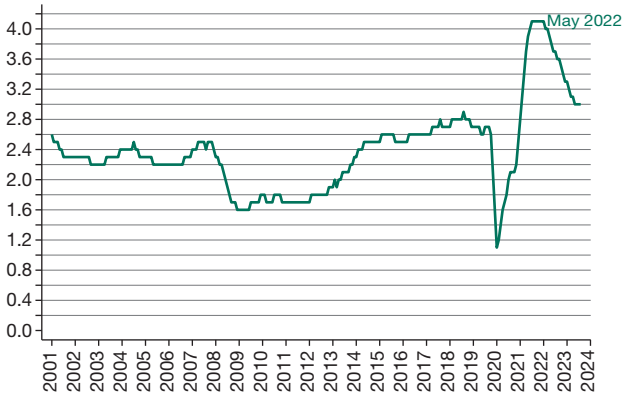
ber 2020 to a record 7.4% in March 2022. After some softening, the rate declined relatively consistently beginning in December 2022, reaching 5.3% in January 2024. There is no question that the post-COVID-19 trajectory looks very different from previous cycles; the rate has remained elevated relative to historical norms for three years now.

Interestingly, Figure 2 shows that the job vacancy rate for the euro area, measured quarterly, followed a similar pattern as the U.S., though both the pre-COVID-19 range (1.1%-2.2%) and the post-COVID-19 peak (3.2%) in the second quarter of 2022 are significantly lower than the corresponding figures for the United States. The consistently higher vacancy rate in the U.S. relative to the EU has been noted previously, though the reasons for it are unclear (Bauer, 2015). Figure 3 shows the vacancy rate in the United Kingdom also fluctuated within a narrow range similar to the euro area for 20 years (1.6%-2.8%) before rising sharply to over 4% in May 2022 and falling subsequently.

Although the levels differ across regions, the shapes of the trends are remarkably similar, including the timing of the peaks around the first or second quarter of 2022 and the subsequent downward trend, which has yet to reach pre-pandemic levels. Even though many European countries helped workers stay in their jobs through wage subsidies, in contrast to the U.S. offering enhanced unemployment benefits to the jobless, there may be some common force that caused vacancies to rise sharply in all three regions, which, nevertheless, has been diminishing for the past two years. Public concerns over labor shortages find support in the unprecedented and sharp rise in vacancy rates in all three regions, but this indication of acute shortage has been reversing in all of them, as well.

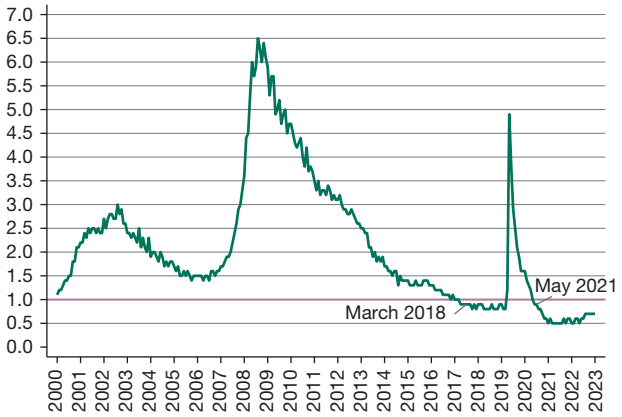
This view must be qualified somewhat, at least for the United States, in light of trends in the number of unemployed persons per job opening shown in Figure 4. This measure gives a general sense of the number of available workers per vacancy, though the potential entry into the labor market of persons not currently looking for work means that it is not an exact measure of labor availabil-

Figure 3
UK job vacancies ratio per 100 employee jobs, May 2001-December 2023



Source: UK Office for National Statistics.

Figure 4
Number of unemployed per job opening, seasonally adjusted, December 2000-December 2023



Source: U.S. Bureau of Labor Statistics.

ity. Nevertheless, the ratio rarely fell below 1.0 and averaged 2.1 unemployed workers per vacancy over the entire 23-year period. However, the ratio fell below 1.0 from March 2018 to February 2020 and from May 2021 to December 2023. For most months between December 2021 and April 2023, the ratio was 0.5, meaning the number of unemployed job seekers was only one-half the number of job vacancies, which is unprecedented. This could be interpreted as indicating that the United States labor market has been in shortage for five of the past six years. However, the economy has not experienced notable strain despite what would normally be considered a disturbing scarcity of jobseekers relative to the number of vacancies.

Distinguishing among labor shortages

The vacancy rate and the number of unemployed per vacancy are useful indicators of the general state of the labor market. But discussions of labor shortages cover several, often related issues that are useful to distinguish in more detail.

The most important distinction is between shortages associated with very low overall unemployment rates and shortages less related to general labor market conditions, some of which seem chronic.

Related to this distinction is the contrast between labor shortages for less skilled jobs having low barriers to entry and shortages relating to jobs with long preparation times (tertiary education, apprenticeships) or other barriers to entry (e.g. certifications, licensing, remote location). Related to the previous point, shortages for less skilled jobs generally emerge when overall unemployment is very low, while shortage issues for jobs with long training times are tied less closely to the business cycle.

Within this latter group are particular jobs that seem to be subject to consistent complaints regarding labor availability across time and space, such as skilled trades, information technology (IT) jobs and healthcare. Indeed, among the top twenty shortage occupations reported by the European Employment Services (EURES), 60% were in skilled trades, 15% were healthcare professionals, and 10% were software professionals, and these occupations tend to be reported relatively consistently over time and across countries as facing shortages (European Labour Authority, 2023, 20-26). For the IT and healthcare sectors, which are growing robustly, demand is a moving target that chronically races ahead of supply. Other occupations might appear more idiosyncratically and experience one or more episodes of shortage, rather than be subject to such persistent concerns.

Finally, there is a need to consider employer claims critically outside of the recent anomalous labor market situation. A survey sponsored by a manufacturing trade association (2011) found 74% of firms agreed that a lack of skilled production workers had had a "significant negative impact on [their] company's ability to expand operations or improve productivity." However, a more rigorous research survey (2012-13) testing these claims found only 16.1% of respondents, mostly plant managers, agreed that "lack of access to skilled workers is a major obstacle to increasing financial success" (Osterman and Weaver, 2014). Indeed, wages for manufacturing production workers had not increased prior to this time, even for those with the highest training, as one would expect if there were a genuine shortage (Osterman and Weaver, 2014). Analysts might doubt the existence or depth of a labor shortage if employers say they cannot find workers but have not tried raising wages to attract more workers or if they complain of a skill shortage but offer poor working conditions or cite poor work motivation when pressed to identify specific skills in short supply.

Shortages relatively independent of the business cycle

Reported shortages that are relatively independent of the business cycle exhibit certain patterns. Roughly speaking, some mainly reflect the nature of the industry, employer or job, while others mainly reflect worker characteristics. A third group reflects systemic characteristics more clearly related to policy and institutions.

Employer-side issues

As noted above, the most frequently reported shortages relate to IT, skilled trades and healthcare. To some extent, this reflects strong *expansion demand*. Demand for IT workers has tended to increase rapidly and in a sustained fashion. The demand for healthcare professionals has been even more consistent over time, though perhaps less rapid. The demand for construction trades workers has often increased sharply during building cycles, but also has a more chronic aspect independent of cycles, partly for reasons discussed below.

The IT sector experiences an unusually rapid rate of skill obsolescence as technologies, products and strategies evolve, such that current workers do not necessarily satisfy current needs. There is demand for younger, more recently trained workers in preference to some members of the current workforce. Firms or sectors may face a continuous recruitment cycle, replacing workers with obsolete skills with recent graduates on an ongoing basis. This *substitution demand* means that even firms that are not increasing the overall size of their workforce find themselves searching for new hires among a relatively small group of highly specialized workers. It would not be surprising for firms seeking developers of artificial intelligence (AI) models to complain of shortages, though it is possible that rising compensation is performing its equilibrating function in this case.

If jobs require *long education and training times* (tertiary education, apprenticeships), this can produce lags in labor supply responses to shortages, as may occur in the cases of STEM jobs, healthcare and skilled trades.[2] This may partly account for reports of skilled trades shortages outside of construction booms and outside the construction industry itself, such as shortages of machinists and other metal workers in manufacturing.

Spatial isolation may also contribute to shortages, especially when jobs involve skills in high demand elsewhere (e.g. rural health professionals), the local supply is not large enough relative to production volumes, or working conditions are undesirable and demanding (e.g. offshore oil drilling).

Most of the preceding considerations reflect characteristics of jobs that are relatively outside the control of individual employers. Other employer-side issues are more controllable and potentially modified by individual employer actions.

Restrictive hiring standards of various kinds, such as requirements regarding education and prior experience, narrow the effective pool of potential hires. Much debate and research considers the degree to which education requirements reflect functional job demands as opposed to credentialism, signaling or attitudes, social skills and cultural capital (Bills, 2003). Indeed, there is evidence that employers relax education and prior experience requirements somewhat when labor markets tighten, presumably in response to hiring difficulties (Modestino et al., 2016). A number of U.S. state governments and major corporations have dropped formal requirements that applicants have a bachelor's degree for equity reasons and in response to the tighter labor market, but these moves are too recent for their effects to be well understood (Fuller et al., 2022; McCrary-Ruiz-Esparza, 2023; McLean, 2024). Less formal employer criteria, such as gender, ethnic/racial, cultural or other stereotypes regarding ideal job candidates, also narrow the hiring pool but efforts to address significant underrepresentation of women and minorities in IT, other STEM occupations and skilled trades have had limited impact.

Also contributing to perceived shortages are high quit rates in jobs with low pay, poor working conditions and high levels of dissatisfaction, stress and burnout, leading to persistently high levels of *replacement demand*. Jobs in food service, call centers, care work and social assistance, nursing, and long-distance trucking often experience constant churn, such that employers are effectively always looking for workers, potentially reaching the limits of the local labor supply.

Finally, if employers keep *job rewards and job attractiveness unchanged* while hiring difficulties increase, so-called shortages may develop. If pay, working conditions and terms of employment (e.g. scheduling) do not improve, then greater hiring difficulties are a predictable consequence. Employers are reluctant to raise wages because they may reduce profits directly or indirectly through declining sales after prices increase and because they are difficult to reverse if the labor market loosens. They may also affect longstanding internal pay differentials, creating dissatisfaction among long-tenure workers. Thus, employers may prefer to increase recruiting efforts or wait to see if the problem resolves itself. Nevertheless, this reluctance partly explains why labor markets do not equilibrate like commodity markets and disequilibria persist, even as employers continue to complain of shortages.

Worker-side issues

Among worker characteristics contributing to labor shortages, *skill shortages* receive the most attention. Reported

2 STEM stands for science, technology, engineering and mathematics.

problems include basic and general skills associated with secondary or tertiary education, more narrow occupation-specific skills (e.g. skilled trades) or highly technical skills associated with STEM occupations. While complaints of skill shortages seem an almost perpetual feature of the employment landscape, the evidence rarely clearly supports these claims (Handel, 2003; Handel, 2005; Weaver and Osterman, 2017).

In certain cases in which skill supplies seem to fall below demand, this may reflect *worker preferences*, such as an aversion to working in skilled trades or manufacturing production jobs, or to studying highly demanding STEM subjects in university. In such cases, rising demand collides with an unenthusiastic workforce. Insofar as gender differences in occupational choice reflect individual preferences or other societal forces independent of employers (e.g. social norms, societal and coworker attitudes), this will also narrow the potential workforce for particular jobs.

Finally, there are *spatial mismatches* between the areas in which employment is expanding and the location of jobseekers that reflect worker resources and preferences. Lower-income workers are particularly affected by limited public transportation in many urban U.S. labor markets and long commutes in non-metropolitan areas, which inhibits effective matching. Likewise, the expense of permanent relocation across long distances and workers' embeddedness in family and local social networks inhibits redistribution of workers across regions with high and low unemployment rates.

From the preceding, one can hypothesize that IT jobs face chronic shortages partly because total demand is rising robustly, skill obsolescence is common, high skill requirements lengthen training times and decrease workforce interest, while broadly held gender attitudes contribute to narrowing potential supply. Healthcare also faces sustained demand growth and long training times, while skilled trades in construction experience bursts of cyclical demand, long training times, and perhaps insufficient workforce interest. This undoubtedly still leaves much unexplained but provides a coherent framework for understanding the issues.

Systemic issues

On a more systemic level, the *efficiency and effectiveness of matching* affect the potential for shortages. Online job boards and employer web postings may have reduced search frictions (Bhullar et al., 2023). However, the ease of discovering and applying for vacancies online also produces a flood of applicants for many openings, leading employers to use automated screening software and generating concerns regarding algorithmic bias. Even before online job posting became popular, U.S. employers hired relatively few workers from public employment services, viewing this pool as less skilled or less desirable, and private employment agencies account for only somewhat more hires (Eberts and Holzer, 2004, 26).

Weak *training systems* may be a source of scarce skills. In the U.S., training providers besides employers include community/technical colleges, government agencies, trade schools, nonprofit organizations, unions and various online microcredential and certificate providers. These actors address skill shortages with greater or lesser effectiveness, but represent a loosely organized field rather than a well-defined system. Increasing the quantity and quality of training are longstanding policy goals, but effective government training programs and scalable non-government programs remain scarce. Workers may also have difficulty accessing training due to costs and competing demands from work and family responsibilities. Older workers may be reluctant to make heavy investments in training given the shorter payback period and knowledge of employer reluctance to hire older workers.

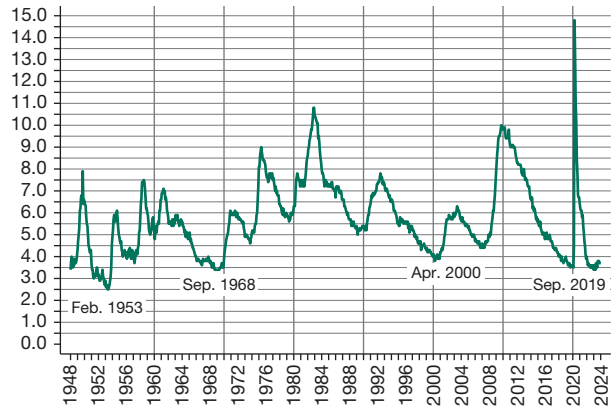
Immigration can address shortages, and there are clear cases where immigration restrictions contribute to labor supply problems, such as in Japan, but its role is often controversial. There is ongoing debate as to whether immigrants displace natives, employers actively seek immigrant workers in order to push down labor costs, or immigrants move into jobs that natives are abandoning as unattractive or for which native supply is insufficient. Domestic policy has a strong influence on the total quantity and the occupational profile of immigrants, but global political and economic conditions also affect immigration flows.

Finally, *population aging* means a declining share of the population will be available to satisfy total demand, as retirees not contributing to current production will continue to consume. The shrinking relative size of the workforce may produce generally tight labor markets and problems for labor recruitment as the baby boom generation ages, perhaps leading to increased demand for immigrant labor. Healthcare and related occupations will be most directly affected given the effects of aging on the demand for services. The decline in the share of working-age cohorts could be offset somewhat by raising women's labor force participation (LFP) through better access to childcare and elder care, reversing declines in prime-age male LFP, raising retirement ages, and fostering a greater use of remote work, but the effects would be relatively small compared to the impact of population aging (Goss, 2023).

Figure 5

Monthly unemployment rate, January 1948 - January 2024

in %

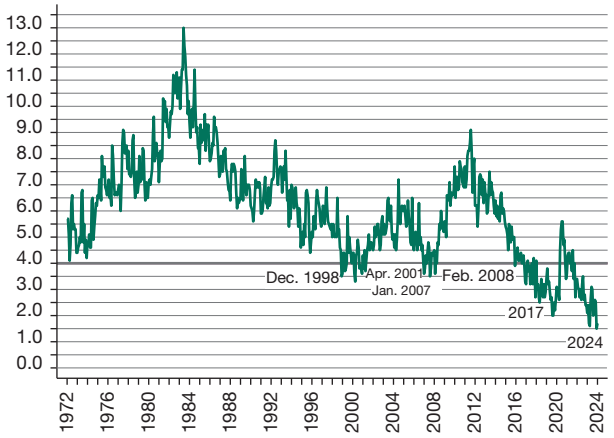


Source: U.S. Bureau of Labor Statistics..

Figure 6

Difference between black and white monthly unemployment rates, January 1972 - January 2024

in percentage points



Source: U.S. Bureau of Labor Statistics.

Shortages related to business cycle peaks: What is the problem?

The previous section focused on shortage considerations that are relatively independent of the business cycle. However, the figures in the first section suggest that the large number of unfilled vacancies today might simply reflect a strong economy. The question this raises is why cyclical peaks should be considered a problem.

Generally speaking, less-advantaged workers face relatively slack employer demand. Tight labor markets disproportionately improve the bargaining power of disadvantaged workers, such as those at the lower end of the education and wage distributions and those belonging to underrepresented groups. In tight labor markets, job opportunities and wages rise, inequality falls, and social inclusion grows. Full employment is a major policy goal that disproportionately benefits the least advantaged at the end of hiring queues. If elevated hiring difficulties in some corners of the labor market are one consequence, they cannot be the primary concern.

Figure 5, showing the U.S. monthly unemployment rate over 76 years (January 1948 to March 2024), illustrates just how favorable recent years have been. For the 23 years between 1948 and 1970, the unemployment rate fell below 4.5% for exactly one-half of all months. The rate did not fall that low for any month in the next 28 years (early 1970-early 1998) or the 10 years between May 2007 and March 2017. Since 1998, nearly two-thirds of the months with unemployment below 4.5% were between 2017 and March 2024. Unemployment has been below 4% for 27 of the past 28 months (December 2021-March 2024). The rate fell to 3.4% for two months in early 2023, a level last seen 54 years earlier in May 1969.

The overall strength of the labor market has powered very large improvements for less educated workers. Between January 1992 and January 2024, the average unemployment rate for those not completing secondary school was 8.8%, while the rate for high school graduates was 5.6%, the rate for those with some college was 4.6%, and the rate for those with a bachelor's degree or more averaged only 2.8%. After 2017, aside from the pandemic months (March 2020-October 2021), the gap in unemployment rates between those with at least a bachelor's degree and those with less than high school fell by more than half to 3.4 percentage points. The gap between the university-educated and high school graduates fell to 1.9 percentage points, and the gap between university graduates and those with some college fell to 1.1 percentage points.

The black-white unemployment gap averaged 6.1 percentage points over the 52 years shown in Figure 6. At its height, toward the end of a deep recession (June 1983), the difference was 13 percentage points, when 8.7% of whites were unemployed as opposed to 21.7% of blacks. The second-largest gap, after the Great Recession (August 2011), was over 9.0 percentage points, when rates were 7.9% for whites and 17.0% for blacks. The gap fell below 4.0 percentage points for only 14% of all months in the past 52 years, all during cyclical peaks since 1997. Of these months, 80% occurred after 2015. In December

2023, the black-white unemployment gap narrowed to 1.5 percentage points, the lowest ever recorded by a wide margin.

Yet even during this period of remarkable progress, there were calls in the U.S. Congress to investigate labor shortages (Donovan et al., 2022). Employers may complain about difficulties finding workers and pressures to raise wages, but it must be recognized that this is the market at work. Net welfare improves and inequality declines when more people seeking employment can find jobs and the reserve army of the unemployed contracts. Those at the bottom suffered the most during long periods when labor markets were looser, so it is hard to gainsay their benefitting when the labor market tightens. This situation is one for which we have been waiting a long time.

This is not to say that there are no potential problems when the economy runs closer to capacity. However, one prominent concern, price inflation, has returned to near pre-pandemic levels without a large increase in joblessness, suggesting the tension between full employment and price stability may be less serious than sometimes supposed. Perhaps a more serious objection is that currently high vacancy rates signify foregone output. One could also argue that increasing worker education and training might raise employment and wages more sustainably than a high-pressure economy. The fact that large numbers of less educated workers remain unemployed or have dropped out of the labor market despite the unusually low unemployment rate suggests skill levels and employability need improvement.

Macroeconomic policy is labor and social policy

Nevertheless, the strength of the macroeconomy is critical. Even the most effective training and education, placement services and work incentives will face extraordinary headwinds if jobs are scarce. The costs of high unemployment include long-run pay losses for new workforce entrants and displaced older workers, skill depreciation and early labor market exit – rather than the extension of working life that is a policy objective in most advanced economies. Improving labor market outcomes during boom times through better education and training, enhanced worker bargaining power and more effective matching are all important, but their effects are not as quick and widespread as a high-pressure economy, which also facilitates the other policies. Policy objectives like raising wages at the bottom, reducing inequality and poverty, and promoting social inclusion are all much easier to address when unemployment is very low. Tight labor markets are not a problem, they are part of the solution.

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Majda Seghir

The Evidence Gap in Labour Shortage Assessments

In November 2023, the European Commission unveiled a set of initiatives to address severe labour shortages. These included the creation of the European Union Talent Pool,[1] an online platform designed to facilitate connections between employers in the EU and jobseekers from non-EU countries. This platform provides a repository of skills and facilitates international recruitment and legal migration procedures. These measures are intended to complement other efforts at the EU and national levels, including initiatives to re-skill and up-skill the existing workforce to meet the changing needs of employers. These efforts also include activating the inactive population and increasing intra-EU mobility. The formulation and implementation of such policies underscore a major concern of policymakers regarding the phenomenon of labour shortage within the EU. Concurrently, they raise crucial questions about the extent of evidence available to substantiate claims of labour shortages, the circumstances under which such shortages arise and the mechanisms that drive them.

Labour shortage: A multifaceted concept

The conceptualisation and measurement of labour shortages remain the subject of ongoing debate in academic and policy circles. While there is no consensus on a single framework, previous research – particularly studies focusing on wage determination and shortages in engineering and science – mainly in the United States, provides theoretical insight into the conditions conducive to shortages. Accordingly, a shortage occurs when the growth rate of labour supply lags behind that of labour demand at prevailing wage levels. This perspective emphasises the importance of the relative dynamics between supply and demand in shaping the occurrence of shortages. In particular, dynamic shortages are associated with a pronounced and persistent increase in demand for some occupations and limited supply adjustment.[2] Several key factors may therefore contribute to the occurrence of shortages, including a pronounced and persistent increase in demand for certain occupations, limited elasticity of supply, sluggish market adjustment and wage rigidities. For example, occupations such as medical doctors, which have restricted entry or certification requirements create barriers to entry, are particularly vulnerable to shortages when faced with a surge in demand. The limited supply resulting from regulatory constraints exacerbates the mismatch between labour supply and demand, thereby increasing the likelihood of shortages.

Another approach that is largely agreed upon, considers shortages to be a market disequilibrium between supply and demand, i.e. the quantity of workers demanded exceeds the available supply and will to work at a particular wage and set working conditions at a particular place and point in time (Barnow et al., 2013; Dustmann et al., 2010). This emphasises the importance of delimiting the geographical scope of the shortage, as it may manifest either locally within specific regions or extend to a national scale. Furthermore, defining the duration of the shortage allows for the assessment of its severity. Temporary shortages indicate the necessary time for supply-side adjustments. For example, temporal shortages may arise due to the lag between the emergence of heightened labour demand and the subsequent dissemination of relevant information to potential workers regarding areas with high labour demand.

Measuring labour shortage: A complex task

Labour shortage is often operationalised in practice through the use of indicators such as hard-to-fill vacancies or recruitment difficulties reported by employers in surveys. Indeed, most evidence on labour shortages comes from surveys in which employers are asked about the difficulties they face in finding and recruiting staff with the required skills. However, employers may face recruitment difficulties for a number of reasons, such as offering inadequate remuneration, unfavourable working conditions or being located in geographically unattractive areas. These factors contribute to recruitment difficulties even in the absence of a genuine labour shortage.

1 https://eures.europa.eu/eu-talent-pool-pilot_en.

2 See the Blank-Stigler (1957) and Arrow-Capron (1959) models.

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In some cases, despite a large pool of available workers willing to take up the job, employers may express concerns about labour shortages. This scenario arises when the available labour force has the necessary formal qualifications but lacks the essential generic skills required to meet employers' needs. Such a mismatch highlights a nuanced aspect of labour market dynamics, where the focus shifts from mere availability to the matching of skills to job requirements. Consequently, the manifestation of perceived shortages goes beyond the mere availability of workers to the adequacy of their skills to meet the multiple demands of the labour market.

Labour market shortages arise from the combination of challenges related to the quantity and quality of the available workforce in a given geographical area, as well as employment conditions. Relying on recruitment difficulties as reported solely by employers is thus a limited indicator of shortages. It does not indicate whether the problem is one of the quantity or quality of the workforce, or of unattractive employment conditions. Conclusions drawn solely from ad hoc employer surveys or the vacancy rate can be misleading. For a more comprehensive understanding, it is essential to complement such measures with additional indicators that take into account both the availability of the labour force and its quality in terms of the skills demanded by the labour market and employment conditions.

The Organisation for Economic Co-operation and Development (OECD, 2017) framework for measuring skill shortages provides an alternative departing from a definition of skill shortages as the inability of employers to recruit skilled workers from the local labour market at prevailing wage rates and working conditions. This definition is operationalised by creating a multidimensional indicator of skill shortages at the occupational level. This indicator combines measures of employment pressure (total employment, unemployment rate and hours worked), wage pressure and talent pressure (under-skilling). The rationale behind this approach is that occupations experiencing real shortages should show faster wage growth, high employment and low unemployment rates, an increase in the hours worked by available workers and an increase in the proportion of underqualified workers. This indicates that there is a limited pool of candidates with the required skills. Skill requirements are then mapped to each occupation to identify skill mismatches.

Although this multidimensional approach seems more promising for identifying labour shortages, the indicator lacks the ability to determine which dimension is driving the shortage situation and, consequently, which policy measures are more effective in alleviating this shortage. Furthermore, this indicator has the limitation of relying on components that are highly sensitive to cyclical factors, making it difficult to identify structural skill shortages. The optimal measure of skill shortages must match the skills demanded by employers with the skills available in a given labour market. In this case, the main obstacle is the availability of reliable disaggregated data collected from employers, including job vacancies and terms and conditions of employment offered, complemented by data on the available supply of skills.

Exploring the causes of labour shortages

As highlighted above, empirical evidence on causal factors of labour shortages remains scarce. The causes of labour shortages are often presented as a mere list of potential determinants, lacking both in-depth examination and empirical investigation. On the demand side, structural changes such as shifts in consumer preferences, changes in production processes and technological advances have a significant impact on the skill composition of labour demand. Such changes often lead to an increased demand for specific skills, requiring a corresponding adjustment of the available labour force to meet the evolving needs of the industry.

Conversely, supply-side factors, such as an ageing population or a limited labour reserve due to high employment rates or low participation rates, can lead to shortages by limiting the pool of available workers. In addition, mismatches between the skills and qualifications available in the labour market and those required by employers exacerbate shortages, highlighting the need to adapt education and training programmes to the evolving needs of industry and to improve the quality match between workers and their jobs. In addition, limited mobility of workers between regions or within the EU can exacerbate shortages in certain geographical areas, thereby limiting employers' access to skilled labour.

What are the potential solutions to address the labour shortage?

A commonly advocated solution to labour shortages is the recruitment of foreign workers. This is a relatively straightforward solution for employers to find workers with the required skills. However, it can pose challenges if the occupations or sectors experiencing shortages are unattractive. In such cases, foreign workers may temporarily fill these positions, potentially re-creating the shortage problem when they eventually seek more attractive employment opportunities. Furthermore, the reliance on foreign workers is a matter of contention in public opinion due to its impact on social integration and potential com-

petition with native workers, which affects employment outcomes. The effectiveness of migration policies in addressing labour shortages in European countries (Seghir and Nezhyvenko, 2024) remains an underdeveloped area of research, and further investigation is needed to assess its reliability.

In the meantime, employers facing difficulties in filling vacancies have various solutions staff. Nevertheless, including increasing the hourly workload of existing staff. Nevertheless, while this approach may provide a short-term solution, its long-term viability is questionable due to its potential negative impact on employee well-being, satisfaction and productivity. Another straightforward approach is to increase wages and improve working conditions to attract highly skilled workers, provided there is a sufficient pool of suitable candidates. Despite the effectiveness of this strategy in theory, employers are often reluctant to implement it due to concerns about increased labour costs and potential perceptions of unfairness among incumbent workers. An alternative approach is to hire lower-skilled workers and provide on-the-job training, which is a more sustainable solution. Furthermore, whenever possible, restructuring job roles to delegate certain tasks to workers in shortage occupations can be part of the solution to shortages.

The successful implementation of solutions designed to alleviate labour shortages is contingent upon an understanding of the structural factors that drive these shortages. Structural changes, such as shifts in skills demand driven by technological advancements, necessitate a multifaceted approach. This includes reforming education systems to integrate new qualifications demanded by employers, upskilling and reskilling the existing workforce, and potentially relying on foreign labour as a short-term solution to meet immediate needs.

Conclusion

The lack of a robust measurement framework for identifying shortages poses a significant challenge to the effectiveness of any policy initiative aimed at addressing the issue. The development of such a framework requires not only the identification and definition of shortage indicators, but also a nuanced understanding of the contextual factors that contribute to their emergence and persistence. It also requires the collection of detailed data on various aspects, including job vacancies, working conditions and the skills demanded and available in different occupations and geographical areas. High-quality data is essential to ensure the reliability and validity of measurement results in relation to the different circumstances that give rise to shortages.

Improving the measurement of shortages by providing more accurate data not only facilitates the identification of shortages, but also allows for a comprehensive examination of the structural factors underlying these shortages. This in turn allows for the formulation of targeted and effective interventions to address them effectively. With regard to policy solutions, post-implementation evaluation is essential to assess the impact and effectiveness of policies. Such evaluations enable policymakers to identify successful strategies, refine approaches where necessary and inform future policy decisions.

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Gabriel Felbermayr and Eckhard Janeba

Improving Supply Security: Guidelines and Policy Proposals

Supply security is threatened by technical, business, natural and policy shocks, as well as geopolitical tensions. Is there a rationale for policy intervention? If yes, what are efficient and effective measures that achieve de-risking? This article first explains why private incentives do not generally lead to an optimal diversification of supply sources, and then discusses measures that strengthen protection against and resilience in the face of shocks. Governments should refrain from policies that further disincentivise diversification such as the *ex post* skimming of excess profits when adverse shocks force the halt of production and should work on framework conditions that facilitate diversification. Importantly, most measures are best taken at the EU level.

In recent years, various shocks, including pandemic-related production interruptions abroad, disruptions of maritime transport routes caused by pirates or extreme weather as well as politically imposed sanctions and counter-sanctions, have led to bottlenecks in supply chains. These have had a lasting impact on industrial production and triggered, at least partly, higher prices. Increasing geopolitical tensions and higher climate risks make such disruptions more likely.

The EU has a higher degree of openness than the US or China. It is, therefore, more exposed to external disruptions of supply chains. Because of its lack of a common foreign policy and a military, it is also more vulnerable to opportunistic behaviour of foreign powers that seek to employ asymmetric economic interdependence as a geo-economic weapon. This danger became clear in 2021 and 2022, when Russia first raised uncertainty about gas supplies to Europe and eventually massively cut its exports.

A major reason for the supply risks and for high procurement prices for important raw materials and intermediate products was and still is the partly low diversification of the supplier portfolio of European companies or the supply channels through which they obtain their imports.

Against this background, many countries have begun to fundamentally rethink their foreign economic policies, which have often led to a much more active industrial policy. Both the United States and the EU are stepping up efforts to secure their strategic autonomy and to reduce blackmail opportunities due to one-sided dependencies. The focus is on China and Russia, but the list of potentially problematic suppliers has grown longer in recent years.

This paper presents the difficulties arising in the identification of strategic dependencies. It derives welfare-economic justifications for government interventions in supply chains. It elaborates general regulatory principles for supply chain regulation. Finally, it discusses measures that should lead to an improvement in the diversification of the supplier portfolio.

Identifying strategic dependencies

How can strategic dependencies be identified? Objective answers are hard to come by because the available data are incomplete and circumstances are constantly changing. Therefore, there is a risk that government interventions are poorly calibrated. The following passages highlight some fundamental premises for evidence-based economic policy in the supply chain context.

The need for a European perspective

The first such premise is that strategic dependencies and crisis preparedness need to be discussed at the EU level.

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Within the EU single market, production networks are densely interconnected. Moreover, member states have ceded trade policy and other relevant competences – such as some regulation of foreign investments – to the EU.[1] Therefore, interdependencies should be examined at the EU level, not only at the national level; economic policy responses must also be primarily sought and found at the EU level.

What is considered scarce depends on the context

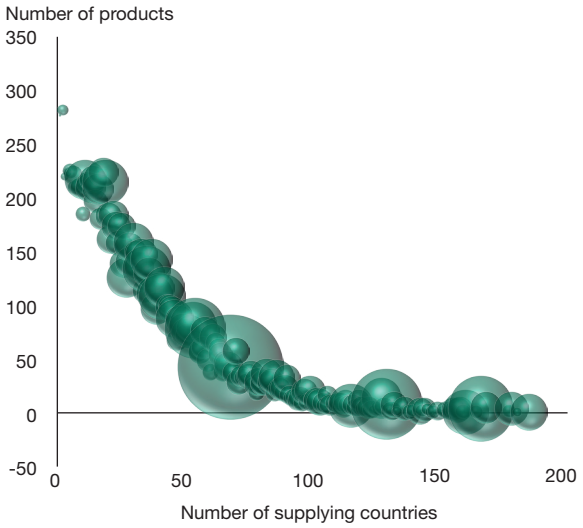
The second premise is that the perception of scarcity is highly context dependent. During the pandemic, a lack of medical face masks was reported; shortly after, there was talk of shortages of reagents and glass vials for the manufacturing of tests and vaccinations, leading to price increases. Based on rumours, bank-run-like effects can lead to shortages, even if the security of supply is not actually at risk at all. In addition to sensitive communication, reliable, up-to-date and readily available real-time data can help avoid such episodes.

Besides such rather anecdotal cases, supply problems are also discussed from an industrial policy perspective. Around the introduction of electric vehicles, dependencies on electronic components such as chips have become more apparent. Shortages have weighed on the output of the German motor vehicle industry in 2021 and 2022. However, in the meantime, the chip shortage has receded and there are already warnings of oversupply.[2]

In the case of rare metals, which are important to produce batteries as well as wind turbines, the focus also changes constantly when new deposits are found or developed,[3] and when innovations make substitutes possible or savings achievable. Especially in metals, boom and bust cycles and high price volatility are the rule rather than the exception.

There is a danger that hectic policy measures that curb these fluctuations are counterproductive because increasing supply typically takes time and therefore their effect often only kicks in when shortages are already decreasing. Ill-considered policies geared to short-term needs also run the risk of failing to keep future shortages in mind. Thus, a poorly designed government commodity policy would not reduce but rather fuel price volatility.

Figure 1
Supplier diversification of EU imports



Note: The size of the bubbles is proportional to the import value. 280 products come from a single supplier, 779 products are supplied by at most three countries.

Source: Own elaboration based on Comtrade Data for 2019.

Information: Incomplete and asymmetric

The most important data source for identifying dependencies at the product level is trade statistics. They are detailed and comparatively timely, but only refer to goods; services data are much less complete. Based on detailed product-level trade data, various authors have analysed the degree of diversification of EU imports. For example, in 2019, out of 10,280 products imported by the EU, 779 products came from a maximum of three different supplier countries (see Figure 1).

Also, in 2019, China accounted for more than 50% of global exports for almost 600 of around 5,000 products contained in the globally harmonised trade statistics (Jean et al., 2023).

Alarming as these numbers may seem, on their own, they are not informative. They must be complemented with production data, which are not available at the same level of granularity as trade data. Moreover, if no production of a certain product in a certain country in a situation of relatively free international trade is observed, one cannot infer anything about the capabilities that can be mobilised in a situation of crisis. Technological dependencies from foreign countries, too, are rarely well observed, as they go beyond material inputs but could be crucial in a situation of conflict. Finally, elasticities of substitution between products or sources are notoriously hard to estimate,

1 See, e.g. Article 6 paragraph 9 last sentence Regulation (EU) 2019/452.
2 See, for example, the reports in the *Frankfurter Allgemeine Zeitung* on 9.1.2023 ("Autohersteller leiden weiter unter Chipmangel") and in *Neue Zürcher Zeitung* on 10.9.2022 ("Nach dem Chip-Mangel kommt das Überangebot").
3 For example, on 16 February 2023, the *The Economist* reported that the metal cobalt was suddenly superabundant.

because there are no reliable price data. Information is, therefore, incomplete.

It would be naïve to believe that the missing data could be easily obtained by surveying companies. Supply chain data are sensitive because they allow for the drawing of conclusions on firms' productivities and vulnerabilities. Hence, information is also asymmetric.

Insights from macro data

What we know about vulnerabilities is, therefore, either highly partial and thus prone to misinterpretation, or based on relatively aggregate data.

One can obtain a comprehensive picture about aggregate dependencies from balance of payments (BoP) statistics, where trade in services as well as primary and secondary incomes are shown in addition to trade in goods.[4] The comprehensive BoP-perspective reveals that the EU's external economic relations are actually quite balanced. This is highly relevant from a geo-economic perspective because asymmetrical bilateral relations are particularly vulnerable to political abuse (Mattoo and Staiger, 2020). A bilaterally balanced BoP-position with a trade partner does, however, not imply the absence of one-sided strategic dependencies, because foreign goods can have a higher criticality in domestic value networks than vice versa.

To convincingly identify strategic dependencies, an appropriate analytical framework must not only capture European trade and production data but also incorporate global input/output relationships and production opportunities. Furthermore, information on the substitutability of goods and services by alternatives in production and consumption is needed. Felbermayr and Krebs (2023) have used such a model to study various disruptive scenarios for Germany. The key insights, which also hold for other EU countries, are

- The economy is dependent not only on imports of raw materials and industrial supplies, but also on imports of services.
- Moreover, macroeconomically relevant vulnerabilities exist not only vis-à-vis China, but also vis-à-vis other important trading partners such as the USA, UK or Switzerland.

4 Primary income refers to income from all types of foreign investment; it includes income from the posting of workers. Secondary incomes are payments without reciprocation. They are relatively insignificant in quantitative terms.

Evidence-based micromanagement is hard

There are additional complications because firms continuously adjust to changing circumstances. They also react to public policy interventions, e.g. by redirecting their sourcing, by acquiring or selling vertically integrated units, or by changing their pricing policies. Hence, the nodes in input/output networks at the company level are endogenous and changeable. A reliable and objective identification of strategic goods (or services) is very hard.

Moreover, there is a danger that lists of industries or goods worthy of protection are drawn up based on special interests rather than general welfare and may be used to subsidise domestic production, prohibit takeovers of domestic suppliers by foreign rivals, or restrict exports of goods or technologies.

That does not imply the complete rejection of such lists; they are necessary for many policies. However, there is the need for clear rules and processes that set out transparently how the list entries are generated. It is important that policies to secure the supply of raw materials and industrial inputs are based on principles that do not take specific products of firms as starting points, but instead set a regulatory framework that is helpful for many configurations of potential supply crises.

Welfare-theoretic foundations

Do firms optimally diversify?

Do companies have the correct incentives to sufficiently diversify their supply chains? Firms can insure against supply shocks by diversifying their supplier base. However, including actors other than the cost-minimal supplier in the portfolio raises costs. Firms must balance supply risks against costs. Their choice depends on many factors: the nature and strength of the correlation of the shocks, the loss of profit due to non-delivery, the possibility of varying sourcing quantities at short notice, the costs of different suppliers for different quantities of inputs, the fixed costs that arise for each active buyer-seller relationship,[5] the costs of alternative hedging options, such as warehousing or traditional insurance.

In general, one cannot expect the decentrally chosen degree of diversification to correspond to the social optimum because of externalities, lack of full information, absence of perfect competition and other distortions. Importantly, as shown by Grossman et al. (2023), when a producer cannot supply the market anymore, besides lost

5 See, for example, the overview article by Antras and Chor (2022).

profits, there is also a loss to consumers which is not fully incorporated in firm-level decision-making ("consumer surplus externality"). Hence, firms under-diversify, thereby justifying state intervention.[6]

The situation is exacerbated when distortions interact at individual stages of a supply chain, for example, when incomplete information hinders the operation of price signals along the supply chain beyond the buyer. Then, the buyer's behaviour generates a potentially negative externality on further (downstream) firms that cannot be (fully) internalised by contracts (Liu, 2019). In other words, in complex supply networks, systemic risks can arise that are not addressed by market activity alone.

The security externality

Procurement decisions of domestic companies can have an impact on a country's security: a strong concentration of procurement of an essential input on one supplier country makes a government vulnerable to blackmail by that supplier country.

However, domestic "strategic autonomy" does not enter the decision-making calculus of companies because it has characteristics of a public good: companies are not willing to incur higher costs to improve their governments' strategic autonomy through better diversification because the respective contribution of each company on its own has only a very small effect on its own success. Therefore, under-diversification occurs.

In the presence of such security externalities, state intervention can be justified by the divergence of individual economic and total economy rationality.

Moral hazard through rescue policies

These problems are exacerbated if companies can count on government support measures such as short-time allowances, liquidity assistance or subsidies in the event of a supply disruption. All of these reduce the incentives to invest in their own supply security. To eliminate the problem, governments would have to be able to commit *ex ante* – i.e. before shocks occur – that there will be no support measures, even if this causes major economic distortions. However, such "no-bail-out" commitments are rarely credible. The resulting "moral hazard" reinforces the problems mentioned above and drives an even larger wedge between the socially optimal degree of diversification and the one resulting from decentralised decisions.

6 There is the theoretical possibility of over-diversification, which is discussed in Grossman et al. (2023).

Excess profit taxation

If an industry is hit by a supply chain crisis, firms within that industry that have diversified their supply relationships continue production of final goods while firms that have not will have to stop. Output available to consumers falls, and the resulting scarcity drives prices up. Firms unable to produce register losses, those that invested in diversification benefit from high price and record bumper profits. In such an environment, public opinion tends to turn against the firms that continue producing and blames them for causing "greedflation". In the recent crisis, governments have responded by increasing profit taxes for such firms (e.g. in the electricity sector).

Such *ex post* excess profit taxation is highly problematic, as the concept of excess profits is ill-defined and the uncertainty in tax policy resulting from ad hoc adjustments of tax rates puts off investment. Most importantly, if firms expect a skimming of profits in supply chain crises, they lose any incentives to incur the *ex ante* costs of diversifying their supply chains. Therefore, to encourage risk-conscious behaviour, governments should credibly renounce any form of excess profit taxation.

General policy principles

Because the future needs of European industry and the nature of possible disruptions affecting supply chains are unknown today, the best strategy is to create general structures that increase security of supply and improve resilience to shocks. We will now turn our attention to government instruments, safeguards against protectionist abuse, and the need for a regulatory framework that targets the security externality and moral hazard problem.

Decoupling and friendshoring are not the solution

Eppinger et al. (2022) show that a decoupling from individual supplier countries would not contribute to supply security. While European economies might experience less significant negative effects from disruptions in foreign supplies if they relied less on imports, the costs of decoupling are orders of magnitude higher than the benefits of reduced dependence. Even if one were to allow security policy arguments to apply alongside economic considerations, these would have to be given an extremely high monetary valuation for the calculation to turn around. In addition, if domestic supply suffers an adverse shock while foreign supply is restricted, the damage would be tremendous.

Starting from a situation of well-diversified supply networks, it obviously does not make sense to concentrate

procurement on friendly countries ("friendshoring") because this reduces the diversity of domestic supply relationships. Conversely, expanding supply networks to countries with which friendly relations exist may make good sense from a security perspective if diversification for critical products that cannot easily be substituted is improved in this way.

Expand reciprocity of bilateral dependencies

Mattoo and Staiger (2020) show that bilateral dependencies can be abused for opportunistic deployment. The attractiveness of such behaviour can be reduced by the (tacit) threat of countermeasures. However, this requires the existence of a potential threat. It is therefore important not only to have a good grasp and understanding of one's own dependencies, but also of trading partners' dependencies on European inputs and technologies.

Gehrke and Ringhof (2023) recommend expanding technological leadership positions in a targeted manner to maintain sustainable pressure points vis-à-vis trading partners. The best instrument for this is a smart innovation and technology promotion policy that specifically seeks to strengthen comparative advantages instead of compensating for comparative disadvantages.

Coordination of policy interventions

Policymakers should ensure that other foreign policy initiatives do not have counterproductive effects on security of supply. All measures relevant to foreign trade should be examined regarding their intended and unintended as well as direct and indirect effects on the security of supply, especially regarding the question of whether they promote or impede diversification.[7] All measures should be coordinated as far as possible with partner countries.

Measures to promote diversification

"Breathing tariffs"

"Breathing tariffs" are import duties that vary with global market conditions or with import shares. They could be used to discourage the excessive dependence on few supply sources. Indeed, a targeted (second-best) policy would be to design bilateral tariffs that increase in the share of sourcing obtained from the trade partner in question. Such a quota tariff violates the most favoured nation principle of WTO law but could possibly be defended with the help of legitimate national security objectives under Article XXI of the General Agreement on Tariffs and Trade (GATT, National Security Exception). Of course, where the EU still has external tariffs on inputs or raw materials, it can vary them within the framework agreed under WTO law, i.e. without discriminating against trading partners. This cannot directly promote diversification, because the system would have to be applied equally to all trading partners. However, the price effects of shortages could be mitigated in this way. It could also provide incentives to develop alternatives to the respective imported goods.

Trade agreements

The EU should push for trade agreements that minimise import tariffs or non-tariff restrictions on trade. However, this requires a strategic shift: instead of focusing primarily on opening new sales markets for European goods and services, the security of supply for its own economy must gain in importance as a strategic goal for EU trade policy. The EU must conclude agreements with countries that are particularly important for the procurement of raw materials.

Often resource-rich countries have been granted unilateral trade advantages by the EU in the context of the Generalised System of Preferences, making access to the European market conditional on compliance with human or environmental rights. In times of greater scarcity of raw materials and high prices, the conditions for granting preferences should be reviewed and adjusted if necessary. The negotiation and adoption of agreements on critical minerals – a process the EU has started with the USA or Chile, for example – is welcome even if it is a step away from comprehensive free trade agreements under Article XXIV GATT.

International investment agreements

In many cases, it is not possible to diversify the supplier base because there are only a few countries where certain raw materials are produced or because the production capacities are limited. It can therefore make sense for European companies to invest in countries rich in raw materials to find alternative sources of supply. Because legal certainty is often not sufficiently guaranteed in these countries, investment promotion and protection agreements (international investment agreements, IIAs) have been concluded in the past. These have fallen into disrepute since the discussion about the Transatlantic Trade and Investment Partnership agreement. However, if for-

7 The proposed EU Corporate Sustainability Due Diligence Directive is an interesting example. In its design, the effects on diversification of EU supply relationships do not seem to have received substantial attention by lawmakers.

eign investments are perceived as too risky and cannot be properly insured, they are not made. The result can be that the procurement base of domestic companies is not sufficiently diversified.

Trade and investment guarantees

EU countries maintain well-functioning systems of export credit insurance. These can be adapted to give companies incentives to better diversify their sales markets, for example by making the conditions dependent on how high the share of EU companies in the target markets already is. Moreover, instruments to insure import transactions are much less developed.

Many EU countries grant guarantees for foreign investments, but only under certain conditions and if an IIA is available. It would make sense to take the criterion of securing the supply of raw materials into account when granting guarantees.

Securing transport corridors

For raw materials and industrial primary products to reach Europe safely and at good prices, efficient and secure transport infrastructure is needed. The Chinese Belt and Road Initiative is aimed precisely at opening procurement and sales markets for its own benefit; development policy goals take a back seat. Infrastructure such as ports, road or rail connections are in principle available to all trading partners of the countries in which they are developed. In practice, however, it often turns out that access is not equal and Chinese companies are favoured (Bluhm et al., 2018). It is important that Europe, e.g. in its Global Gateway approach,[8] makes attractive offers to countries in the Global South. In addition to the human rights situation, arguments such as the country's own security of supply or geostrategic influence should find their way into investment decisions made by publicly financed development banks. Furthermore, the protection of transport routes must be given higher priority (see, for example, Sandkamp et al., 2022). The recent announcements by the EU and the USA to push ahead with the development of an India-Middle East-Europe Economic Corridor and a Trans-African Corridor within the framework of the Partnership for Global Infrastructure and Investment are therefore to be welcomed.[9]

When diversification is not possible: Strategic reserves, urban mining and R&D

It is rarely feasible or desirable to fully control all supply risks through diversification. In the case of products, the manufacture of which is associated with strong economies of scale (such as battery cells or computer chips), an increase in the global number of production sites is associated with substantial cost increases. In such markets, purely market-based processes lead to a sub-optimally small number of producers in the presence of a security externality. Therefore, it may be justified to promote the location, establishment or scaling of production facilities in the EU (or even abroad) with subsidies.[10] However, the correct calibration of subsidy policy is difficult. The risk of subsidy races is high and there is a threat of global overcapacity.

For products where there are only a few sources of supply or where the risks over the possible suppliers are highly correlated, the establishment of strategic stocks may be necessary, as for example with mineral oil, preferably at the EU level. However, because stockpiling is expensive when interest rates are positive, there are limits to this strategy. The government should consider providing additional fiscal incentives to build sufficient stocks of critical inputs. It should ensure that companies can create storage capacities, which requires appropriate zoning and the approval of storage buildings.

A second means of improving the security of supply of poorly diversifiable products is through fiscal and regulatory subsidies for recycling. "Urban mining" is the extraction of valuable raw materials, such as copper, silver and gold from waste, such as that produced by shredding old cars or recycling wind turbines. This requires suitable facilities in the EU and cooperation among member states. Above all, it needs a minimum of planning certainty, because if commodity prices fall on the world markets, the processing plants will no longer be profitable.

A third sensible approach is to direct research policy towards exploring technological substitutes for raw materials or intermediate products that are difficult to diversify.

Government as buyer

In many areas, the state is itself active as a buyer, albeit often indirectly, e.g., the market for medical products is heavily dominated by demand from public health insur-

8 https://www.consilium.europa.eu/en/policies/global-gateway/.
9 https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4421.

10 Modern research on the meaningfulness of industrial policy is less sceptical than older research, both in terms of its theoretical foundation and empirical evidence (see, for example, Liu, 2019).

ance schemes. In the last few decades, there has been a strong focus on reducing the pecuniary costs for the health system, for example with mandatory discounts for the pharmaceutical industry, which has reacted by outsourcing and concentrating on the cheapest suppliers. At the same time, health insurance authorities do not seem to have prioritised security of supply sufficiently, presumably because this would have entailed additional costs. As a result, bottlenecks arose when shocks occurred. In such highly regulated markets, the lack of diversification is not always a result of market failure, but occasionally of government or regulatory failure.

In these markets, it is necessary for member states to consider and coordinate the effects of one's own measures on the integrity of the EU internal market. In other EU states, there is concern that Germany is offering up to 50% higher prices to the pharmaceutical industry to secure its own supply of medicines, which can endanger the security of supply in other countries.

New markets for supply security

Finally, newly created markets can counteract the tendencies towards suboptimal low diversification or stockpiling described above.[11]

Governments could commit in advance to the purchase of a predetermined quantity of the respective product at a certain price. This instrument is known as Advance Market Commitment (AMC). To use AMCs to prepare for crises, there should be a clear definition of when the obligation to purchase by the public sector takes effect. The trigger could be, for example, that the market price of the commodity exceeds a certain level.

When such AMCs are in place, companies can better plan for crises. This reduces the concern that the government will intervene in market prices or tax (windfall) profits in these situations, as they have previously contractually committed to these AMCs. This makes investments in alternative supply channels and stockpiling more attractive.

Another option comes in the form of capacity markets, which are found in the electricity market and are used in the USA or France (Cramton et al., 2013). Electricity producers apply for contracts on the capacity market, with which they enter into the obligation to supply electricity at a predetermined price at certain times. In return, they receive payment on the capacity market.

11 Innovative market design can also contribute to easing the situation after a crisis has occurred, see, e.g. Cramton et al. (2020).

A European supply security office

For effective and efficient supply security management, the public sector needs comprehensive and adequate information. In addition, competences are needed for the development and implementation of preventive measures, which must be synchronised and harmonised across the EU. Following the Scientific Advisory Board of the German Ministry for Economic Affairs and Climate Action, we therefore propose the establishment of a European supply security office (ESSO).[12]

As we have argued above, *ex post* government support measures may compromise firms' incentives to diversify. Thus, governments should create clear structures and rules for the insurance of supply chain risks. However, governments regularly cannot deny state support in the event of a risk materialising. Therefore, it is appropriate for the government to be aware of the risks and, under certain circumstances, to intervene in a forward-looking regulatory manner if high vulnerabilities build up in companies or sectors.

ESSO should collect, systematise and provide quality-assured relevant information and carry out corresponding analyses.[13] In addition to internalising cross-border effects within the EU, an EU institution can use economies of scale absent at the national level.

ESSO should monitor and assess systemic risks in European supply networks and develop measures to limit systemic risk and introduce them into the political process. It could assess and evaluate measures taken by member states or third countries regarding their impact on European security of supply. It could design and supervise crisis resilience audits (stress tests) recommended in the EU's draft Raw Materials Act and accredit private auditors. Finally, it could be tasked with coordinating joint strategic reserves.

ESSO could produce or commission reports on potential systemic risks in supply networks and give specific mandates to expert groups to assess supply chain risks.

12 The provisional deal on Europe's crisis preparedness in the IMERA/SMEI dossier reached on 1 February 2024 establishes an Internal Market Emergency and Resilience Board. It remains to be seen whether this Board will establish itself as a forum for fruitful discussions on matters relating to supply security from a European perspective.

13 Experience with the European Systemic Risk Board (ESRB) can be used here. The ESRB is responsible for macro-prudential oversight of the EU financial system and for the prevention and mitigation of systemic risk. As part of its mandate, the ESRB monitors and assesses systemic risks and issues warnings and recommendations as appropriate.

It could publish, like the ESRB risk dashboard, a set of quantitative and qualitative indicators of systemic risk in European supply networks.

ESSO should be integrated into the interaction of national and European institutions in such a way that redundancies, unclear responsibilities and additional bureaucracy are avoided. Because questions of international security of supply are inherently connected with political, especially foreign policy, aspects, for which the responsibilities are shared between the EU and the member states, a European supply security office should not be constructed as an independent agency with its own decision-making powers but should work with the European and national institutions.

Conclusions

Our economic model depends on secure and largely unhindered access to world markets. In recent years, this system has come under threat as various trading partners have sought to exploit Europe's dependence on certain supplies from abroad and on certain export markets to obtain foreign policy concessions. At the same time, the COVID-19 pandemic has highlighted how vulnerable domestic supply chains and security of supply can be.

Given incomplete and asymmetric information, it is impossible to draw up lists of critical goods, technologies, or sectors according to objective standards for the purpose of financial support by the general government or deriving foreign trade policy measures.

To avoid the emergence of dependencies, an appropriate regulatory framework is needed that can internalise the existing security externality. We have proposed several measures that make it easier for companies to diversify their supply networks, such as free trade agreements, and the promotion and facilitation of foreign investment to develop alternative sources of supply.

A European perspective is central to both the assessment and the development of economic policy responses. Not only does competence for most foreign economic policy fields lie at the EU level, the integrity of the internal market and its dynamism are the best insurance against attempts from abroad to instrumentalise any dependencies. To ensure that national policies and initiatives are optimally dovetailed with the European level, a European supply security office should be established to harmonise the collection of data on supply chains, develop uniform stress tests and monitor the impact of national policies on the internal market.

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The EU's Digital Markets Act: Regulatory Reform, Relapse or Reversal?

As of 7 March 2024, the EU Commission began to enforce its controversial Digital Markets Act (DMA). This article sheds light on the recent debate. It lists the dos and don'ts of the DMA as well as stakeholder reactions to them before tracing some of the underlying motivations and reasoning that emerge from the EU's current policy reversal with reference to dealing with abuse of dominant positions in line with Article 102 of the Treaty on the Functioning of the European Union. Following this, the paper reviews economic aspects of digital platforms, concerns about market foreclosure and essential facility as well as appropriate remedies before closing with a discussion of the challenges in stipulating and enforcing efficient rules to govern digital platforms. It is argued that the DMA ought to be rewritten to stipulate clear and cogent legal standards, return to a strengthened system of ex post control and provide platforms with the opportunity to deliver efficiency defenses as part of corporate self-regulation.

The EU Commission's Digital Markets Act (DMA) came into force on 7 March 2024 (Regulation (EU) 2022/1925). As part of a set of regulations proposed to make "Europe fit for the Digital Age",[1] the DMA establishes quantitative thresholds as well as per se obligations and prohibitions for providers of online search engines, app stores or other platform services that are considered "gatekeepers" to digital ecosystems. For the moment, the DMA applies to six extra-EU companies: Alphabet, Apple, Amazon, ByteDance, Meta and Microsoft. To ensure that digital markets are becoming more fair and contestable, and to avoid legal fragmentation, unwarranted lenience and needless delays, DMA regulations complement existing EU competition rules but, unlike these rules, are entirely centrally enforced. Also, there are significant penalties to guarantee compliance. For some, the EU is seen as having finally set a new standard for how the digital economy should be regulated and function worldwide.[2]

For others, however, the DMA amounts to an intentional distraction of global market leaders and an infringement on their property rights in order to protect less efficient European competitors. What is more, the regulation is seen to override consumer preferences and welfare benefits and to be built on the assumption that digital markets inevitably fail (Suominen, 2022). It therefore may not be surprising that the DMA does not permit any effect-based economic assessments of specific cases, trade-offs and efficiency defences but instead establishes a set of preventive norms grounded in some vague notion of fairness and contestability. Seen this way, the DMA departs from recent advances of competition law and returns to earlier, form-based and excessively discretionary regulations; it also furthers the centralisation of these controls, undermining member states' ability to enforce national laws with likely counterproductive consequences. Moreover, there is concern that the EU's regulatory reform could inspire "copycat legislation", leading to a worrisome global convergence of pertinent competition standards.

The first section of this article lists the dos and don'ts of the DMA as well as the reaction of various stakeholders to them. The next section highlights the EU's current policy reversal in

1 For an introduction and overview of the EU's Digital Service Act, Artificial Intelligence Act, Data Act, European Cloud Service Scheme, the regulations linked to European Telecommunications Network Operators, see https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age_en.

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2 As projected by the rapporteur from Parliament's Internal Market and Consumer Protection Committee, Andreas Schwab, quoted in Press Release (European Parliament, 2022). For a recent call for gatekeeper cooperation, see https://eutechalliance.eu/wp-content/uploads/2024/01/Public-statementcalling-on-Gatekeepers-to-cooperate-16-Jan-2024pdf.pdf.

dealing with the potential abuse of dominant positions in line with Article 102 TFEU. The paper then reviews economic aspects of digital platforms, concerns about market foreclosure and essential facility as well as appropriate remedies. Finally, there is an examination of the challenges in stipulating and enforcing efficient rules to govern digital platforms.

The Digital Market Act: Context, content and commentary

The Economist's (2018) article on "Taming the Tech Titans" foretold the regulator's current dilemma: if tech titans may use their power to protect and extend their dominance to the detriment of consumers, how can one restrain them without undermining consumer benefits and stifling innovation? Would utility-type regulation or a stricter enforcement of competition standards provide the answer?

Today our understanding of digital platforms may be more refined, but we are still unable to agree on a proper regulatory approach. Search engines, social media networks and marketplaces reduce transaction costs and increase price transparency; they expand consumption, production and sharing opportunities at little or no monetary cost. Digital platforms create user benefits through network effects driven by economies of scale and scope. And yet, although their data aggregation and reuse allow them to capture only part of the total value that they create, platforms quickly appear to be massively profitable, formidable gatekeepers that impose barriers to potential and actual competition. As a result, markets may tip, and the winner could take all.

But is this really so? And if yes, is the outcome the result of users' preference for the existing, more attractive infrastructure? Or is it due to some foreclosure or the immobility of network users that limits market opportunities for followers? When is increasing the attractiveness of a platform's offer at a larger scale and scope inadvertently limiting entry opportunities – and into which markets? Should such conduct be restricted for the sake of less efficient followers? Should key elements of platforms such as core data or algorithms be considered an essential facility and freely open for public use? Are companies obliged to help their competitors? Is the purpose of regulatory intervention the protection of competition or competitors? How should competing *for* and competing *within* a standard be separated? How does one distinguish having a competitive advantage from abusing a dominant position?

Discussing a closely related competition policy concern, vertical restraints, Nobel laureate Jean Tirole (1988, 188) suggested that

> (t)heoretically, the only defensible position (…) seems to be the rule of reason. Most vertical restraints can increase or decrease welfare, depending on the environment. Legality or illegality per se thus seems unwarranted. At the same time, this conclusion puts far too heavy a burden on the antitrust authorities. It seems important for economic theorists to develop a careful classification and operative criteria to determine in which environments certain vertical restraints are likely to lower social welfare.

This is what the EU Commission tried to do with its 1999 competition policy reform. It first established a list of per se unacceptable contract clauses and a market share limit and then advised companies above that limit to prepare an "efficiency defence" that justified any of the non-listed clauses used. In addition, third parties were incentivised to monitor company behaviour, and penalties were increased. Hence, the 1999 reform pioneered the restructuring of EU competition control from *ex ante* authorisation to strengthened *ex post* control. The transformation reflected the realisation that contractual complexities limited the extent of centralised regulatory fine-tuning, which instead needed to be complemented or substituted by ways of reliably outsourcing regulation to those closest to the case at hand (Boscheck, 2000). The DMA rejects this logic and falls back on top-down rules.

DMA Article 1(1) reads:

> The purpose of this Regulation is to contribute to the proper functioning of the internal market by laying down harmonized rules ensuring for all businesses, contestable and fair markets in the digital sector across the Union where gatekeepers are present, to the benefit of business users and end users (Regulation (EU) 2022/1925).

Article 3 of the DMA identifies gatekeepers as online platforms that, for the last three years, had a strong and stable position in linking large user bases and a significant number of companies across EU countries.[3] Article 4 affirms that the gatekeeper status should be reviewed every three years. Article 5 lists obligations for gatekeepers to ensure interoperability with third parties: provide access to key data in order to allow third parties to generate their own gatekeepers' platform; provide tools and information for companies to independently verify the performance of their advertisement on the gatekeepers' platform; allow business users and consumers to transact outside the gatekeepers' platform; ensure non-discrimination between gatekeepers' and third parties' offerings; allow us-

3 A significant impact on the EU market requires "an annual Union turnover equal to or above EUR 7,5 billion in each of the last three financial years, or where its average market capitalisation or its equivalent fair market value amounted to at least EUR 75 billion in the last financial year, and it provides the same core platform service in at least three Member States" (Regulation (EU) 2022/1925, Article 3(2a). It is a core platform, which means that in the last financial year it had at least 45 million monthly active end users established or located in the Union and at least 10,000 yearly active business users established in the Union.

ers to remove any pre-installed software or apps; refrain from tracking not-consenting end users outside of the gatekeepers' core platform services for the purpose of targeted advertising. Articles 9 and 10 do not allow for an efficiency defence; the Commission insists that "a distortion of fairness cannot be compensated by economic efficiency."[4] Noncompliance will result in fines of up to 10% of the company's total worldwide annual turnover, or up to 20% in the event of repeated infringements. If infringements are considered systematic, behavioural and structural remedies, i.e. the divestiture of (parts of) a business may be imposed. Article 12 states that the Commission may pass delegated acts to update existing obligations; according to Article 19, the Commission may undertake market investigations into novel services to initiate new legislation.

Various analysts and lobbyists have commented on the rationale and the direction of the EU's shift in policy, its procedural and economic impact as well as any risk of over- or under-regulation (see e.g. CompassLexecon, 2021; Ribera Martìnez, 2024; Hoffmann, 2023). Many see the EU's policy reform motivated by a realisation that competition law had achieved too little, too late in dealing with the digital transformation of markets. The necessary economic analyses seemed to have resulted in enforcement of competition standards that was too slow and cautious without delivering suitable remedies. At the same time, platforms were seen to increasingly bias consumer preferences, which thus could no longer be trusted to deliver proper market responses. For these reasons, and given the worldwide scope of platform operations, the EU also intends to embed DMA-style *ex ante* regulation as the default position globally, forging Digital Partnership Agreements with Korea, Japan and Singapore. Referencing these efforts, India's Parliamentary Standing Committee on Commerce proposed a DMA-style *ex ante* regulatory model and Australia's Competition and Consumer Commission is working on binding codes of conduct for digital platform services. In the US, the Federal Trade Commission's and the Department of Justice's appreciation of the need for stricter, possibly DMA-type, competition controls was rejected by the US Department of Commerce and the US State Department, as expected. Similarly, competition authorities in Brazil, Taiwan and the UK remained sceptical about *ex ante* regulation.

While most critics voice concern about the lack of transparency, unavoidable conflicts with pre-existing national regulations and the higher likelihood of capturing centralised controls, they mainly object to the replacement of a welfarist economic approach and, with it, the elimination of the need to present a robust theory of harm. Apparently guided by the EU's experience in regulating the telecom sector, the DMA attempts to police a (non-existent) digital market by imposing restrictions on crudely grouped but very different platforms that offer dissimilar services in different sectors with quite distinct business and monetisation models. It is an attempt to avoid the "hassle" of having to first define relevant markets, then establish platform dominance in these, and finally demonstrate abuse. Gatekeepers are simply identified in terms of size, which per se is not a sign of dominance. The presumption of tipping markets is analytically flawed; the notion of "winner takes all" is empirically wrong (see below). Similarly, Articles 5 and 6 are but a muddled listing of restrictions derived from past or ongoing investigations of specific business practices, which, quoted "out of context", are established as general rules to be indiscriminately applied. The presumption of illegal conduct is irrebuttable, although procompetitive effects of some of the admonished behaviours are well established (Boscheck, 2000). Finally, the potentially negative economic impact of the EU regulatory reform is projected to amount to billions of dollars – mainly due to new compliance and operational costs for digital service suppliers, their business and individual customers as well as a lack of product and service innovation (Suominen, 2022). As an offshoot, Europe is apt to see a compounding of its inflationary pressures and increasing technological divide separating it from the rest of the world.

Towards "a dynamic and workable effects-based approach to abuse of dominance"?[5]

The Commission's background paper on its Amendments to the 2008 Guidance on Enforcement Priorities, published on 27 March 2023, provides some clues to answer this question. It starts off by describing the original Guidance as vital in

> moving away from a formalistic approach to enforcing Article 102 TFEU, where cases were prioritized based on per se criteria, to an effects-based approach where priorities are set taking into account the potential effects of the given conduct, through the analysis of market dynamics, in line with mainstream economic thinking (McCallum et al., 2023, 2).[6]

But soon thereafter, the paper calls for change.

Reflecting upon a large number of decisions made by Union Courts[7] and the Commission since 2008, and in light of the growing importance of digital markets with supposedly "winner takes all" characteristics, the Commission feels compelled to ensure an effective and fast enforcement of competition principles "before tipping occurs and entrenched market positions are created" (McCallum et al., 2023, 2). It hence endeavours to replace existing guidelines and avoid that "an overly

4 See Digital Markets Act, recitals 10 and 11.

5 McCallum et al. (2023).

6 The lead author of the paper, Linsey McCallum, is Deputy Director-General for Antitrust in the EU Directorate-General for Competition.

7 The Court of Justice and the General Court.

rigid implementation of the effects-based approach (…) set the bar for intervention at a level that would render enforcement against practices that restrict competition unduly burdensome or even impossible" (McCallum et al., 2023, 4). The Commission's finding, presented in this policy brief, however, is rather worrying: evidentiary standards are diluted, conduct is considered objectionable if probable rather than profitable; the impact on competition is extended from "as efficient" to "not yet as efficient" competitors.

The Commission's interpretations of Union Court decisions in TeliaSonera, Google Shopping or Post Danmark II and others suggest that to find abuse, a dominant company's conduct must merely have the potential to have an anticompetitive effect.[8] The profitability or outcome of an alleged behaviour is also deemed irrelevant. Instead, what is to be considered is when "the dominant undertaking adversely impacts an effective competitive structure" (McCallum et al., 2023, 5). But it is not clear what may constitute such a structure. In judging pricing abuses, the Commission wants "to avoid an unduly strict and dogmatic application" of the "as efficient" competitor standard and broaden it to capture "not-(yet)-as efficient" competitors "to allow them to gain a foothold in the market, with the prospect of scaling up volumes and potentially increasing at a later stage" (McCallum et al., 2023, 5). As this conflicts with the insistence of Union Courts that "EU competition policy should not ensure that competitors less efficient than the undertaking with the dominant position should remain on the market" (McCallum et al., 2023, 5), the Commission had to find a solution. It discovered it in Unilever, Post Danmark II and Google Android, where the Courts considered efficient competitor tests (AECs) as "optional", "one tool amongst others" or "only one of several factors".[9] Still, "the fact that a dominant undertaking's pricing conduct 'passes' an AEC test should not be considered as a conclusive indication that such pricing conduct is not capable of negatively affecting competition" (McCallum et al., 2023, 7). As a result, companies are left without any guidance. Finally, in assessing constructive refusals, supply conditions and alleged situations of margin squeeze, the Commission considers the case law of the Union Courts to show that the indispensability of the product or service in question, part of the so-called Bronner criteria,[10] does not need to apply.

Clearly, the Commission's U-turn results in anything but "a dynamic and workable effects-based approach to abuse of dominance."[11] Substituting presumptions for establishing effects, it boosts the Commission's discretion and enforcement agenda at the cost of regulatory certainty and adequacy. The competition policy brief clarifies the reasoning behind the DMA and its censure of economic analysis.

On digital platforms, abuse of dominance and remedies

Digital platforms are markets in which the market-maker connects a variety of groups of users, offers additional products or services or tracks and commercialises user information. The attractiveness of these markets reflects the quality of both offers and users and the network benefits that affect each. Strong network effects, economies of scale and complementarities on the demand-side and supply-side may skew inter-platform competition to the benefit of a major platform (for an early discussion of this, see Katz and Shapiro, 1994). The risk of such "tipping" is mitigated by users utilising several competing platform services in parallel (so-called multi-homing), segmentation opportunities on each side of the market, negative network effects as well as technological disruptions. Conversely, strong positive network effects, proprietary user insights or valuable bundles of services may not only put followers and smaller players at a competitive disadvantage, but also enable the leading platform to abuse its dominant position. To avoid any presumption, however, relevant markets must be defined, and dominance and abuse established.

Markets typically consist of substitutes of different degrees. Facebook and Google compete in digital advertising, which as a category competes with print media and billboards. Match Group, the dominant aggregator of dating sites competes with a huge competitive fringe catering to the special dating interests of the LGBTQ community (Grindr), older individuals (Our Time), Jews (J-Date) or fans of spicy food (Hotsaucepassions) (Hovenkamp, 2021, 1999). Operating a so-called cluster market, Amazon uses its platform to offer non-competing goods or services, some of which one also finds in Walmart as well as at speciality stores. As platforms are unlikely to eliminate diverse businesses as long as user preferences value product differentiation, winner-take-all outcomes are improbable. Unfortunately, courts and regulatory authorities on both sides of the Atlantic still do not understand this. In Ohio v. American Express Co., the Supreme Court "lumped production complements into the same market, and in the process, it stymied coherent economic analysis of the problem" (Hovenkamp, 2019, 47). The EU's DMA singles out gatekeepers irrespective of their market contexts and bars any economic assessment.

Still, scale and network effects, lack of product differentiation, or switching costs resulting from a lack of interoperability or the superiority of an incumbent's product offerings may ren-

8 Case C-52/09 – TeliaSonera; Case T-612/17, Google Shopping; Case C-23/14 – Post Danmark II.

9 Case C-680/20 – Unilever, paragraph 62; Case C-23/14 – Post Danmark II, paragraph 61; Case T-604/18 – Google Android, paragraph 643.

10 Judgment of 26 November 1998, Oscar Bronner v. Mediaprint, Case C-7/97, EU:C:1998:569, paragraph 41.

11 McCallum et al. (2023).

der that platform dominant, possibly even naturally monopolistic. Here, the best regulatory response would be a fact-based assessment of alleged anticompetitive conduct, such as the recent complaints against Facebook, Google and Apple related to exclusivity, tying, self-preferencing and default practices under the US Sherman Act (see Scott Morton and Dinielli, 2020) or the EU competition standards (prior to the EU's reinterpretation discussed above). But it is important to consider the impact of diverse treatments of presumably foreclosing assets – so-called essential facilities – on the incentives to create, sustain and develop platform businesses.

The US Supreme Court for long has avoided essential facility reasoning, simply because the underlying doctrine raises more questions than it is able to answer. Areeda (1990, 841), for one, could not "find any case that provides a consistent rationale for (…) requiring the creator of an asset to share it with a rival". For Hovenkamp (2021), "it is a detrimental doctrine that should be dismantled". Marquardt and Leddy (2003, 848) quote US Antitrust Guidelines related to licensing, which expressly states that "(a)s with any other tangible or intangible asset that enables its owner to obtain significant supra-competitive profits, market power (or even monopoly) that is solely 'a consequence of a superior product, business acumen or historic accident' does not violate the antitrust law." In addition, Marquardt and Leddy (2003) point out that any ill-defined concern for a proper business justification opens a futile debate about what constitutes legitimate strategic intent. A refusal to deal is by definition exclusionary and inspired by the desire to impose a relative disadvantage on a rival; in fact, even "(t)he desire to crush a competitor, standing alone, is insufficient to make out a violation of the antitrust laws" (Ocean State Physicians Health plan, Inc. v. Blue Cross & Blue Shield, 1989).

By comparison, the EU asserts as a general principle an "objectively unjustifiable" refusal to supply by an undertaking holding a dominant position on a market breaches EU competition rules. Unlike in the US, there is no doubt in the EU that a refusal to license may raise antitrust liability, and the doctrine of essential facility may be applied to intellectual property rights (see Peeperkorn, 2003; Elhauge, 2003). The EU suggested an "as efficient competitor" test – asking whether a dominant firm itself would survive its own exclusionary conduct.[12] As discussed above, the Commission now extends the impact test to "not yet efficient competitors." This not only invalidates any attempt to gain a first-mover advantage or win a technology or standard-setting race, but it misconstrues competition to mean cooperation to help the runner-up.

Finally, the DMA foresees that systematic infringements will trigger structural remedies, i.e. the divestiture of (parts of) a business. But the social costs of such an imposition can be high. Platforms may lose economies of scale and scope; consumer choice and network benefits may be eliminated without even reducing market power in a particular product or service (see Hovenkamp, 2021, 2017-2019). For instance, obliging Amazon to spin off its ebook business may merely shift the company's market power to the acquirer but cause consumers to incur higher search costs. Conversely, curtailing a platform's business development for fear of leverage may foreclose opportunities for creating synergistic efficiencies and network effects. Following that logic, Amazon could be denied participation in streaming services, and Microsoft may be barred from expanding into computer hardware. Unfortunately, recently proposed alternatives to divestitures do not provide a convincing solution either (Hovenkamp, 2021, 2020-2032). Spreading out platform ownership among its main users, effectively creating a common, will replace suspected unilateral decision-making with more cumbersome multilateral dealings among the platform owners. Never mind the costs and time spent on coordinating cooperative outcomes under these conditions, would success not mean replacing a monopolist with an effective cartel? Similarly, mandating interoperability or pooling vital information among multiple firms constituting a platform is likely to discourage the creation of platforms *ex ante* and result in anticompetitive conduct in dealing with haggling and hold-up problems *ex post*. So, what is one to do?

Avoiding relapse: Towards an efficient rule for dealing with digital platforms

An efficient administration of competition rules must minimise the sum of two types of interrelated costs: enforcement costs incurred in assessing a case including the uncertainty and time involved and its effect on behaviour, and the costs of permitting (prohibiting) efficiency reducing (increasing) clauses. Enforcement costs vary depending on the quality of the enforcement processes; the costs of wrong decisions differ in line with the value of foregone alternatives and the extent of welfare distortion until removed. Clearly, one would expect that the closer a rule approximates the specifics of a case at hand, the higher the enforcement costs, and the lower the costs of a wrong decision. Conversely, simplifying rules by aggregating business relationships based on some shared characteristics is efficient to the extent that reductions in enforcement cost more than compensation for the likely increases in the costs of wrong decisions.

12 In 2004, EU fined Microsoft €497 million for abusing its dominant position and refusing to supply information required to ensure the interoperability between its Windows and competing operating systems and for bundling its Media Player with the Windows software. The company was ordered to offer an unbundled version of Windows to PC makers. According to the ECJ's judgment on IMS Healthcare, a firm can be ordered to license its IP if the IP is indispensable for carrying on a particular business, where competitors do not merely duplicate existing products and where market demand is sufficient.

Dealing with digital platforms, the fact that both types of costs are potentially very high invalidates any per se ruling as proposed by the DMA. By the same token, a rule of reason must be excluded. As an alternative, Condorelli and Padilla (2020) propose considering conduct where enforcement would clearly result in net welfare losses or net welfare gains as legal or illegal per se respectively. Conduct with a high likelihood of a net welfare loss should be considered illegal, but the dominant firm should be given an opportunity to demonstrate efficiency effects. In the reverse case, the conduct should be considered pro-competitive, but regulators could prove there are detrimental effects (Condorelli and Padilla, 2020). While it seems that their recommendation returns to the principles spearheaded by the EU's Competition Policy Reform of 1999, it does not establish a clear black list of per se unacceptable conduct nor does it provide a market share limit to assess and contain the potential welfare impact of that conduct and determine the responsibility for challenging that finding. It offers an approach to thinking about the problem but no blueprint for advancing a regulation that would be able to combine the benefits of economic evaluation with concerns for legal certainty and enforcement efficiency. Again, the original Commission Regulation (EC) No 2790/1999 of December 1999 on vertical restraints offers some pointers worth reconsidering.

The Regulation responded to the lack of substantive policy guidance, symptomatic for the prior legal treatment of vertical restraints in both the US and the EU, by changing procedural rules to delegate the assessment task and the choice of tools to contractors themselves. The Commission merely defined a "clear" standard to screen cases for likely negative impact and offered a framework that firms were able to take as guidance in reviewing their arrangements and building an efficiency defence. The new regulation offered authorities and companies a truncated rule of reason that helped to limit the cost of wrong decisions and improved the efficiency of enforcement. On a broader level, the regulation pioneered the restructuring of EU competition control along three vital building blocks: clear, or better recognisable and cogent, legal standards; a strengthened system of *ex post* control; and corporate self-assessment. The DMA is lacking all three.

Summary and conclusions

Starting 7 March 2024, the EU Commission began enforcing its controversial Digital Markets Act. This article sheds light on the recent debate. It lists the dos and don'ts of the DMA as well as stakeholder reactions to them before tracing some of the underlying motivations and reasoning that emerge from the EU's current policy reversal with reference to dealing with abuse of dominant positions in line with Article 102 TFEU. Following this, the paper reviews economic aspects of digital platforms, concerns about market foreclosure and essential facility as well as appropriate remedies before closing with a discussion of the challenges in stipulating and enforcing efficient rules to govern digital platforms. It is argued that the DMA ought to be rewritten to stipulate clear and cogent legal standards, return to a strengthened system of *ex post* control and provide platforms with the opportunity to deliver efficiency defences as part of corporate self-regulation.

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BRICS: World Heavyweight in Agricultural Trade

BRICS, the 15-year-old alliance of Brazil, Russia, India, China and South Africa, has emerged as an important actor on the global political and economic stage, not least by expanding its membership to include middle-power states Egypt, Ethiopia, Iran, Saudi Arabia and the United Arab Emirates in early 2024. Much like the countries of the G7 and the EU, BRICS members are among the major players in international agri-food markets. BRICS and the G7 have accounted for around one-seventh of each other's agricultural exports in the past decade. However, excessive protectionism and mounting sanctions as well as ideology-driven de-risking strategies are a high-risk venture that could ultimately lead to isolationism and the formation of blocs. Food insecurity is growing, primarily at the expense of poorer people in the Global South. Against this background, it seems advisable to balance geopolitical and geoeconomic interests by turning away from confrontational Stone Age politics and towards more cooperative approaches, such as more diplomacy.

BRICS has long been overlooked.[1] However, at least since its most recent annual summit in August 2023, the almost 15-year-old alliance made up of Brazil, Russia, India, China and South Africa has begun to attract growing media attention. This has largely been focused on the development of the group, and its political and economic significance in the global arena. From January 2024, the BRICS alliance expanded its membership to include middle-power states Argentina,[2] Egypt, Ethiopia, Iran, Saudi Arabia and the United Arab Emirates to create BRICS+ (see Figure 1).[3] Given the significance of some of its new members as major resource powers and energy exporters, BRICS could once again consolidate its status as the voice of the Global South and expand its geopolitical role and international economic influence (e.g. Maihold and Müller, 2023). Much like the countries of the G7, BRICS members are among the major players in international agri-food markets, especially when it comes to exports of staple foods such as wheat and rice to food insecure countries in the Global South.

The five countries that make up the original BRICS partnership account for around 40% of the world's population (3.3 billion people). Together, they generated close to 32% of global economic output in 2022, measured in gross domestic product (GDP) based on purchasing power parity. China generated by far the largest share, accounting for 70% of BRICS GDP (IMF, 2023). The newly expanded BRICS+ is home to almost half of the world's population (46%) and generates 36% of global GDP.

In comparison, the G7 group of industrialised nations made up of Canada, France, Germany, Italy, Japan, the United Kingdom and the United States is home to around 10% of the world's population and accounts for close to 30% of global GDP. Around half of this is generated by the United States. If the European Union, which holds observer status in the G7, were added to the mix, the alliance would account for close to 13% of the world's population and around 38% of global economic output.

Further, the United Nations Human Development Index (UNDP, 2023) takes into account per capita income as well as education standards and life expectancy. According to this measurement, in 2021, all G7 countries were ranked very high, the highest of four categories. In contrast, of the five original BRICS members, only Russia was rated very high, while China, Brazil and South Africa

1 As of 8 March 2024. This article was written as part of the BMBF project O1DO21009 and the DFG project 51485816. We thank Hayley Moore for her excellent editing of the text.

2 Argentina's newly elected president, Javier Milei, withdrew his country from its planned entry into BRICS and is instead planning to pursue bilateral ties with member states. Argentina is therefore included (hypothetically) in the following quantitative analyses, which are predominantly based on the period 2001–2021.

3 A further 16 countries applied to join: Algeria, Bahrain, Bangladesh, Belarus, Bolivia, Cuba, Honduras, Indonesia, Kazakhstan, Kuwait, Nigeria, Palestine, Senegal, Thailand, Venezuela and Vietnam.

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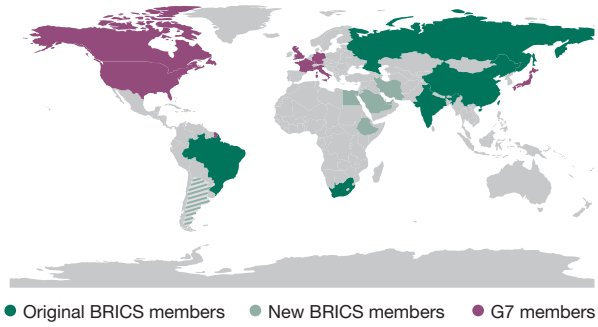
Figure 1
BRICS+ members and G7 members



Note: Argentina's president, Javier Milei, withdrew the country from its planned entry into BRICS and is instead planning to pursue bilateral ties with member states.

Source: Authors' illustration.

were rated high and India was rated medium. Finally, at the beginning of the current decade, both BRICS and the G7 each accounted for around a quarter of global goods exports, with China accounting for around 15% and the USA around 10% of global export volumes. Close to 30% of BRICS exports went to G7 countries and, conversely, around 15% of G7 exports went to BRICS countries.

BRICS: Neither paper tiger nor jack of all trades

Due to the growing importance of the (expanded) BRICS alliance as well as rivalries between major powers, a shift towards protectionism and a surge in armed conflicts around the world, transnational groupings like BRICS are expected to gain greater geopolitical and geoeconomic influence (Maihold et al., 2024).

Media reporting often characterises BRICS as an endeavour to create a new world order – of whatever kind – and to push back against Western alliances such as the G7. However, given there is no clear reason for this or means of achieving it, as is often pointed out, such a motive seems more superficial and far-fetched than probable.

Experts are less likely to view BRICS as a single-minded group working to revolutionise the world. Rather, they see in BRICS members a desire to achieve better representation of their individual interests and a greater status on the international stage (Katz, 2024; Nam, 2024; Maihold, 2024). The middle powers of the alliance, such as Brazil, Egypt, Saudi Arabia and South Africa, want strategic sovereignty, greater economic independence and political neutrality with regard to major power blocs.

Similar assessments can be made for many other emerging economies (see Lippert and Mair, 2024), which generally believe that a multipolar order and multilateral (economic) relations will offer them greater opportunities for strategic independence. Forming single alliances could stand in the way of their own economic development and threaten international order and their own national security interests.

This is evident in the desires of emerging economies to advance their economic partnerships in market-oriented and flexible ways, to contain security threats and to manage dependencies. Values-based partnerships or shared ideologies are in no way a prerequisite for cooperation. The fact that BRICS+ members also belong to or have applied to join other global alliances, such as the OECD, G20, G77, SCO and the Quad,[4] further highlights their commitment to international cooperation.

Nevertheless, BRICS+ members share common concerns and institutions. In addition to agreeing on foreign policy and security issues, these include reducing the dominance of the US dollar in international trade and reforming the global financial system, including the Bretton Woods Institutions. This is also linked to the establishment of the New Development Bank (NDB) to promote development projects and the Contingent Reserve Arrangement (CRA) to provide payment support.

The BRICS members' strong economic and trade interests and their desire for inclusive multilateralism are also reflected in the annual BRICS summit declarations (BRICS, 2023). The summits in India in 2021 and China (virtually) in 2022, for example, emphasised the importance of (unhindered) international agricultural trade and trade dialogues for global food security. The most recent summit in South Africa also highlighted the expansion of partnerships for sustainable development between BRICS and Africa.

Competitive agricultural trade has made a significant contribution to reducing hunger and food insecurity in recent decades. It has also shown itself to be robust and adaptable in the face of geopolitical and market-related challenges (Glauben and Svanidze, 2023). For example, the past decade has seen remarkable growth in global agricultural trade. Global exports rose by around a third (in nominal terms) in 2021, from around US $1.5 trillion to almost US $2 trillion (UN Comtrade, 2023). The countries of BRICS, the G7 and the EU contribute significantly to international food trade and thus to overcoming global food security challenges.

4 OECD: Organisation for Economic Co-operation and Development; G20: Group of 20 (19 industrialised and developing nations plus the EU); G77: Group of 77 (coalition of 77 countries from the Global South); SCO: Shanghai Cooperation Organisation (coalition of nine Asian countries including Russia); the Quad: Quadrilateral Security Dialogue (organisation for security dialogue in the Indo-Pacific region).

BRICS and G7 together account for almost half of global agricultural exports

Figure 2a shows that almost half of global agricultural exports in 2021 came from the G7 and BRICS. France, Germany and Italy accounted for 13% of global agricultural exports, and the USA accounted for 9%. Together the four countries made up around 80% of G7 agricultural exports (Figure 2b), but the EU remained the most significant exporter of agricultural goods.

Since the beginning of the last decade, the original BRICS members' share in global agricultural exports has increased slightly, by around 1%. If the new 2024 members were included, the BRICS+ countries would have (hypothetically) accounted for 20% of global agricultural exports in 2021 (original members 16% and new members 4%). In contrast, the share of agricultural exports from the G7 fell slightly, from 30% in 2011 to 28% in 2021. Since 2011 both the EU and the USA have lost around 4% and 0.5% of their export shares respectively.

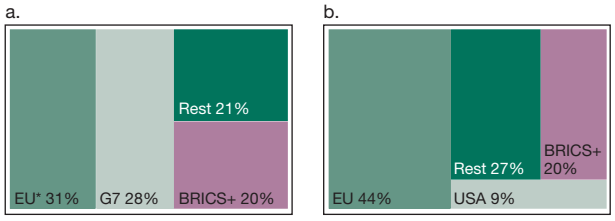
These slight changes – without seeking to overinterpret or overexplain them – could also be due to improvements in the conditions for trade, including agricultural trade. The OECD's Services Trade Restrictiveness Index (STRI) (OECD, 2023), for example, shows that, over the past 10 years, the BRICS countries have made marked improvements in the areas of air transport, road freight transport and maritime transport and are now roughly on par with the G7, the EU and the USA. This is most evident for China and Brazil. Nevertheless, BRICS members are still behind when it comes to, in particular, logistics customs brokerage and rail freight transport. A similar situation can be observed using the Digital STRI (OECD Stat, 2023), which identifies regulatory bottlenecks in digital trade processes. This applies in particular to the quality of digital infrastructure, which, despite noticeable improvements in recent years, is significantly lower on average in BRICS countries than in the USA, the G7 or the EU. However, BRICS performs very well in terms of the quality and use of electronic transactions and digital payment systems.

BRICS and G7 account for around a seventh of each other's agricultural exports

While some may see BRICS and the G7 as two (politically and economically) distinct and adversarial blocs, their relationship on global agri-food markets paints a different picture.

BRICS and the G7 maintain lively agricultural trade relations with one another. In 2021, around 12% (US $66 billion) of total G7 agricultural exports went to BRICS countries. The largest export shares were held by the USA at 57%, Canada at 13% and France 10%. The main products were oilseeds, grain and meat.

Figure 2
Share of global agricultural trade by country group (2021, value share of world trade)



Note: BRICS+ (original members 16% and new members 4%). EU* (excluding G7 members France, Germany and Italy).

Source: UN Comtrade (2023).

Conversely, in 2021 close to 17% (US $52 billion) of total agricultural exports from BRICS went to the G7. China and Brazil dominated, together accounting for around three-quarters (48% and 25% respectively) of BRICS agricultural exports to the G7. China mainly exported meat and fish, and Japan (42%) and the USA (31%) were the most important destinations in the G7 group. In Brazil, coffee, tea and spices were the main exports to the G7. The most important trading partners were the USA, which accounted for 36% of Brazil's total exports to the G7, followed by Japan at 18% and Germany at 15%. It is worth noting that 81% of Brazil's grain exports to the G7 in 2021 went to Japan and 99% of Brazil's exported live animals went to the USA.

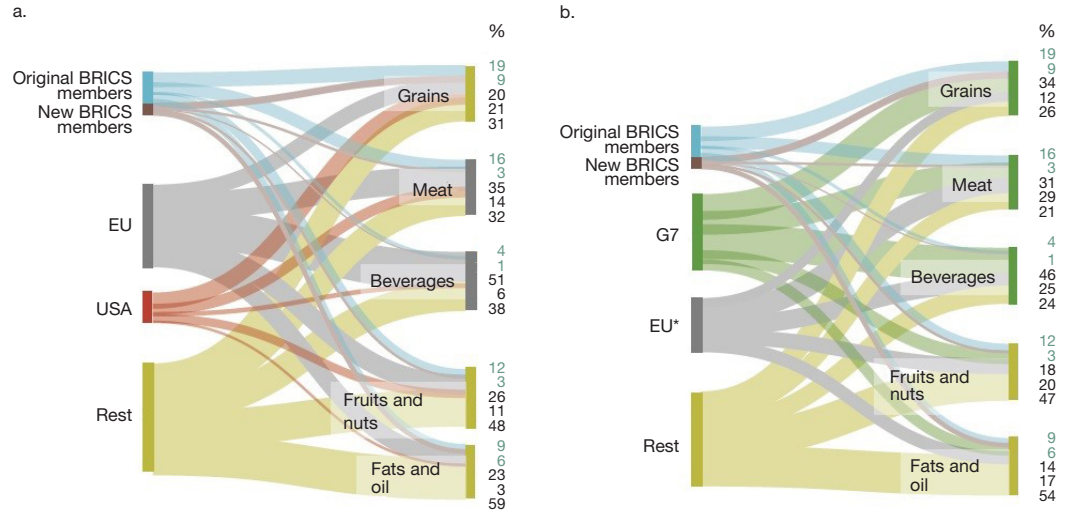
A similar picture emerges for agricultural trade between BRICS and the EU. In 2022, the EU exported 12% of its agricultural products to BRICS countries and sourced around 22% of its agricultural imports from BRICS (European Commission, 2023).

BRICS: Key player in multibillion-dollar agricultural markets

The important role that BRICS plays in agricultural trade extends beyond its relations with the G7. Indeed, BRICS accounts for a significant share of exports of the top five agricultural and food commodities based on trade value. With a total export value of around US $730 billion in 2021 (based on UN Comtrade 2-digit nomenclature), the top five commodities are grain (US $151 billion), meat (US $153 billion), beverages (US $139 billion), fruits and nuts (US $139 billion) and fats and oils (US $145 billion), which account for around 40% of global agricultural export values. This does not include soybeans, which also has a significant trade value of around US $80 billion (see below).

In particular, BRICS is a key player in grain markets, accounting for around one-fifth (19%) of global exports in 2021. This position is comparable to that of the USA

Figure 3
Top five world agricultural export markets (2021, value share of world trade)



Note: EU* (excluding G7 members France, Germany and Italy).

Source: Authors' own illustration, UN Comtrade 2023.

(20%) and the EU (21%, Figure 3b). If the new BRICS members were also taken into account, the share would be 28% and would be roughly on par with the G7 (34%, Figure 3a). BRICS also holds a considerable share in terms of export value in the markets for meat, fruits and nuts, and fats and oils at 16%, 12% and 9% respectively; with the exception of fats and oils, this is roughly on par with the USA (14%, 11% and 3%) but noticeably lower than the EU (35%, 26% and 23%). If the export shares of the new BRICS members were added, the relative export values for fruits and nuts, and fats and oils (15% and 15%) would be very similar to those of the G7 (18% and 14%). For meat, however, the G7 (31%) ranks around ten percentage points higher than BRICS+ (19%). This is largely due to the high export market share of the G7 members in the EU (Germany, France and Italy).

The top five agricultural export markets for BRICS/BRICS+ are oilseeds, cotton and fish as well as grain and meat mentioned above. For these products, BRICS export shares range between around one-fifth and two-fifths (Figure 4). In terms of oilseeds and cotton, in particular, BRICS held a dominant position in 2021, accounting for around 40% and 45% of exports. The export shares for oilseeds roughly correspond to those of the G7 (37%). For cotton, they are noticeably higher (46%), and for fish, at around 20%, they are roughly at the level of the G7 (15%) and the EU (18%). Brazil was by far the largest BRICS exporter of oilseeds in 2021, with a share of 85% (US $39 billion). Almost two-thirds (63%) of this was traded within BRICS. At the same time, Brazil accounted for a large proportion (68%) of imports to other regions of the world.

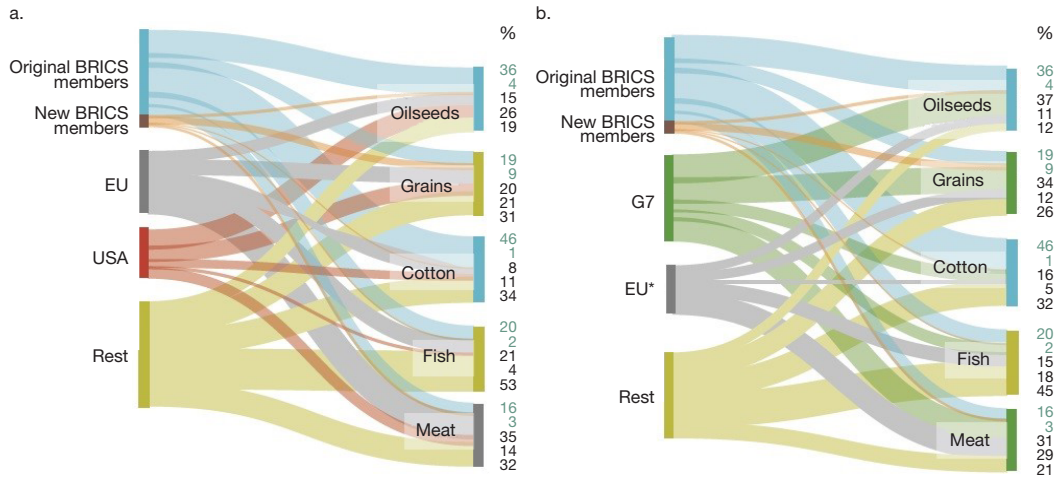
Despite the importance of BRICS in the multibillion-dollar agricultural markets, the individual member countries have quite diverse agricultural export portfolios. According to the Herfindahl-Hirschmann Index (HHI),[5] both the export product portfolios and the export market portfolios for 2021 were rather unconcentrated and largely diversified. Only very slight changes in the indices can be seen compared to 2011. In terms of product concentration, the indices fluctuate around the threshold value of 15, between low and moderately concentrated. In terms of export market concentration, all five countries are well below the threshold value and have very low concentration. The latter is also reflected in the number of BRICS trading partners across all exported products, which is around 200 for each of the BRICS members.

Soybeans, rice, wheat and corn are the top agricultural exports from BRICS

Almost nine-tenths (86%) of total BRICS oilseed exports are soybeans (Figure 5a), which primarily come from Brazil. In 2021, global soybean trade amounted to almost US $80 billion. Soybeans are primarily used as animal feed in livestock production, and only a small amount is used directly for human consumption, for example as soybean oil. China is by far the largest importer of soybeans (accounting for around 60%) and Brazil's main competitor is by far the USA. Brazil and the USA alone satisfied 85% of global import demand in 2021, with Brazil (50%) replacing the USA (35%) as the main supplier over the past decade.

5 The authors can provide the HHI calculations upon request.

Figure 4
Top five BRICS agricultural export markets (2021, value share of world trade)



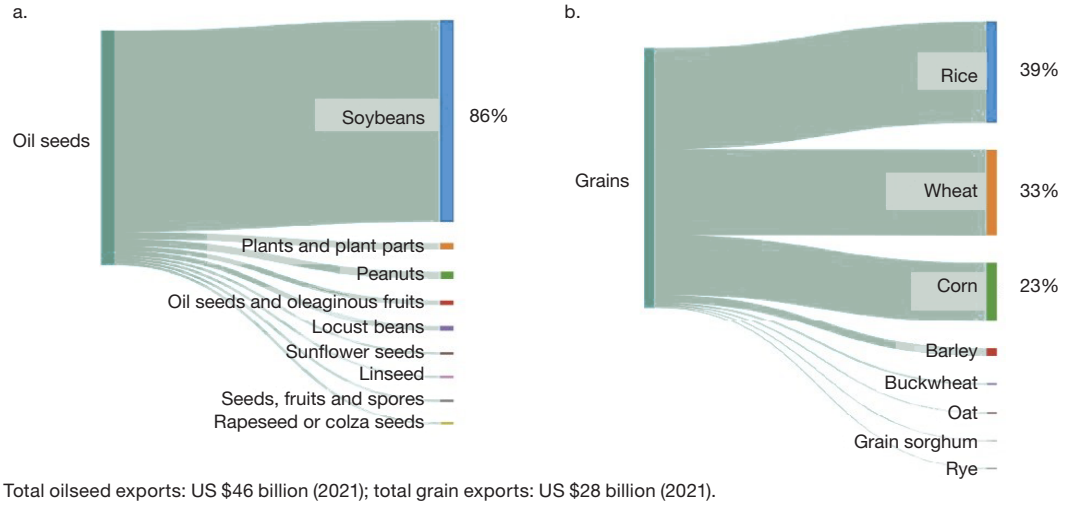
Note: EU* (excluding G7 members France, Germany and Italy). Total global exports in 2021 of the top five BRICS/BRICS+ agricultural exports amount to USD 620 billion (oilseeds: USD 128 billion; grain: USD 151 billion; cotton: USD 61 billion; fish: USD 128 billion; meat: USD 153 billion).

Source: Authors' own illustration, UN Comtrade (2023).

Towards the end of the last decade in particular (July 2018 to January 2020), the global soybean market experienced turbulence as a result of significant retaliatory and punitive tariffs between the US and China due to the escalating trade conflict. This came to an end at the beginning of 2020 with the Phase One agreement, under which China committed to importing US $200 billion worth of US goods (Grant et al., 2021). In addition to short-term price distortions on the soybean market (Gale et al., 2019), the trade dispute also caused temporary policy-related changes in trade flows.

In 2017, Brazil's soybean exports to China amounted to US $20 billion, just under twice the value of the USA's exports (US $12 billion). After the conflict began in 2018, the trade situation changed significantly, and Brazil's soybean exports to China increased to almost nine times the value of the USA's exports (US $26 billion compared to US $3 billion). At the same time, the US increased its soybean exports to other regions of the world by around 50%, from US $10 billion to US $15 billion, and reduced its crop area by around six million hectares. After trade tensions began to

Figure 5
Top BRICS oilseed and grain export products (2021, value share of world trade)



Note: Total oilseed exports: US $46 billion (2021); total grain exports: US $28 billion (2021).

Source: Authors' own illustration; UN Comtrade (2023).

ease, imports from the USA to China increased significantly in 2021 to around US $14 billion and a share of close to 30%. Nevertheless, in 2021 Brazil was able to secure 60% of the Chinese market (US $28 billion), gaining a higher share than before the conflict. The market – which has the structure of a bilateral oligopoly with two major suppliers, Brazil and the USA, and a dominant buyer, China – has evidently adapted well, and there have been no noticeable gaps in supply.

There is likewise an observable "specialisation" when it comes to grain exports from BRICS, with rice accounting for 39%, wheat 33% and corn 23% of the total grain export value (Figure 5b). Rice and wheat are the main staple foods, especially in countries of the Global South. The unhindered trade of these commodities is therefore key to reducing the risk of food insecurity. India supplied by far the most rice to international markets in 2021, with a global market share of 35%, ahead of Thailand (12%) and Vietnam (10%). Major destinations were China, the Philippines and Bangladesh in Asia as well as various West African countries and South Africa. Russia recorded the most wheat exports at around 15%, followed by the USA (13%), Australia (12%), Canada (11%) and Ukraine (10%). According to a recent econometric study (Jaghdani et al., 2023), these exporting countries showed fairly stable supply relationships on global markets between 2011 and 2021. The main importing countries were Egypt, Nigeria and Algeria in Africa, Indonesia, China and Turkey in Asia and Brazil in Latin America. In addition to being used in human food and animal feed, corn also serves as a raw material for biogas and biofuels. In 2021, Brazil accounted for close to one-tenth of corn exports and was the fourth largest exporter of corn after the USA (36%), Argentina (17%) and Ukraine (11%). China, Mexico, Japan and South Korea are among the main destinations (OEC Trade, 2024).

Mission creep: Are we stumbling in a geopolitics-driven "world planned economy"?

The era of geopolitical calm seems to have well and truly given way to the storm, affecting the global economy and international economic relations, including agricultural trade. The members of BRICS, the G7 and the EU are not immune to this, and any impact on trade relations between and among these countries poses a considerable (additional) risk to food security in the Global South, where hundreds of millions of people already suffer from hunger and malnutrition. The situation is particularly dire in countries affected by armed conflict and frequent extreme weather events (Glauben and Svanidze, 2023).

Geopolitical posturing, hot and cold conflicts, and wars threaten to divide the world into blocs and artificially fragment global trade. Rampant protectionism, escalating sanctions regimes and state dirigisme, driven by competition between major powers, an overemphasis on shared political values and, increasingly, market interventions supposedly motivated by national security, threaten the international trading system. This is exacerbated by the ongoing crisis in the World Trade Organization (WTO) caused by the US blockade of the WTO's Appellate Body (dispute settlement body).

According to Global Trade Alert (2023), the number of direct state interventions in foreign trade activities, such as import or export restrictions, has risen to around 20,000 in recent years. In 2020 and 2021, the number of new protectionist interventions in foreign trade peaked at several thousands. Key agricultural commodities were also affected.

The growing number of sanctions restricting market access for foreign importers or goods is leading to rising inflation and concern. The Global Sanctions Database (GSDB) has recorded around 400 active sanctions regimes since the beginning of the 2020s. This is almost three times as many as in the 1990s and 2000s and around twice as many as in the 2010s. Since the early/mid-1990s, almost 40% of sanctions have been implemented by the USA, 20% by the EU and 10% by the UN. This directly or indirectly affects agriculture worldwide. According to a recent study (Yalçin, 2023), around 80% of the sectors observed experienced negative effects on trade due to sanctions, with agriculture being one of the most affected sectors.

These sanctions are motivated not by trade policy but by geopolitics. For example, they aim to achieve political change, to destabilise regimes, to promote democracy or to prevent or resolve territorial conflicts or wars. This is sometimes justified by the need to reduce the externalities of trade activities related to power relations and national security, as trading companies do not (sufficiently) internalise these (Felbermayer, 2023).

The growing tendency towards state intervention has recently been supplemented by politically driven demands for companies conducting business abroad to orient their trade activities towards something like de-risking. They are increasingly encouraged to engage in friendshoring and nearshoring or to trade with partners that share similar political and ideological values. At the same time, they are asked to achieve greater regional diversification while also increasing national self-sufficiency in goods and services. All of this is expected to reduce dependencies and national supply risks.

What can we expect going forward? With the increasing spread of protectionist measures and sanctions regimes as well as ideology-driven de-risking strategies, the market as a proven decentralised system will be severely undermined in its functions such as supply, pricing and innovation. The foreseeable consequence for the agri-food sector is that

goods will become harder to source and more expensive and the safety net of global agricultural trade will be weakened. A large number of studies (e.g. Verma et al., 2014) emphasise the importance of unhindered trade for the short- and long-term supply of food for the world's population, especially given the increased climate and environmental challenges.

It is also doubtful that geopolitically and dirigistically driven world trade is a suitable recipe for promoting ambitious goals such as political change or destabilising regimes or for resolving military conflicts. Studies show that sanctions often fail to achieve their politically motivated objectives (e.g. Pape, 1997) or have, at best, moderate success (e.g. Hufbauer et al., 2007). This may also be the result of market adjustments, for example in the form of trade diversions as a result of sanctions. On the other hand, it could be due to the high bureaucratic cost of implementing and monitoring these sanctions. In addition, sanctions are generally part of broader foreign policy and security measures, and as such it is hard to gauge their true success (Yalçin, 2023).

In summary, excessive protectionism, mounting sanctions and an overemphasis on shared political values is a high-risk venture that could ultimately lead to isolationism and the formation of blocs. Key players on international agricultural markets, such as BRICS+, the G7 and the EU, could be affected by this. Food insecurity is growing, primarily at the expense of poorer people in the Global South. Although makeshift solutions such as green corridors for essential goods or plurilateral arrangements can provide some relief, they cannot replace an open multilateral trade system.

In light of this, it seems advisable to take a more targeted and modern approach to balancing geopolitical and geo-economic interests (Gopinath, 2024), one that steps away from confrontational Stone Age policies and towards more cooperative approaches, such as more diplomacy in the true sense of the word. The investment required to improve the art of diplomacy, whether in terms of personnel or institutions, is likely to be considerable, but it would undoubtedly pay off, not least when it comes to tackling major global challenges such as climate change, poverty and war.

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Housing Markets

sciendo

Intereconomics, 2024, 59(3), 167-175

JEL: R31, E30

Tobias Just and Hannah Salzberger

Structural and Cyclical Risks in Housing Markets in OECD Countries

This paper analyses the housing markets of OECD countries using a scoring model. This model is based on a European Systematic Risk Board approach to risk assessment of housing markets but extends this approach in two important ways. First, this paper distinguishes between cyclical and structural risk factors. Markets facing higher susceptibility to cyclical risks necessitate a distinct policy approach to prevent or handle disruptions, as opposed to markets primarily affected by structural risks. Second, it illustrates that scoring models contain subjective aspects, e.g. in the choice of weighting factors. We develop four distinct models to weigh risk factors. We show that these different weighing schemes have a significant impact on the estimated risk scores. For policy decisions, such models can therefore only be an indication of the vulnerability of housing markets to crises. Therefore, several scenarios and models should be calculated in parallel to reduce subjectivity.

Following a decade-long period of growth, nominal housing prices in OECD countries experienced a downturn in the latter half of 2022 and the first half of 2023. Data reveals a decrease of 9.92% in Germany and 1.66% in the overall euro area, as illustrated in Figure 1. Additionally, other countries, including Canada, the United States, Australia, Japan, the United Kingdom and New Zealand have been observing a decline in their nominal residential property prices (Szemere, 2023).

Given the substantial price increases in almost all OECD countries prior to this recent decline, there is growing concern about a new financial and economic crisis induced by distortions on housing markets. Financial crises often follow downturns in housing markets: the stock market crash in Japan was preceded by a bursting residential real estate bubble (Posen, 2006), the 2007-2008 financial crisis had its origins in excessive credit financing of residential real estate, and the savings and loan crisis (late 1980s and early 1990s) in the US started with the correction of commercial real estate loans that no longer held their value (Wilmarth Jr, 2008). According to Jordà et al. (2016), financial crises following corrections in real estate markets are more severe than financial crises induced by other situations. With this in mind, it is important to understand the risks associated with housing markets for three main reasons. Firstly, real estate accounts for the largest share of the tangible assets in an economy: the gross fixed assets tied up in real estate in Germany, for example, amounted to €22.2 billion in 2022 and thus correspond to about five times the GDP (Destatis, 2023). Secondly, real estate is financed by a high proportion of debt capital, and this tempts private and institutional investors to take greater financing risks (Kindleberger and Aliber, 2005). Thirdly, declining real estate prices negatively affect households' propensity to consume (Yao et al., 2015), companies' propensity to invest (Summers, 2016) and banks' propensity to lend (Dagher and Kazimov, 2015), thereby reinforcing a recessionary tendency.

This article adds to the understanding of real estate risks by differentiating cyclical and structural real estate market risks. We measure these risks employing a scoring model that builds upon similar models by the European Systemic Risk Board (ESRB, 2016) or Just and Ebner (2006). The methodology presented in this paper deepens approaches in two important ways. First, we differentiate between cyclical and structural risk factors. Second, we also develop a set of scenarios and weighting factors within the scoring to reduce the arbitrariness of the approach. The remainder of this article provides a brief literature review on property market risks, followed by an illustration of the methodology and data used, and a discussion of the results.

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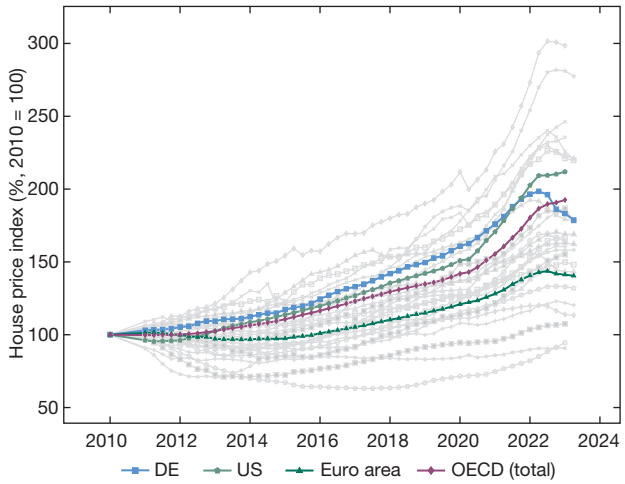
Figure 1
Development of house price indices in different countries (2010-2023)



Notes: AT, BE, BU, CR, CZ, DK, EE, FI, FR, EL, HU, IE, IT, LV, LT, LU, NL, NO, PL, PT, RO, SK, SI, ES, SE, CH and UK are displayed in grey.

Source: OECD (2023d).

Measuring structural and cyclical risk on housing markets

Scholars have conducted extensive research on real estate risks, focusing on issues such as lending and fluctuations in housing prices, and their connections with monetary policies, financial institutions and stock markets. Studies by Kallberg et al. (2014) and Pavlov et al. (2015) highlight the negative impact of misguided financial decisions, while Drouhin et al. (2016) emphasise the consequences of extreme housing price variations. Zhou et al. (2021) delve into the relationship between monetary policies and real estate risks by synthesising the risk indices through advanced big data analysis techniques, while Baulkaran et al. (2019) link them to stock market trends.

These risks have been measured, for example, by combining index systems and statistical tests with techniques like time-varying parameter models and big data analysis (Saiyed et al., 2016). Bourassa et al. (2019) employ indicators and capital asset pricing models, whereas Yang et al. (2018) define systematic risk measurement indicators.

In the European Economic Area, the ESRB analyses residential real estate (RRE) markets, emphasising the economic significance of housing. Employing a methodology based on three risk dimensions (collateral, funding and household stretches), equally weighted key risk indicators (covering house price trends, household indebtedness, income ratios and financial asset-to-debt ratios, among others) are compared against critical thresholds. The assessment categorises vulnerabilities as "low", "medium" or "high", indicating areas necessitating intervention through macroprudential policies or changes in other policy sectors influencing RRE vulnerabilities.

Despite the RRE sector's resilience during the pandemic, uncertainties remain, especially concerning household income and debt as well as the sensitivity of the market to rising interest rates. The ESRB advocates macroprudential policies and broader reforms to address housing supply-demand imbalances besides issuing specific recommendations to countries with insufficient policies (European Systemic Risk Board, 2019). Mareš (2015) delves into the stability of European banking scoring models, drawing comparisons with the challenges faced by American banks during the mortgage crisis. A continuously updated, comprehensive scoring system is advocated after identifying crucial sub-factors such as disposable income and loan history. The Central Bank of Malta (2021) highlights the complex connection between cyclical and structural dimensions. Rising household debt and property prices can amplify existing structural vulnerabilities. If unaddressed, high cyclical risks can disrupt the housing market, impacting loan quality in the banking sector. Similarly, housing supply shortages can exacerbate cyclical risks, leading to increased debt.

This paper extends the ESRB approach by distinguishing between cyclical and structural risk factors, highlighting the subjective nature of scoring models. By exploring multiple scenarios simultaneously, it emphasises the importance of diverse risk assessment models.

Data and methodology

The methodological framework consists of three steps. Step 1 entails the *identification of risk indicators*. Twelve indicators, supported by literature, are selected and categorised into cyclical and structural risks to differentiate vulnerabilities over long- and short-term perspectives. Step 2 involves *scoring*. Country data from 28 OECD countries is assigned scores based on deciles[1] ranging from one (low risk) to ten (high risk) for each variable within the cyclical and structural risk categories, facilitating an overall score for each country. Step 3 focuses on *stress testing and scenario analysis*. Implementing stress testing through simulations for indicators and countries, the evaluation assesses potential adverse event impacts on the residential real estate sector. The resulting variance is used for a weighting procedure based on individual indicators.

1 An underlying cross-sectional normal distribution is assumed.

Table 1
Description of variables in different categories

Category	Abbr.	Variable	Favourability[1]	Main data source
Cyclical domain	ANHPG	Average nominal house price growth (2012-2022)	Low values	OECD (2023e)
	DHPSP	Development of house prices since peak	High values	OECD (2023e)
	GDPG	Forecast for GDP growth (2023-2024) compared to 2015-2022 average	High values	OECD (2023a)
	CBR	Change of bond rates (10y) from trough to today	Low values	Trading Economics (2023)[2]
	CORL	Change in total outstanding residential loans, (2021-2010)	Low values	European Mortgage Federation (2022)
	HDIID	Development in household debt as proportion of net disposable income	Low values	OECD (2023b)[3]
	ACC	Average annual rates of change for total construction calendar adjusted, 2005-2021	High values	Eurostat (2023)
Structural domain	EPCSP	Expected population change from peak to 2030	High values	OECD (2023c), United Nations (2023)
	ASHCII	Average share of housing costs in disposable household income, growth (2010-2022)	Low values	European Union (2023)
	SFVI	Share of gross financing with variable interest rate (up to 1 year) in 2021	Low values	European Mortgage Federation (2022)
	HDII	Household debt as proportion of net disposable income, 2021	Low values	OECD (2023b)[4]
	ORLP	Proportion of outstanding residential loans to GDP	Low values	European Mortgage Federation (2022)

Notes: [1] The column indicates whether low (high) values for a variable are related to low (high) risk for housing markets. [2,3,4] In cases where data is unavailable from one source, additional sources have been considered to ensure the completeness of the data set, which again enhances the overall depth and reliability of the analysis.

Source: Own depiction.

Identification of indicators

During economic upswings, housing demand and prices tend to surge. Conversely, during economic downturns, reduced demand can trigger price corrections and, occasionally, market instability. Moreover, real estate cycles are frequently exacerbated by supply that is often lagging behind demand fluctuations. To evaluate these cyclical risks, the subsequent indicators are incorporated (see Table 1):

Firstly, the average nominal house price growth (2012-2022) is included to reflect price trends in the housing market. Then, the housing price development since peak indicator assesses whether the market has already corrected and whether timely intervention is still feasible (Bengtsson et al., 2020; Borio and Drehmann, 2009). Furthermore, the projected GDP growth (2023-2024) vs. the long-term average (2015-2022) indicates potential economic downsides, reflecting the risk of economic downturns for real estate prices (Ciocchetta et al., 2016).

The change in the 10-year bond rates indicator explores the implied interest rate pressure on real estate financing markets, considering costs for investors and relative attractiveness compared to fixed-income alternatives. The change in the total outstanding residential loans (2021-2010) indicator offers insights into the extent of residential borrowing. During economic upswings, borrowing tends to increase, impacting market dynamics. Adding the development of household debt as a percentage of net disposable income enriches the analysis by considering adverse events like income shocks and rising interest rates, particularly in over-indebted private sectors (Drehmann and Juselius, 2012). The last cyclical indicator, the average annual rate of change for total construction, measures the supply-side risk (Ciocchetta et al., 2016).

In the second domain, structural risk factors include: expected population change from peak to 2030, average share of housing costs in disposable household income (growth 2010-2022), proportion of outstanding residential loans to GDP,[2] share of gross financing with variable interest rate (up to one year) in 2021 and household debt as a proportion of net disposable income (2021). These indicators provide insights into potential long-term downward pressures and structural vulnerabilities related to population changes, housing affordability, banking system stability, interest rate fluctuations and household finances

2 This can be seen as potential indicator of banks' Common Equity Tier 1 capital.

(Bengtsson et al., 2020; Drehmann and Juselius, 2012; European Systemic Risk Board, 2016).

Ranking of unweighted scores

Our developed scoring tool, a modification of the ESRB (2019) model, is based on the following steps. First, we arrange the values for each variable in ascending order. Table 1 (column 4) shows which indicators are positively (negatively) correlated with the risk on housing markets.

Subsequently, deciles spanning from 10% to 100% of the complete value spectrum are defined. Variables positioned within the lowest 10% range are assigned a score of 1 (or 10 for those that favour higher values). Similarly, variables surpassing the 90% threshold of the value distribution receive a score of 10 (or 1 for those favouring higher values). Each country receives a score for each indicator, which are aggregated into compound scores for cyclical and structural domains, as well as a total score. At this stage, similar to the ESRB model, all indicators are given equal weight (equal weights scenario), but recognising the potential impact of weighting, we explore assigning weights to indicators, as discussed in the following section (Drehmann et al., 2010).

Stress testing and weighting procedure

Following Lausberg and Krieger (2021), we use stress tests to assign deviating indicator weights. We differentiate between four scenarios, which are displayed in Table 2. These involve subjecting the sector to hypothetical shocks to evaluate its resilience, estimating the influence on key indicators and vulnerabilities (Chenet et al., 2021; European Systemic Risk Board, 2016).

The weighting process unfolds in three iterations:

Initially, each variable is subject to upside and downside scenarios, calculating scores based on deciles for each scenario, and then determining absolute changes in scores across all scenarios and countries.

The final weight results from the overall changes (share) observed across all considered variables. The sum of these weighted scores is first built within each respective category (cyclical or structural) before computing the overall score for each country (see part A of Table 3).

In subsequent iterations, each country undergoes isolated stress testing within the scenarios, while the remaining countries stay unaffected. Firstly, deciles for the respective indicators are computed for each country's upside and downside scenarios, assessing deviations from the collective baseline shared among all countries.

Table 2
Weighting procedures with key features

Name	Key feature	Interpretation/Implication
Equal weights scenario	Weights are applied equally to all indicators.	Assumes uniform impact of vulnerabilities in financial markets across all countries.
Weighted difference scenario (upside- and downside-based)	Variable weighting based on relative changes following a standardised ten percent shock for each indicator (upside- and downside scenarios).	Reflects countries' vulnerability to specific dimensions, emphasising variables exhibiting significant changes.
Country-specific shock resilience scenario	Shocks impacting each country separately while others remain unchanged.	Emphasises individual countries' resilience to isolated shocks wherein both upside and downside scenarios are considered, before normalising these changes against the overall variations observed across all indicators and countries.
Adjusted country-specific shock resilience scenario	Deciles are adjusted for all shocks in all countries before calculating risk scores.	Ranks countries based on comprehensive vulnerability to shocks across various dimensions, highlighting countries with significant vulnerabilities.

Source: Own depiction.

Following this procedure for each country, the individual country-specific scores within each variable are consolidated, and the absolute change from the downside to the upside scenario is computed. The weighting for each indicator is subsequently determined by evaluating its alteration to the overall changes across all considered variables. If no changes occur, indicators receive a modest weight to avoid complete neglect in the overall score (manual weighting). This overall score contributes again to a ranking for all countries (as seen in part B of Table 3).

The last scenario differs in decile calculation, deduced from country-specific upside and downside scenarios across all countries (part C of Table 3). This provides insights into how a country's upside and downside scenarios compare to the global range of possibilities, providing a broader perspective on its relative performance.

Results for OECD countries

Reference: Equal weights scenario

For our baseline scenario, we apply equal weights to the different indicators similar to the ESRB (2019).

Table 3
Weighting scenarios for different indicators

Variable	Cyclical domain							Structural domain				
	ANHPG	DHPSP	GPDG	CBR	HDIID	CORL	ACC	EPCSP	ORLP	SFVI	HDII	ASHCII
A) Weighted difference scenario (upside- and downside-based)												
Absolute change	31	45	35	111	12	21	20	2	23	26	24	6
Share	0.087	0.126	0.098	0.312	0.0337	0.059	0.056	0.006	0.065	0.073	0.067	0.017
Final weight	0.087	0.126	0.098	0.312	0.0337	0.059	0.056	0.006	0.065	0.073	0.067	0.017
B) Country-specific shock resilience scenario												
Absolute change	56	28	84	28	84	28	28	0	28	84	450	38
Share	0.060	0.030	0.090	0.030	0.090	0.030	0.030	0.00	0.030	0.090	0.481	0.041
Manual weight								0.01				
Final weight	0.060	0.030	0.090	0.030	0.090	0.030	0.030	0.01	0.030	0.090	0.476	0.041
C) Adjusted country-specific shock resilience scenario												
Absolute change	8	1	0	0	9	0	0	0	0	0	0	7
Share	0.32	0.04	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.28
Manual weight			0.02	0.02		0.02	0.02	0.02	0.02	0.02	0.02	
Final weight	0.276	0.035	0.017	0.017	0.310	0.017	0.017	0.017	0.017	0.017	0.017	0.241

Note: See Table 1 for information about different indicators.

Source: Own depiction.

Cyclical risks indicate higher volatility in residential housing markets for Luxembourg, Slovakia and Czechia, whereas Cyprus, Latvia and Ireland show lower risk. In the structural domain, Portugal, Finland and Greece face the highest long-term risks (see Figure 2), while Hungary, Croatia and Slovenia have comparatively lower risks. Overall, Luxembourg, Finland and Sweden have the highest risk, while Croatia, Ireland and Latvia have the lowest risk in the residential real estate market. While Luxembourg consistently ranks as a high-risk country across both dimensions, Ireland and Croatia demonstrate lower risk levels in certain aspects. Notably, the last-ranked country's score is about half the magnitude of the top-ranking country's score.

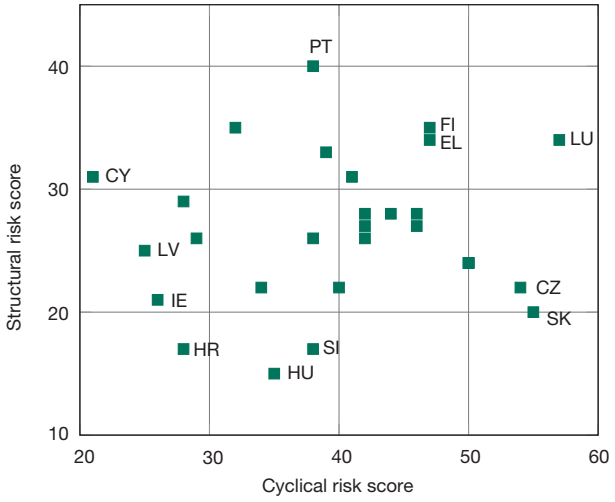
The baseline analysis assumes uniform risk structures, but country-specific risk profiles may vary as indicated in Figure 2, emphasising the need for appropriate indicator weighting.

Weighted difference scenario (upside- and downside-based)

To address the lack of differentiation, variable weighting based on the relative changes following a 10% change in each indicator for each country (upside and downside scenarios) is introduced. This method prioritises variables that exhibit the highest changes, in the form of high weights, indicating greater vulnerability and consequently higher risk for each country.

Within the cyclical dimension, Poland, Bulgaria and Romania emerge as highly responsive to property market

Figure 2
Cyclical vs. structural risk scores for different countries



Source: Own depiction.

fluctuations. In the structural category, Sweden, Finland and Portugal face long-term challenges in their housing finance structure. Countries like Croatia, Estonia and Ireland are less affected by property market value changes. Hungary, Slovenia and Croatia show greater stability and resilience in their housing markets. Considering the overall scores, Poland emerges as the country with the highest risk score, closely followed by Luxembourg, the United Kingdom and Bulgaria, while Croatia, Ireland and Estonia show the lowest overall risk.

Country-specific shock resilience scenario

In this scenario, where shocks impact only a single country while the others remain unchanged, and the intervals are only adjusted for each country-specific shock separately, the assessment emphasises individual countries' resilience to isolated shocks.

As a result, the total household debt, relative to disposable income, carries substantial weight. Consequently, excessive indebtedness elevates risk scores. Luxembourg, evaluated with the highest risk score within the cyclical domain, is particularly sensitive to adverse events in its property market. It is closely followed by Austria and Slovakia, while Ireland, Latvia and Cyprus record the lowest risk scores. The structural realm's results demonstrate the high vulnerability of countries like Sweden, the Netherlands and Finland. Croatia, Hungary and Slovenia present stability in this category, due to their comparatively late-established funding mechanisms. Overall, Sweden, Luxembourg and Finland fall into the high-risk category, followed by the Netherlands, Denmark and Portugal. The lowest risk category includes Bulgaria, Latvia and Croatia.

Adjusted country-specific shock resilience scenario

Ranking differences arise when adjusting the deciles to account for all shocks in all countries before calculating the risk scores. The cyclical dimension results indicate that Luxembourg, Czechia and Slovakia are most vulnerable to changes in property market values. Spain, Bulgaria and Cyprus on the other hand, show better resistance. The structural realm's reordering emphasises Greece, Luxembourg and Bulgaria as being especially susceptible to long-term vulnerabilities. Meanwhile, Latvia, the United Kingdom and Croatia exhibit greater stability. In summary, with the adjusted weighting approach, Luxembourg, Sweden, Austria and Czechia emerge as the countries with the highest risk. The second highest risk group, encompassing Finland, Portugal and France, also reflects significant vulnerabilities. Latvia, Cyprus and Romania display the biggest resilience to shocks.

Summary

Analysing these scenarios reveals a pattern: some countries maintain stable scoring positions, while others exhibit score fluctuations depending on the weighing scheme.

Several countries consistently emerge as either high risk or low risk across the different weighting approaches, as shown in Table 4. Luxembourg and Finland consistently maintain a high-risk position within the cyclical risk and structural risk categories. Sweden exhibits a relatively high-risk position in most scenarios. In contrast, Croatia and Latvia consistently rank among the least risky countries.

Some countries experience variability in their rankings due to the complexity of their risk profiles. Bulgaria's rating, for instance, witnesses significant fluctuations across different approaches. Portugal's and Germany's rankings, primarily in the middle of the distribution, also change substantially, showing that their risk profiles can change based on the specific weights applied.

Table 5 summarises the results for each country in the reference scenario with regard to indicator-driven impact.

Despite variations in outcomes arising from the distinct weighting approaches employed in different methods, notable correlations persist among these ranks, indicating general similarities in their assessments. The equal weights method is remarkably responsive to changes in cyclical risk. In contrast, the weighted differences scenario shows agility in addressing shifts in structural risks, making it a valuable tool for evaluating sector resilience. The adjusted country-specific shock resilience scenario reacts to changing cyclical market conditions. The country-specific shock resilience scenario assesses both structural and cyclical risks comprehensively, revealing their combined impact on market stability. These correlations highlight the significant impact of the weighting procedure on the results concerning market vulnerabilities.

Concluding remarks

This paper analyses the cyclical and structural risks in OECD housing markets using a scoring model also employed in a similar form by regulators. Our model extends the regulators' approach in two key ways.

First, the indicators were differentiated into cyclical and structural risk factors. In this context, "risk" signifies economic fluctuations, structural weaknesses and financial

Table 4
Rankings of risk scores for different scenarios and countries

Rank	Equal weights scenario		Weighted difference scenario		Adjusted country-specific shock resilience scenario		Country-specific shock resilience scenario	
	Risk score	Country	Risk score	Country	Risk score	Country	Risk score	Country
1	47.42	LU	8.40	SE	9.41	LU	7.50	PL
2	42.00	FI	8.34	LU	7.41	SE	8.65	LU
3	41.58	SE	8.27	FI	7.08	AT	8.54	UK
4	40.67	CZ	7.86	NL	6.97	CZ	8.38	BG
5	40.42	SK	7.60	DK	6.87	FI	8.10	FI
6	39.17	AT	7.30	PT	6.84	PT	8.02	LT
7	39.17	BE	7.30	UK	6.63	FR	8.00	RO
8	38.83	PT	6.99	FR	6.56	DE	7.90	DK
9	38.50	PL	6.53	BG	6.44	SK	7.79	SK
10	38.08	DE	5.99	DE	6.40	MT	7.53	AT
11	37.33	FR	5.97	AT	6.28	NL	7.08	CZ
12	36.83	BG	5.70	CY	6.24	BG	6.96	BG
13	36.50	NL	5.49	EL	6.12	PL	6.74	HU
14	36.17	IT	5.46	IT	5.86	EL	6.63	SE
15	35.75	DK	5.42	IE	5.85	EE	6.07	NL
16	35.33	LT	5.29	ES	5.60	SI	5.39	IT
17	33.25	EL	4.96	CZ	5.51	IT	4.98	CY
18	33.00	UK	4.96	SK	5.32	IE	4.93	PT
19	32.50	RO	4.93	PL	5.27	LT	4.79	FR
20	29.25	SI	4.40	EE	4.82	HU	4.56	DE
21	29.00	MT	4.15	MT	4.69	BG	4.27	MT
22	28.42	EE	4.02	LT	4.64	UK	4.23	SI
23	27.75	ES	3.25	SI	4.52	ES	4.21	EL
24	26.67	HU	2.96	HU	3.99	DK	4.04	ES
25	25.17	CY	2.94	RO	3.91	HR	3.62	LV
26	25.00	LV	2.84	BG	3.88	LV	3.36	EE
27	23.92	IE	2.74	LV	3.75	CY	3.10	IE
28	23.42	HR	2.60	HR	3.58	RO	2.89	HR

Source: Own depiction.

instabilities, which can compromise market robustness and resilience. Recognising the importance of these distinctions is crucial, as varied regulatory interventions may be required based on the specific risk group. For instance, if the risk primarily arises from structural factors, counter-cyclical measures may be ineffective, and conversely, addressing changed financing structures may not suffice if the risk is predominantly cyclical. Our analysis reveals that countries exhibit diverse risk structures, emphasising the necessity for tailored policies in the face of a crisis.

Second, various scenarios and weighting algorithms were presented, which led to the results of the reference scenario of an equal weighting of all factors being changed, in some cases considerably. It follows that caution must be exercised when calibrating such risk models, as the weighting has a big impact on the results, the measured housing market risks. This gives the method an arbitrary element – ultimately, equal weighting of the factors is only one of many possibilities. Using different weighting schemes in parallel is then advisable. Further limitations of the analysis lie

Table 5
Indicator-based risk assessment by country

Country/ Indicator	Cyclical risk							Structural risk				
	ANHPG	DHPSP	GDPG	CBR	CORL	HDIID	ACC	EPCSP	ASHCII	SFVI	ORLP	HDII
AT	High	Medium	High	Medium	High	High	High	Low	High	Medium	Medium	Medium
BE	Low	Medium	High	Medium	High	High	High	Low	Medium	Low	High	High
BG	Low	High	Low	High	High	.	High	High	High	High	Low	.
HR	Medium	Low	Medium	Low	Low	Medium	Medium	High	Low	Low	Low	Low
CY	Low	Low	Medium	High	Low	Low	Low	Low	High	High	Medium	High
CZ	High	High	Low	High	High	High	High	High	Medium	Low	Medium	Medium
DK	Medium	High	High	Medium	Medium	Medium	Medium	Low	Low	Medium	High	High
EE	High	Low	Low	Low	High	Low	Low	High	Medium	High	Medium	.
FI	Low	High	High	Medium	Medium	High	High	Low	High	High	High	High
FR	Low	Medium	High	Medium	Medium	High	High	Low	High	Low	High	High
DE	High	High	High	Low	Medium	High	High	Medium	Medium	Low	High	Medium
EL	Low	Low	High	Low	Low	High	High	High	High	High	Low	Medium
HU	High	High	Medium	High	Low	Low	Low	High	Low	Low	Low	Low
IE	High	Low	Medium	Low	Low	Medium	Medium	Low	Medium	Medium	Low	High
IT	Low	High	High	Medium	Medium	Medium	Medium	High	Medium	Medium	Medium	Medium
LV	High	High	Low	Low	Low	Low	Low	High	Low	High	Low	Low
LT	High	Medium	Medium	High	High	Medium	Medium	High	Low	High	Low	Low
LU	High	Medium	Medium	High	High	High	High	Low	High	Medium	High	High
MT	High	Low	Low	Medium	High	Low	Low	Low	Medium	High	High	Low
NL	Medium	Medium	High	Medium	Medium	Medium	Medium	Low	High	Low	High	High
PL	Medium	High	High	High	High	Low	Low	High	Low	High	Medium	Low
PT	High	Low	High	Low	Low	High	High	High	High	High	High	High
RO	Low	High	Low	High	High	Medium	Medium	High	Low	High	Low	Low
SK	Medium	Medium	High	High	High	High	High	High	Low	Low	Medium	Medium
SI	Medium	Low	Medium	.	Medium	Medium	Medium	High	Medium	.	Low	Low
ES	Low	Low	High	Low	Low	High	High	Low	High	Medium	Medium	Medium
SE	Medium	High	High	Low	High	High	High	Low	High	Medium	High	High
UK	Medium	Medium	High	High	Medium	High	.	Low	Low	Medium	High	High

Note: Risk levels are categorized as follows: Values ranging from one to three are designated as low risk, values between four and six are classified as medium risk, and values exceeding six are labeled as high risk.

Source: Own depiction.

in the availability of data: real estate markets are comparatively intransparent and this also applies to real estate financing markets. Of course, the presented scenarios do not capture all factors that contribute to a country's vulnerability. Elements such as regulatory policies, or market sentiment, which can significantly influence vulnerabilities, are not accounted for within this framework. Also, country-specific idiosyncrasies cannot be captured; for example, could Luxembourg's risk be overrated due to the country's small size and high stabilising dependency on European institutions? Moreover, the reliance of the methodology on deciles makes it sensitive to outliers. Although the assumption of data following a normal distribution is deemed acceptable after testing, real-world data frequently deviates, impacting the reliability of quantile-based scoring (Wooldridge, 2011).

For future analyses, it might be useful to measure the sensitivity of the results to model changes after integrating additional variables. Examining country-specific differences more closely would help identify the indicators contributing to increased risk in each country's housing market. The question would then focus on which factor in which

country contributes to increased risk. This could help to compare and optimise national regulatory systems.

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Climate Change in the EU's Macroeconomic Imbalance Procedure

EU member states observe an elaborate process to preserve macroeconomic stability: the macroeconomic imbalance procedure (MIP). The MIP is supposed to monitor and prevent macroeconomic imbalances – and if necessary, correct them. It considers a variety of variables to determine the existence of imbalances, e.g. the current account balance or unit labour costs. However, the macroeconomic impact of climate change is ignored. In light of the growing economic risks due to climate change, this article argues that the MIP should consider climate-related risks explicitly to maintain relevance.

In the wake of the European debt crisis, the EU established the European Semester, an annual process for the coordination and monitoring of economic policy between the European Commission and member states.[1] A core component of the European Semester is the macroeconomic imbalance procedure (MIP). Its goal is to identify, prevent and correct risks for macroeconomic stability in the EU, the euro area and single members states.

Every year in autumn, the EU Commission launches a new round of the MIP with its alert mechanism report. The report points out specific risks in individual member states that warrant so-called in-depth reviews. If these reviews determine the presence of imbalance for a member state, this member state may receive "homework" from the European Commission in form of country-specific recommendations, published in spring with the Commission's spring package. When an imbalance is "excessive", the excessive imbalance procedure may be triggered. However, this has not yet occurred.

The screening for potential imbalances is based on a scoreboard of economic indicators, combined with indicative thresholds. The scoreboard in its current form consists of 14 headline indicators and 25 auxiliary indicators, for example, the current account balance, unit labour costs, unemployment or private and public debt stocks.[2]

The European Semester addresses climate change so far only with respect to broad mitigation policies, and not with a focus on its macroeconomic effects. Environmental sustainability has been repeatedly mentioned as one of four main pillars for an EU growth strategy in the annual sustainable growth survey (ASGS). Yet, in its latest ASGS, the European Commission noted an "increasing need for Member States to consider and prepare for the fiscal impact of excessive weather events and other climate hazards in their medium-term budgetary planning" (European Commission, 2023a, 5). This underlines that the macroeconomic effects of climate change should be regularly monitored in the European Semester.

Time to reform

The MIP has been evaluated from various angles by the literature. For instance, Savage and Howarth (2018) illuminate the microeconomic structure of the procedure. Hodson (2017) assesses it in light of theories of European

1 For the history of and rationale for the MIP, see European Commission (2016).

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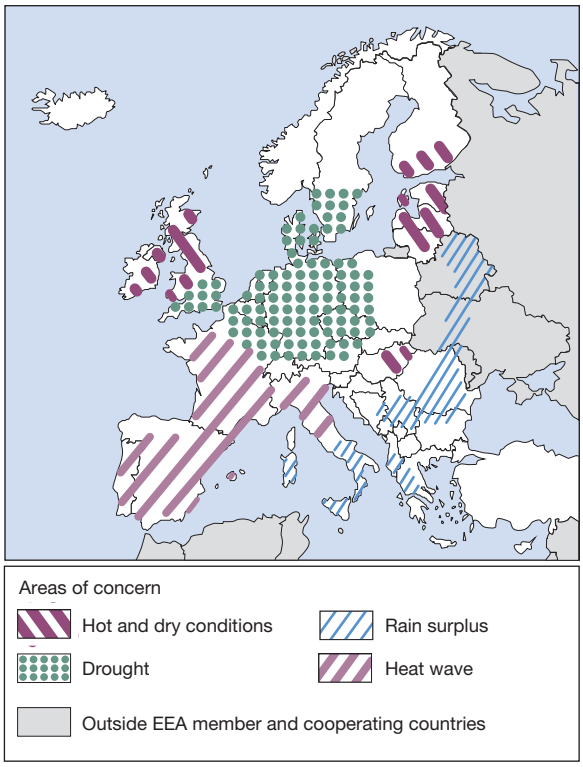
2 The latest data for the scoreboard indicators compiled by Eurostat can be accessed under https://ec.europa.eu/eurostat/web/macroeconomic-imbalances-procedure/visualisations.

integration. Others have highlighted the ineffectiveness of the MIP and demand reform (e.g. Koll and Watt, 2022 or Belke et al., 2016). Koll (2022) specifically argues for an MIP reform with respect to climate action. The most relevant branch of the literature deals with the composition of scoreboard indicators. However, these papers focus on the effectiveness of the MIP in detecting, preventing and correcting imbalances in the past (e.g. Bénassy-Quéré and Wolff, 2020; Pierluigi and Sondermann, 2018; Efstathiou and Wolff, 2018; Belke et al., 2016).

Notably, Pierluigi and Sondermann (2018) conclude that if the MIP's "indicators [had] been properly monitored in the first decade of the EMU, they would have predicted the crisis well in advance of its appearance in several euro area countries". This is probably correct. However, in its current setup, the MIP is blind to the risks that climate change poses to the European economy. This may be due to the fact that economists tend to struggle to properly capture the economic effects of climate change (Stern, 2013). In its 2023 autumn economic forecast, the European Commission included a special issue on the effects of extreme weather events, concluding that the economic costs of natural hazards are not well reflected in its own forecasts (European Commission, 2023b, 66). In any case, with climate change intensifying, its macroeconomic ramifications will be increasingly important, thus posing a risk that is originally macroeconomic (as we argue below). In fact, only one – rather brief – proposal by Sustainable Finance Lab (2022) suggests considering the effects of climate change on macroeconomic stability in the MIP.

Nonetheless, now is the best time to update the MIP with a sensor for climate-related macroeconomic risks. First, the EU's new economic governance framework, which went into force in April 2024, has opened up a bigger stage for the MIP. As a result of the Economic Governance Review, member states are supposed to compile national medium-term fiscal-structural plans, in which they outline their paths for fiscal policy, reform and investment. The results of the MIP will inform these plans. While the Stability and Growth Pact increasingly sidelined the MIP in recent years, the MIP now has the chance to obtain a more prominent role next to the updated rules of the Stability and Growth Pact. Second, the MIP is currently subject to a regular revision. More precisely, the scoreboard indicators and thresholds are currently under review by the Economic Policy Committee and its aiding working groups.[3]

Figure 1
Extreme weather events in 2018



Note: The UK left the European Economic Area in 2020.

Source: European Environment Agency (2019).

Climate change as a macroeconomic risk

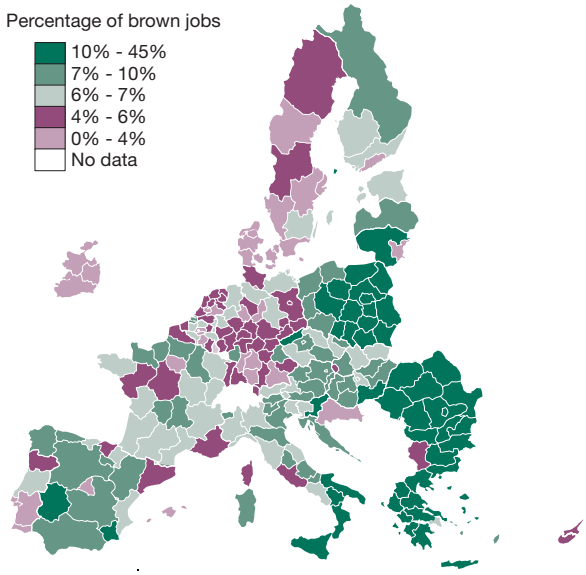
It is worth stating again that climate change is a global problem that entails not only ecological but also economic impacts. The latter can be separated into physical impacts and transition impacts:

Physical impacts from climate change result from a rise in adverse weather events, such as floods, droughts, forest fires or heat waves. Such events damage property, disrupt supply chains and cause infrastructure failures.[4] The resulting economic losses in the future will likely be high, but vary substantially across regions and member states. Research by the European Environment Agency shows that Europe's regions are affected differently by physical climate impacts (see Figure 1). Whereas northern Italy faces the risk of heat waves, the south is threatened by a rain surplus. In Central Europe, droughts are the main

3 The Economic Policy Committee (EPC) contributes to the work of the ECOFIN Council. The authors have participated in some EPC meetings for Germany in the past, and they are members of the EPC's LIME working group.

4 The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2022, Chapter 13.10.) identifies four key risks for Europe that go along with rising temperatures: i) mortality due to extreme heat, ii) heat and drought stress on crops, iii) water scarcity and iv) flooding and sea level rise.

Figure 2
Regions with "brown" jobs



Source: Vandeplas et al. (2022).

physical climate risk. An example of the economic impact of these events is the low water level of the Rhine river during periods with low precipitation. The resulting limitation of inland shipping causes a decline in industrial production of about 1% in Germany in a month of low water (Ademmer et al., 2023). On a global level, such effects are likely to lead to supply chain disruptions across regions and sectors (World Trade Organization, 2022).

Destructive weather events not only impair the capital stock, but also affect public finances: in the short run, by requiring higher spending on disaster relief and reconstruction, and in the long run by affecting productivity and debt sustainability (Avgousti et al., 2023c). Adding indicators that account for the risk of future physical impacts to the MIP scoreboard therefore seems useful.

Transition impacts encompass costs from structural economic adjustments due to climate change and decarbonisation. Costs also emerge from measures to alleviate social impacts of the transition, such as structural policies, income support or retraining. Again, the costs of transition vary greatly across member states. They are higher in member states with a high concentration of carbon-intensive industries (see Figure 2). In Poland, for example, about 0.8% of total employment falls on jobs in coal and lignite mining alone (106,000).[5] According to the European Commission, the costs just for retraining can amount to 0.8% of GDP for the EU as a whole. In countries with more carbon-intensive industries, these costs are higher and can amount to more than 1.5% of GDP (European Commission, 2022).

Moreover, extreme weather events and the switch to climate-neutral technologies will render some past investments uneconomical, leading to *stranded assets*. A rising number of stranded assets has substantial consequences for the financial system by increasing the likelihood of loan defaults or insurance claims. Stranded assets may be more likely to occur in the case of a disorderly transition (Gourdel et al., 2022). The ECB requires that banks include climate change risks in their assessment for credits by 2024 (see, for instance, Kanutin, 2023 or ECB, 2021).

That is, climate change will likely create its own macroeconomic turbulences, influencing both demand and supply (Ciccarelli et al., 2021). The MIP scoreboard will only indicate these impacts indirectly and retrospectively. Yet, the objective of the MIP is to detect emerging macroeconomic imbalances so that policy can respond to them. It thus should take into account the macroeconomic risks posed by climate change by incorporating appropriate indicators explicitly.

Indeed, some organisations are beginning to monitor the macroeconomic implications of climate change, most prominently central banks. The Bank of England (2022) has discussed the macroeconomic implications of climate change in general. The ECB (2023a) has published research on transition impacts specifically. Most notably, it already considers the management of climate-related risks of assets held on its balance sheet as part of its strategy (ECB, 2023b). It has also considered the implications of climate change for banking supervision and published related guidelines (ECB, 2020). In the same vein, the European Banking Authority is assessing on behalf of the European Commission the resilience of the EU banking system to the potential impact of climate risks, focusing on "climate-change related risks that could already materialise in the near term, most likely in the form of asset price corrections triggered by a sudden reassessment of transition or physical risks" (European Securities and Markets Authority, 2023, 2). In its October 2022 World Economic Outlook, the International Monetary Fund focused on the near-term macroeconomic impacts of decarbonisation policies, noting that decades of inaction have made a "smooth transition" unlikely (International Monetary Fund, 2022).

Principles for monitoring macroeconomic risks from climate change in the MIP

The motivation underlying the indicators that were originally selected for the MIP was to include variables asso-

5 Authors' calculation based on Eurostat data.

ciated with economic crises – based on the economic literature and the experiences after the events of 2008-2010 (European Commission, 2016). The legal basis for the shape of the scoreboard is given by Article 4 of Regulation 1176/2011, which states that the scoreboard shall encompass indicators that are useful in the early identification of both internal imbalances and external imbalances. Climate change-related impacts can be attributed to both kinds of imbalances, e.g. adverse financial and asset market developments (internal imbalance) as well as adverse developments of non-price competitiveness (external imbalance).

To select the original indicators for the scoreboard, the European Commission (2012) applied four principles:

Relevance. Indicators should focus on the most relevant dimensions of macroeconomic imbalances and competitiveness, particularly with regard to the smooth functioning of the euro area. The indicators should be associated with potential economic crises that are established by the economic literature and recent experiences.

Early warning function. Indicators and thresholds should reliably detect potentially harmful imbalances and competitiveness losses at an early stage of their emergence. Stock and flow indicators are used that can capture both short-term rapid changes and long-term gradual changes. The thresholds are set at prudent levels to avoid excessive "false alarms" and to signal deteriorations before they become entrenched. These thresholds are generally established by a statistical approach.

Communication and transparency. The scoreboard has a key communication role. Indicators should be simple, clear, and of limited number. Any data transformations should be transparent and replicable. The indicators should complement those used in other EU surveillance exercises.

High statistical quality. The indicators should be available for all countries and comparable across countries. They should be sourced from high quality sources such as Eurostat or ECB and be compiled according to the principles of the European Statistics Code of Practice of the European Statistical System.

For new indicators related to climate change, these principles pose challenges:

- The literature on the macroeconomic impacts of climate change is still emerging. The size of macroeconomic impacts on output, inflation or employment can often only be estimated (see e.g. Kahn et al., 2019).

- The risks of climate change can build up gradually, but strike suddenly. For example, the risk for imminent adverse weather events may vary substantially in the short term. The rising of sea levels, on the other hand, is a long-term process that can be largely anticipated today. As a result, monitoring the risk or development of these events in the MIP in order to steer medium-term macroeconomic policy is difficult.

- Potential indicators are still unavailable for some member states. Numerous efforts to improve the statistical comparability of economic impacts of climate change are underway, both at the member state level as well as at the EU level.

Possible indicators

Well aware of the current scarcity of proper indicators comparable at the EU level and suitable for the MIP scoreboard, the above suggests that the current MIP scoreboard is incomplete. It should be updated accordingly. However, selecting indicators for the macroeconomic impacts of climate change is more difficult than selecting indicators for classical macro-financial crises. For the latter, we have ample experience from a rich history of crises, while for the former the extreme experiences may still lie in the future. Based on the European Commission's principles for scoreboard indicators (relevance, early warning function, communication and transparency, and high statistical quality, as suggested in European Commission (2012)), we develop implications for new indicators that capture macroeconomic risks from climate change: the share of "brown" jobs or industries, the share of "brown assets" and the risk of medium-term adverse weather events.

Share of "brown" jobs or industries. This indicator could take different forms, e.g. the share of employment in industries such as mining of coal and lignite in the member state. A related indicator would be the industrial emissions in member states, relative to economic activity. Indicators of this kind have also been used for the allocation criteria of the Just Transition Fund (European Parliament, 2023).

- Relevance and economic rationale: The share of employment in "brown" jobs indicates the risk of transformation impacts on employment, such as costs of retraining the corresponding labour force. In addition, it may indirectly capture some risks of stranded assets. However, the availability of cost-effective alter-

natives is not captured by the indicator. It thus cannot be translated directly into "risk" but requires a careful economic reading.

- Early warning function: The indicator's warning function is questionable since employment in mining of coal and lignite is not very volatile in the first place, but stable or declining in nearly all members states. However, the share of employment in fossil industries must dramatically sink by 2045, which in turn increases the likelihood of sudden disruptions worth monitoring. Meaningful thresholds might be difficult to establish.

- Communication and transparency: The indicator is sufficiently simple and clear.

- High statistical quality: Employment figures for different industry sectors are available via Eurostat on a quarterly and annual basis, but with some delays. They are comparable across member states.

Share of "brown assets". This indicator assesses the share of the asset stock that is not compatible with the net-zero target.

- Relevance and economic rationale: A higher share of "brown assets" implies higher looming transition impacts as well as a higher risk of stranded assets. Read in conclusion with the public debt indicators, it simultaneously considers the member states' capacity to bear the associated transition costs.

- Early warning function: The indicator's warning function is reasonable since the share of brown assets has direct implications for future policy and its room for manoeuvre.

- Communication and transparency: The indicator would require some explanation, but nevertheless seems of below-average complexity.

- High statistical quality: Data on the emissions of single assets (i.e. installations) exist due to the Emission Trading System reporting procedures. Granular data on the valuation of these assets are not available, however. The indicator would therefore need to be estimated with a common methodology across member states.

Risk of medium-term adverse weather events. Such an indicator would measure the risk of physical impacts which have macroeconomic repercussions. A candidate indicator that may be suitable is the INFORM Climate Change Risk Index provided by the European Commission's Joint Research Centre (JRC), in particular its "Hazard and Exposure" dimension. It may need to be adjusted since it incorporates components for climate change-related risks, such as floods, droughts and tsunamis, but also for earthquakes and epidemics. It would also need to be regularly updated to be useful for the MIP. In the long term, mitigation and adaption measures should be considered as well.

- Relevance and economic rationale: As discussed above, physical impacts from climate change will result in substantial economic harm, such as sudden decreases in the capital stock, declining productivity or disaster relief costs.

- Early warning function: The indicator's warning function is reasonable, but depends on the properties of the underlying sources and the probability distribution for the respective events.

- Communication and transparency: The final indicator would likely be some kind of index, which requires sufficient explaining.

- High statistical quality: Estimates for the risk of natural disasters are well established in the literature on natural hazards, e.g. coastal flood hazard maps. They are, however, not updated regularly. In any case, they should be easily comparable at the level of member states.

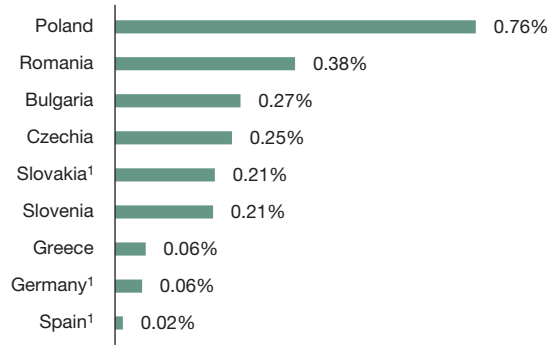
What would the indicators imply for member states?

Because "brown assets" are not (yet) comparably and robustly measured, we use the other two indicators suggested above – the share of brown jobs or industries as well as the risk of medium-term adverse weather events – to obtain a first indication for macroeconomic risks due to climate change by member state.

For the share of "brown" jobs or industries, we consider employment in the sector of coal mining and calculate the share of total employment. Figure 3 reveals that for Central and Eastern European member states, this share is particularly high. This implies high transition costs for these countries in the future. In Poland, for example, more than 100,000 workers were active in this sector in 2022.

For the risk of medium-term adverse weather events, we consider the INFORM CC Risk Index for 2022. The INFORM CC Risk Index has been developed as a tool for the communication of the potential impacts of climate change and the associated risks for individual countries (JRC, 2022a). It employs climate models and socio-economic projections for different scenarios, combining indicators

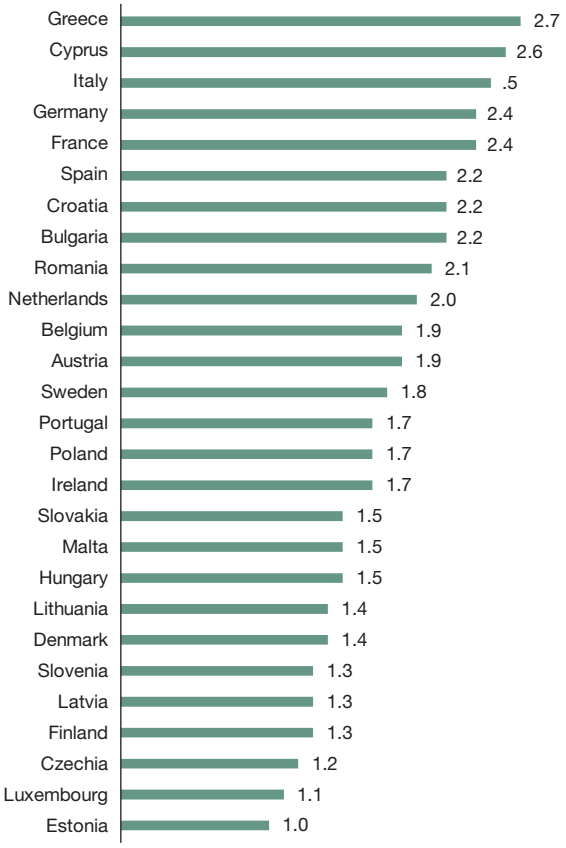
Figure 3
Employment in mining of coal and lignite, 2022
% of total employment



Notes: [1] For Spain, Slovakia and Germany, the reference year is 2018.

Source: Authors' calculations based on Eurostat.

Figure 4
Baseline risk of medium-term adverse weather events
INFORM CC Risk Index



Note: The risk index is given on an interval from 0 to 10.

Source: JRC (2022b).

for natural hazards, socio-economic vulnerability and the coping capacity of countries. We use its baseline risk index, which indicates the risk of climate change impacts at present (latest values available are for 2022).

Figure 4 shows the baseline risk index for all EU member states. The higher-risk countries are mostly Mediterranean countries and/or less economically developed member states. This may indicate a geography prone to impacts from climate change like draughts or heat waves, but also a lack of coping capacity of the respective countries.

Conclusion

The regulation underpinning the MIP defines an imbalance as "any trend giving rise to macroeconomic developments which […] have the potential adversely to affect, the proper functioning of the economy of a Member State […] or of the Union as a whole" (Regulation 1176/2011, Article 2). According to the European Environment Agency, economic losses related to extreme weather events have been increasing by 3% per year over the last 14 years in the EU (European Environment Agency, 2023). If this trend continues, macroeconomic impacts of all sorts will compound. This article shows that it would be the right thing to monitor imbalances and their possible macroeconomic repercussions for each member state, while it would be grossly negligent for the MIP to monitor almost 40 indicators that have no bearing on the costs of climate change. The key issue is, however, to find indicators that offer actionable, concrete policy options and that, at the same time, vary meaningfully across member states in order to work within the MIP framework. This debate clearly needs more contributions. The political will to face the dire reality that climate change will be a growing source for macroeconomic concern is also a necessity.

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Biden's International Trade Policy: Déjà Vu, Again

After four years of President Trump's slash-and-burn trade policies, the bar for the incoming Biden Administration could hardly have been lower. Trump's "America First" bravado was an ungainly amalgam of tax hikes (against foes and friends alike), bilateral power plays and a retreat from international trade cooperation (Trump spurned the Trans-Pacific Partnership, TPP, and crippled the World Trade Organization, WTO). Trump's trade policies ruffled the feathers of many of America's closest trade partners. They were also economically ineffective, failing to benefit even those sectors and locations that his tariffs were supposed to protect. Notably, the Trump's tariffs did not change China's behavior one bit.

It came as no small surprise when Joe Biden, despite calling Trump's trade actions "disastrous" and "reckless", not only failed to repudiate those policies, but actually amplified them. While Biden's version of economic nationalism is more carrots than sticks (commentators have called it "polite protectionism"), it is no less fervent. In a barely noticed but tremendously consequential speech in July 2023, National Security Advisor Jake Sullivan laid out the most coherent version of the Biden Administration's economic ideology. Sullivan blamed hyperglobalization, trade liberalization, unfettered deregulation and naïve beliefs in market efficiency for the most pressing challenges currently facing the United States – a hollowed-out industrial manufacturing base, dramatic economic inequality, the rise of China and the climate crisis. Drawing a sharp contrast to the "Washington consensus" – the 1990s-era policy package championed by the U.S. Treasury, the IMF and the World Bank that, to many, is synonymous with deregulation and free trade – Sullivan declared that the Administration stood for a "new Washington consensus". This novel paradigm is aimed at achieving supply chain resilience, more equitable growth for American workers, rapid decarbonization, and a containment of China's military and economic might.

While few Americans would disagree that these are worthy goals, their *implementation* as proposed by Sullivan – a "modern" industrial policy, selective partnerships with economic allies and policies aimed at curbing the ascent of China – warrants scrutiny. Let us start with Biden's industrial policy. The strategy consists of a mix of muscular government interventions through direct subsidies and tax credits, e.g. under the Inflation Reduction Act, directed at industries deemed especially critical or strategic, mainly semiconductors and green technologies; "Buy America" provisions for government procurement; and protectionist policies, including a continuation of many of the Trump-era tariffs, domestic content requirements, and trade defense measures. As a case in point, in mid-May of this year the Administration slapped major new tariffs on Chinese electric vehicles, advanced batteries, solar cells, steel, aluminum and medical equipment.

While industrial policy, done right, can be useful, all indications are that Biden's version is poised to cause significant domestic and international damage. Let us focus on the international repercussions of Biden's trade policy. First, many implementing actions are in apparent violation of the very trade principles that the United States once held dear. Second, since industrial policy is essentially self-dealing designed to draw investment, production and raw materials away from other countries, this zero-sum logic will almost definitely provoke an international backlash. Powerful countries will retaliate and/or emulate. Emulating discriminatory U.S. industrial policies can easily trigger lose-lose subsidy wars that, in addition to the monetary costs, tend to stifle innovation and

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technological diffusion, a particular concern for the desired green energy transition. Poorer countries that cannot afford costly subsidy programs will see export markets and inward investment shrink, and with them, developmental progress. This breeds resentment of the United States and over the short or long haul will draw them towards other trade alliances.

As for Biden's strategy for cooperating with trade partners, it entails neither aspirations to pursue traditional trade agreements (such as rejoining the TPP), nor a revitalization of the multilateral trading order (for example, Biden has continued Trump's assertion of national security exceptions to justify trade restrictions). Instead, the Administration has championed sectoral partnerships and so-called "frameworks" (such as the Indo-Pacific Economic Framework for Prosperity, IPEF). Common to these ventures is Biden's unwillingness to offer foreign countries additional access to the U.S. market. Rather, the Administration seeks to extract non-binding commitments on environmental or labor standards or to sign off on mutual recognition of existing procedures or standards. How such "trade" deals are supposed to benefit U.S. workers, make supply chains more resilient, or result in decarbonization is anyone's guess.

Finally, the Biden team argues that China pursues aggressive economic policies and has flouted international trade rules; it also considers slowing down China's economic and military ascent as a core objective. It is then all the more puzzling that the Administration continues to weaken, rather than strengthen, important alliances that it would need to pursue its objective effectively and with as little economic blowback to the U.S. economy as possible.

At its core, the "new Washington consensus" of the Biden Administration is a challenge of five decades of economic orthodoxy and a rejection of the rules-based international economic order. It espouses a zero-sum logic where cooperation is ad hoc and transactional. Given that stance, what is the incentive for third countries to cooperate with the United States?

Granted, international trade currently has a bad reputation with U.S. audiences stretching from the nationalist right to the progressive left. Yet, instead of the pendulum swinging towards neo-protectionism, future administrations may consider improving on the existing rules-based order – call it Washington consensus 2.0. What could such an updated WC2.0 look like? Domestically, it would capture the gains of liberalized trade, while offering protection from the downsides of globalization. The focus thereby would be on workers, not jobs – by promoting job creation in distressed areas and improving transition assistance for those having lost their jobs to international competition and technological advances. Next, WC2.0 would foster (WTO-compliant!) investment in infrastructure, R&D, education and talent attraction, rather than betting on hand-picked industries. It would focus on technology *adoption*, not technology *production*: adoption and diffusion of the best available technologies (even if imported) are more likely to create long-lasting economic benefits and larger innovative breakthroughs than a government trying to pick winning technologies.

Internationally, WC2.0 would have the United States pursue more and deeper trade agreements with large memberships, such as TPP, since it is better to coordinate, not compete, with allies on public investments in high tech or decarbonization. Such trade agreements would pursue the adoption of common technical standards on a global scale. They would also provide a veritable counterbalance to China's economic and political heft. Finally, under WC2.0 the United States would immediately revive WTO dispute settlement and reengage in (an admittedly overdue) WTO reform that squarely takes on rule-flaunting by friend and foe alike.

International trade is not going anywhere. The question is how and to what degree the United States will participate. WC2.0 could help capture the gains of liberalized trade and make up for domestic losses. It could remind Americans that trade rewards innovation and efficiency, that it makes the distributable pie larger for all, and that it advances U.S. security and economic interests.