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A New Deep Transformation: Conflict, Climate Pressures and AI Rivalry— Implications and Future Research Directions

Solmaz Filiz Karabag[1], 0000-0002-3863-1073
Linköping University, Sweden

Christian Berggren[2], 0000-0002-4233-5138
Linköping University, Sweden

Abstract

The global economy has entered a decade of deep transformation driven by the confluence of geopolitical conflicts, climate pressures and accelerating technological rivalry. What began as a sequence of shocks in the early 2020s—pandemic disruption, war in Europe, and rising strategic tensions in East Asia—has evolved into a structural reorientation of globalization, security policies, alliance formation and industrial development. Fragmented globalisation has replaced the efficiency-driven integration of previous decades, as states and firms reorganise supply chains along political and security lines. Climate-related shocks further reshape macroeconomic conditions, fiscal priorities and long-term productivity trajectories. These forces interact with rapid technological change, including advances in artificial intelligence, new national armament priorities, and transformations of organisational practices.

Sectoral developments in defense, pharmaceuticals, healthcare and energy illustrate how geopolitical pressures and technological imperatives are reshaping industrial capabilities and strategic policy choices. At the firm level, AI adoption reconfigures decision-making, skill requirements and capability development, underscoring the role of national learning systems in sustaining long-term competitiveness. In this editorial we outline a research agenda that highlights the analytical and empirical challenges for the fields of applied economics, business studies and policy analysis. The editorial concludes by discussing future research directions related to supply chain fragmentation, institutional adaptation and the evolving climate–security–technology nexus.

Keywords: Deep Transformation, War, Climate Pressure, AI Ravily, Multi-Sector Dynamics, Fragmented Globalization.

JEL Codes: B50; B20; F10; F20; F60; I00; J00; L00; M00; O30

1. Introduction

The turbulence that has defined the global economy since the early 2020s shows no sign of abating as we enter the mid-2020s. What initially appeared to be a series of temporary shocks—the COVID-19 pandemic followed by the full-scale Russo-Ukrainian war in 2022—has evolved into a more entrenched and systemic transformation than many observers anticipated. In a 2022 *Journal of Applied Economics and Business Research* (JAEBR) editorial,

1 Correspondence to S.F. Karabag solmaz.filiz.karabag@liu.se
2 Correspondence to C. Berggren christian.berggren@liu.se

it was argued that the war, in combination with intensifying geopolitical rivalry among major powers, had exposed structural vulnerabilities in global supply chains, raised new concerns about energy security, accelerated a trend toward deglobalisation and prompted states to reconsider industrial priorities and commercial strategies (Karabag & Imre, 2022). It was suggested that the war functioned as a catalyst for, and punctuated, an emerging second Cold War and signalled a broader reconfiguration of the international economic and business order.

A year later, Berggren's 2023 JEABR editorial extended this perspective by highlighting how crises and prolonged war conditions reshaped specific knowledge-intensive sectors. His analysis demonstrated that defence, pharmaceuticals and the green-energy transition were undergoing significant technological and organisational adjustments driven by security challenges, political tensions and the reprioritisation of state intervention (Berggren, 2023). Crises, he argued, not only constrain economies but also reallocate resources, accelerate innovation and set new long-term industrial trajectories. These observations proved prescient. Developments since 2023 confirm that the shocks unleashed earlier in the decade have not dissipated; instead, they have deepened and broadened across geopolitical, economic and technological domains.

By late 2025, it becomes clear that these shifts are not transient disruptions but part of a deeper structural transformation (Sachs, 2023; Schot & Kanger, 2018). The continuation of war in Europe, rising tensions in East Asia and the intensifying US–China technology and trade confrontation have contributed to a more fragmented global landscape (Dahlström et al., 2025; Gonçalves et al., 2024; Zhang 2024). These developments coincide with rapid changes in strategic technologies. Competition in artificial intelligence, semiconductors, aerospace, advanced robotics and defence-related innovation has accelerated, reshaping national industrial priorities and creating new arenas of geoeconomic contestation. Technological rivalry is now closely connected to military modernisation programmes, emerging dual-use platforms and broader attempts to secure technological sovereignty and sectoral transfomration.

At the same time, extreme weather events and climate-related economic shocks have intensified (Cevik & Jalles, 2023; Kim et al., 2025). Climate-economy research increasingly suggests that the world economy is already committed to significant long-term output losses from past emissions (Kotz et al., 2024), and that each additional degree of warming may reduce global GDP by more than 20 percent (Bilal & Känzig, 2024). Climate-related disturbances are therefore not episodic events but structural forces that will shape fiscal priorities, supply-chain design and national industrial strategies for decades to come.

Taken together, these developments point toward a global environment characterised by multi-layered fragmentation, geopolitical realignment and deepened climate–security–technology interdependence. In this editorial, we argue that the convergence of these forces marks a structural reorientation of the global economy—one that will shape economic performance, policy priorities and industrial trajectories throughout the coming decade. We integrate recent empirical findings and conceptual advances to examine how prolonged conflict, geopolitical fragmentation, climate impacts and technological rivalry jointly influence global, regional and sectoral dynamics. Our aim is to inform scholars, policymakers, leaders and managers concerned with the long-term evolution of the global economy, to foster debate on the deep economic and business transformations underway and to identify emerging research directions within this shifting landscape.

The remainder of this editorial is structured as follows. *Section 2* examines macro-level transformations in globalisation, realignment and the reorganisation of global value chains. *Section 3* analyses how war and geopolitical tensions continue to reshape regional dynamics and economic decision-making. *Section 4* turns to sectoral developments in defence, pharmaceuticals and the green-energy transition. *Section 5* explores emerging cross-cutting

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structural pressures, and *Section 6* discusses how artificial intelligence intersects with organisational adjustment and contemporary industrial strategy. *Section 7* synthesises the implications of these transformations, and *Section 8* outlines a broad research agenda for contributors to JAEBR.

2. Macro Changes: Fragmented Globalisation, Realignment and the Reorganisation of Global Value Chains

The defining macroeconomic shift of the 2020s is the transition from earlier efficiency-driven globalisation to a more fragmented, geographically diversified, and politically conditioned international economic order. Early assessments characterised this process as deglobalisation (Karabag & Özgun, 2022; Wang et al., 2025), often interpreted as a retreat from international trade or a return to national self-sufficiency. However, recent empirical analyses from the IMF and the OECD suggest that this interpretation is too narrow. While global trade volumes remain substantial, their underlying structure has changed in ways that reflect intensified geopolitical tensions, strategic uncertainty, and new forms of state intervention (Crowe & Rawdonowicz, 2023; Jaax et al., 2023). Rather than signalling a withdrawal from openness, firms and governments have begun to selectively reorganise supply chains in response to geopolitical risk, pandemic-induced vulnerabilities and the security demands generated by ongoing conflicts (Aiyar et al., 2023).

This emerging pattern is best understood as fragmented globalisation (Colantone, 2025): a global economy in which cross-border production networks persist but are increasingly shaped by political alignment, security considerations and industrial-policy frameworks. OECD studies show that global value chains are being reconfigured through diversification, "friend-shoring" and regionalisation rather than dismantled (Crowe & Rawdonowicz, 2023; Jaax et al., 2023). These adjustments reflect governments' efforts to reduce exposure to sanctions, export controls, critical-material bottlenecks, and wider strategic vulnerabilities. They also demonstrate the continued importance of global production systems even as they become more complex, multi-layered and politically segmented.

Geopolitical rivalry reinforces these structural adjustments. The deepening strategic competition between the United States and China is reshaping the governance of technology, critical minerals, data flows, and semiconductors (Zhang, 2024). In recent years, both countries—as well as the European Union, Japan, and South Korea—have introduced extensive policy instruments that link national security concerns with industrial development. Examples include the US Inflation Reduction Act (Bang, 2025), the EU's Net Zero Industry Act (Dahlström et al., 2025) and China's dual-circulation strategy (Alcidi et al., 2024; Javed et al., 2023). Export controls, subsidy programmes and competing mission-oriented agendas illustrate how states increasingly influence market outcomes in technologically strategic sectors. As a result, firms operating internationally face a competitive policy environment in which political alignments and strategic interests shape trade, investment and innovation more than at any point since the late twentieth century.

Alongside geopolitical competition, the macroeconomic effects of climate change have become a second major driver of structural transformation. Recent empirical research shows that the long-term economic losses associated with global warming are substantially larger than previously estimated. For example, global output losses of around 19 percent of GDP are already locked in due to past emissions alone (Kotz et al., 2024). Similarly, analyses of temperature–productivity relationships indicate that each additional degree of global warming may reduce world GDP by more than 20 percent over the long term (Bilal & Känzig, 2024). These findings underscore that climate-related disruptions are not isolated environmental events but persistent forces shaping productivity, labour capacity, fiscal stability, and supply-

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chain resilience. They also suggest that climate impacts will increasingly interact with geopolitical tensions and industrial-policy interventions, influencing how states plan and finance large-scale technological and economic transitions.

Together, these dynamics signal a fundamental reorganisation of the macroeconomic environment. As recent geopolitical research also shows, the war has transformed regional and global alignments, accelerated hybrid forms of geopolitical interaction, and exposed institutional limits in the global security order (Derviş 2023). Globalisation is not collapsing, but it is becoming more selective, more politically conditioned, more tightly managed and more vulnerable to external shocks. Strategic rivalry increasingly shapes the direction of technological development, while climate change introduces long-term economic pressures that influence investment choices, public budgets and the resilience of global production systems. These macro-level transformations form the broader context for the geopolitical, sectoral and organisational developments analysed in the following sections.

3. War, Geopolitical Tensions and Their Enduring Influence on Global and Regional Dynamics

The persistence of the Russo–Ukrainian War continues to exert a defining influence on the global political economy. In the 2022 editorial, it was argued that the invasion marked a fundamental turning point in geopolitical relations (Karabag & Imre, 2022). Developments since then have confirmed that assessment. Rather than moving toward resolution, the conflict has become an entrenched feature of the European security landscape (Farrand et al., 2024), with long-term military and financial commitments by Western governments generating new economic and institutional pressures (Dahlström et al., 2025). Sustained support for Ukraine must be balanced against domestic fiscal constraints, industrial investment needs and broader welfare obligations. Several countries have already reconsidered budget allocations, delayed expenditures or revised industrial-policy instruments to accommodate shifting priorities. In some contexts, heightened emphasis on security (McNamara, 2024) has coincided with increased political polarisation and a narrower space for deliberation, illustrating how prolonged geopolitical commitments reshape national agendas and societal expectations. Although these pressures do not unfold uniformly across Western countries, they demonstrate that long-term geopolitical engagement has consequences that extend well beyond immediate strategic objectives (Karabag & Imre, 2022).

> ***Why this matters:*** The war has become a long-term structural force shaping European political economies, fiscal strategies and governance patterns. Understanding these pressures is essential for analysing how security imperatives reshape domestic policymaking and constrain economic and industrial priorities across the region.

Berggren's 2023 analysis highlighted the limited prospects for negotiated settlement and the ability of authoritarian regimes to sustain or expand defence-industrial capacity under severe constraints (Berggren, 2023). This remains essential for understanding Russia's wartime political economy, yet developments since 2022 show that the broader rearmament trend is not confined to authoritarian states. In some Western settings, intensified security priorities have produced governance dynamics—centralised decision-making, reduced deliberation and expanded executive discretion—that echo certain authoritarian tendencies even as formal democratic institutions remain intact (Gürer & Walczak, 2024; Grillo et al., 2024; Marzo, 2023). Across Europe, North America, and parts of Asia, almost all governments have likewise increased defence spending, revised procurement practices, and launched new industrial investments. These shared patterns reflect a widening recognition of strategic vulnerability, particularly in areas such as ammunition supplies, microelectronics, and specialised components. They also reveal the limits of sanctions in a multipolar and interdependent global economy, where alternative suppliers, informal trade channels, political alignment and domestic institutional capacity moderate their effectiveness (Jeong, 2023). As defence budgets rise across diverse political systems, geopolitical objectives increasingly influence economic decision-making, often taking precedence over short-term efficiency considerations when national security is perceived to be at stake.

> ***Why this matters:*** Contemporary rearmament is no longer limited to authoritarian regimes; it is a cross-system phenomenon that reshapes democratic governance, industrial mobilisation and global security architectures. These dual pressures blur traditional distinctions between political systems and underscore how security imperatives now shape economic policy even within western countries.

The war has also transformed the institutional architecture of European security. Finland and Sweden have joined NATO, defence budgets have risen across the EU and transatlantic cooperation has deepened. These developments confirm earlier expectations that Russia's activities would consolidate rather than weaken Western cohesion. They have also reshaped how European states assess geopolitical risk in domains such as energy, supply-chain management and advanced technology. Decisions that were once guided primarily by economic efficiency and broad societal considerations now increasingly reflect assessments of political trust, institutional alignment and strategic exposure, and, in some cases, more centralised forms of technocratic decision-making. A clear example is the EU's response to the 2022–2023 energy-security crisis, when the European Commission relied on emergency instruments, delegated acts and comitology procedures to fast-track measures such as mandatory gas storage, joint purchasing platforms and electricity-market interventions. These decisions were primarily shaped by small, unelected technocratic bodies rather than national parliaments, illustrating how prolonged security pressures can centralise authority within executive institutions and compress democratic deliberation (McNamara, 2024; Dahlström et al., 2025). These shifts reinforce the broader movement toward geoeconomic fragmentation highlighted in Section 2 (Aiyar et al., 2023). The war, therefore, serves not only as a regional security crisis but as a transformative force reshaping political governance.

> ***Why this matters:*** European security realignment affects governance structures far beyond defence policy, influencing regulatory capacity, industrial strategy and public accountability. The shift toward more centralised and technocratic decision-making has lasting implications for democratic processes, legitimacy, economic development and the future organisation of the EU's political economy.

Tensions in East Asia mirror and amplify these global dynamics. China's military activities, combined with domestic political centralisation and long-term strategic ambitions, sustain a persistent risk of confrontation in the Taiwan Strait and surrounding regions (Chen et al., 2024). Regional governments have responded by revising defence strategies and expanding military investment. Japan and South Korea have adopted more forward-leaning security policies (Ezell, 2025; Jeong & Kwon, 2025), while Australia has strengthened its commitments to regional stability and defence-industrial development. Analyses from SIPRI show that military expenditure across Asia and Oceania has risen for several consecutive years (SIPRI, 2024). These shifts suggest that countries across different political systems are reinforcing defence-industrial bases and long-term planning capacity, indicating that geopolitical tension is increasingly embedded in national development strategies rather than confined to episodic crises.

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Why this matters: East Asia has become one of the central arenas of global strategic competition. The institutional, military and industrial adjustments unfolding there will shape global value chains, technology standards, regional integration and the long-term stability of the global political economy.

Together, these geopolitical dynamics reinforce and deepen the macro-fragmentation described in Section 2. The combination of prolonged conflict and strategic rivalry is reshaping national priorities, altering fiscal strategies and influencing patterns of investment, production and technological development. These structural shifts form the backdrop for the sectoral transformations examined in the next section.

4. Sectoral Changes: Defence, Pharmaceuticals and the Green-Energy Transition

The structural consequences of the current geopolitical and macroeconomic environment are particularly visible in several knowledge-intensive sectors. As Berggren's 2023 editorial noted, defence, pharmaceutical innovation, and the green-energy transition were already undergoing significant realignment driven by crisis conditions and long-term technological trajectories (Berggren, 2023). Developments since then have intensified these patterns, revealing wider and more durable transformations than initially anticipated. These sectoral shifts are not isolated, but part of a broader pattern of simultaneous reorganisation across multiple sociotechnical regimes. Together, they reflect the kind of system-wide reorientation highlighted in the deep transition perspective (Schot & Kanger, 2018), in which geopolitical tensions, technological shifts, climate pressures, and industrial policy interventions interact to create new production systems, organisational capabilities, industry trajectories, meta-rules, and regimes.

4.1 Defence Industries and the Reconfiguration of Security Production

The defence sector has experienced one of the most substantial structural shifts of the decade. After years of limited expansion—and in several European states, a long-term political and societal de-institutionalisation of the military marked by underinvestment, reduced training, and diminished organisational capacity—the combined effects of the war in Ukraine, rising tensions in East Asia, and renewed strategic commitments across NATO have driven sustained increases in defence spending. Governments in Europe, North America and the Indo-Pacific are expanding production capacity, revising procurement practices and investing in more resilient defence supply chains (SIPRI, 2024).

These adjustments have exposed bottlenecks—particularly in ammunition supply, microelectronics and specialised components—that illustrate how decades of efficiency-oriented procurement left defence systems vulnerable to sudden demand shocks. As a result, states are adopting longer-term planning horizons, encouraging industrial upgrading and prioritising supply-chain redundancy (Hellberg & Lundmark, 2025). The rapid proliferation of drone systems and loitering munitions has further revealed gaps in European and North American defence ecosystems, where limited domestic production, insufficient counter-drone capabilities and dependence on foreign suppliers demonstrate how far existing force structures lag behind the technological pace of contemporary warfare (Andersson & Simon, 2024). The increasing importance of dual-use technologies—especially in artificial intelligence, robotics and space systems—reinforces the need for coordinated strategies that bridge defence and civilian technological development (Hadji-Janev, 2025). Together, these developments underscore that defence innovation is no longer driven solely by military demand but by the intersecting pressures of security imperatives, technology competition and industrial resilience.

Why this matters: Defence-sector transformation has far-reaching implications for industrial capacity, technological leadership and national security. The new demands on production systems, supply chains, and dual-use technological integration reshape not only military readiness but also broader innovation ecosystems, labour markets, and long-term strategic autonomy.

4.2 Pharmaceutical Innovation, Biomanufacturing Capacity and Post-Pandemic Resilience

The pharmaceutical sector and broader healthcare systems continue to evolve in the aftermath of the COVID-19 pandemic, building on the scientific and organisational momentum generated by accelerated vaccine development and emergency health responses. The rapid success of mRNA platforms demonstrated the value of sustained research investment and collaboration between large pharmaceutical firms, specialised biotechnology companies and public health institutions. Partnerships such as the Pfizer–BioNTech alliance illustrate how asymmetric collaborations can accelerate innovation and organisational learning under crisis conditions, while advances in diagnostics, digital health tools and telemedicine have reshaped models of healthcare delivery.

At the same time, the pandemic exposed significant vulnerabilities in global pharmaceutical and healthcare supply chains, including concentrated production of active pharmaceutical ingredients, shortages of essential medical equipment, and limited domestic biomanufacturing capacity in many advanced economies. Recent OECD analyses highlight a growing policy emphasis on supply-chain resilience, regulatory preparedness, and coordinated innovation strategies as governments seek to strengthen long-term public-health capacity (OECD, 2023a; OECD, 2023b). These concerns extend beyond pandemic preparedness. They encompass broader debates about equitable access to medicines and healthcare services, domestic production capabilities in critical health technologies, data-governance requirements for digital healthcare and the balance between cost efficiency and security of supply.

These transformations unfold alongside a new global epidemiological challenge: the rapid rise of obesity and metabolic disorders. WHO estimates indicate that more than one billion people worldwide now live with obesity, making it one of the fastest-growing global health burdens (WHO, 2025). This trend has triggered a wave of pharmaceutical innovation centred on GLP-1 agonists such as semaglutide and tirzepatide, which have reshaped expectations around chronic-disease management and opened new multi-billion-dollar markets (Jansen et al., 2025). The sudden surge in global demand has exposed production bottlenecks, highlighted the complexity of biomanufacturing processes, and intensified competition among firms and states seeking to secure supply. These developments reflect how demographic trends, chronic-disease burdens, and the uneven global distribution of innovation and manufacturing capacity are reconfiguring healthcare and pharmaceutical systems.

As countries re-evaluate pharmaceutical governance, healthcare-system resilience, and industrial capabilities, the health sector increasingly reflects wider realignments in national and international strategy. These realignments include renewed investment in public-health infrastructure, expanded biomanufacturing capacity, strengthened regulatory frameworks and deeper collaboration among pharmaceutical firms, healthcare providers and government agencies. Together, these developments indicate that pharmaceutical innovation and healthcare-system transformation—reinforced by emerging technologies such as artificial intelligence—have become central components of the broader restructuring of industrial policy and public-health governance in the post-pandemic era.

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Why this matters: Pharmaceutical and healthcare-system transformations influence economic productivity, labour-force health, public-sector expenditure and long-term national resilience. The intersection of chronic-disease burdens, biomanufacturing capacity and digital-health innovation shapes countries' ability to manage future crises and sustain competitiveness in science-based sectors.

4.3 The Green-Energy Transition and Crisis-Driven System Reorganisation

The energy sector provides another clear illustration of crisis-induced restructuring. The disruption of European gas markets in 2022 triggered unprecedented adjustments, prompting rapid expansion in investment in renewable energy, storage technologies and grid modernisation. While short-term responses included increased reliance on fossil fuels to stabilise supply, long-term strategies have shifted decisively toward diversification and system resilience. Recent assessments by the International Energy Agency show that investments in renewable energy deployment are now driven not only by climate objectives but also by energy security concerns and industrial policy incentives (IEA, 2022).

Yet the transition has also revealed structural challenges. These include the need for substantial grid upgrades, enhanced storage capacity and improved system balancing to integrate variable renewable energy at scale. The WTO's Global Value Chain Development Report (2023) highlights how demand for critical minerals essential to clean-energy technologies has intensified competition for resources and introduced new dependencies across global value chains (WTO, 2023). These developments demonstrate that the green-energy transition is not only a technological transformation but a profound industrial reorganisation shaped by climate pressures, supply-chain constraints (Johansen, 2020; Johansen, 2023), circular economy (CE)practices (Nuur et al., 2025), and geopolitical considerations.

In parallel, many countries are revisiting or accelerating nuclear-power construction plans as part of their long-term energy and industrial strategies. Rising electricity demand, heightened energy-security concerns, and the material constraints of rapid renewable-energy scaling have renewed interest in both large-scale reactors and new-build "advanced" designs, including small modular reactors (SMRs) (IEA, 2025). Recent assessments by the International Atomic Energy Agency highlight growing global engagement in new nuclear projects, repowering initiatives, lifetime-extension programmes and financing mechanisms aimed at integrating nuclear power into broader decarbonisation and energy-security frameworks (IAEA, 2024). This renewed momentum reflects a strategic recognition that nuclear capacity—despite high upfront costs and lengthy development timelines—provides stable baseload generation, supports electrification, reduces import dependence and strengthens long-term system resilience. Nuclear construction also carries significant industrial implications, including complex supply-chain requirements, specialised workforce capacity needs, institutional capability-building, and geopolitical competition over reactor technologies, fuel cycles, and regulatory frameworks.

Why this matters: Energy system restructuring affects virtually all sectors of the economy. The emergence of multi-track transitions—combining renewables, nuclear power, storage and grid modernisation—reshapes industrial strategy, technological pathways, energy security and long-term economic resilience.

4.4 Implications Across Sectors

Taken together, the developments in defence, pharmaceuticals and green energy illustrate how war, geopolitical tensions, climate pressures and industrial-policy shifts interact to reshape technological trajectories and long-term industrial capabilities. Across these sectors, governments and firms face similar complex challenges: balancing short-term crisis response with long-term strategic investment, strengthening domestic capabilities while navigating global interdependence and integrating emerging technologies into legacy organisational structures.

The convergence of security imperatives, technological competition, and climate constraints creates cross-sectoral pressures that reinforce the need for coordinated, mission-oriented national innovation policies and strategies, as well as the synchronization of multi-sector dynamics. In defence, this involves rebuilding supply chains, scaling production capacity and integrating dual-use technologies. In healthcare and pharmaceuticals, it requires combining biomanufacturing capacity, regulatory preparedness and equitable access to essential technologies. In energy, multi-track transition pathways—spanning renewables, storage, nuclear power and grid modernisation—demand sustained institutional capability and long-term policy coherence.

Why this matters: Sectoral transformations reveal the structural pressures reshaping national economies. They highlight the growing importance of resilience, capability building, and mission-oriented innovation policies & strategies as governments confront overlapping geopolitical, climate, and technological disruptions.

5. Emergent Issues Shaping the Global Political Economy

Beyond the sectoral transformations discussed above, several cross-cutting developments have gained prominence in recent years. These emergent structural forces interact with geopolitical fragmentation, climate pressures, and industrial reorganisation, jointly shaping the long-term strategic environment confronting states, firms, and institutions. The themes outlined below—digital governance, demographic shifts, financial vulnerabilities, the global industrial-policy turn and rising social and political pressures—illustrate how conditions have evolved beyond immediate crisis response and now influence the deeper trajectory of economic and institutional change.

5.1 Politicisation of Technology Standards and Data Governance

The politicisation of technology standards and digital governance has become a central feature of international economic relations. Research in international security and digital-policy studies shows that digital infrastructures, data flows and algorithmic systems have increasingly become arenas of geopolitical competition (Wang, 2025). This competition is reinforced by widening regulatory divergence among the United States, the European Union and China, particularly in relation to privacy rules, algorithmic transparency and platform governance. These differences create parallel regulatory ecosystems that generate new forms of institutional uncertainty for firms operating across borders (Farrell & Newman, 2019; Jansen et al., 2023; Wagner, 2022).

Political considerations now shape international standard-setting processes in areas such as artificial intelligence, cybersecurity, 5G and quantum technologies. Several studies document how governments view standardisation not as a neutral technical activity but as a strategic domain where influence over norms provides long-term advantages in innovation and supply-chain architecture (Heeks et al., 2024; Kim et al., 2020). Comparative analyses show that the regulatory approaches of major powers reflect deeper institutional and strategic differences, resulting in competing frameworks for algorithmic accountability and risk governance (Bisson et al., 2023). Other studies highlight how state participation in international standardisation bodies has become a deliberate component of industrial policy, used to support domestic technological competitiveness and geopolitical positioning (Gornet & Herman, 2024; Rühling, 2023; Seaman, 2020).

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Why this matters: The politicisation of digital governance fragments technological ecosystems, raises compliance costs, and reshapes the competitiveness of firms and states, making standards a core dimension of contemporary geoeconomic rivalry.

5.2 Demographic Shifts and Long-Term Economic Capacity

Demographic change has emerged as a major structural driver of economic and institutional transformation. While China's demographic decline has received significant attention, recent analyses reveal that ageing populations and declining fertility rates increasingly affect a wider group of advanced economies (Fang et al., 2023; Jarzebski et al., 2021; Lee & Song, 2025). The IMF's World Economic Outlook (2024) highlights that shrinking working-age populations intensify fiscal pressure on welfare and pension systems while constraining long-term growth potential. These demographic realities also shape national industrial strategies by influencing labour supply, skill availability, and countries' capacity for innovation and organisational adjustment.

In contrast, regions experiencing youth bulges or rapid urbanisation face different structural pressures. These economies must expand employment opportunities, build infrastructure and avoid institutional overstretch (Onyeiwu, 2024). The World Bank's World Development Report 2023 notes that divergent demographic trajectories contribute to shifts in global labour markets, migration flows and participation in global value chains. These demographic patterns interact with climate shocks, fiscal constraints and geopolitical tensions, influencing national development priorities and the distribution of innovation capacity across regions.

Why this matters: Demographic trends affect labour supply, fiscal sustainability and innovation capabilities, shaping the strategic options available to governments and firms navigating accelerating technological and geopolitical change.

5.3 Financial System Vulnerabilities and Investment Pressures

Financial vulnerabilities have become increasingly prominent alongside demographic pressures. Rising interest rates, elevated public debt and the need for large-scale investment in defence, decarbonisation and digital infrastructure have created significant fiscal constraints in many advanced economies. The OECD's Sovereign Borrowing Outlook 2024 shows that refinancing requirements have risen substantially, increasing governments' exposure to interest-rate volatility and shifts in market sentiment (OECD, 2024). These fiscal pressures coincide with expanding security commitments and major industrial-policy programmes, narrowing fiscal space and complicating long-term planning.

Climate-related financial risks further exacerbate these pressures. Studies show that climate shocks influence asset valuations, credit spreads, and institutional investment strategies, with implications for financial stability (D'Orazio, 2024; Giglio et al., 2021; Jondeau et al., 2021; Zhang et al., 2025). Research in ecological economics emphasises that transition risks embedded in carbon-intensive sectors can propagate through financial networks, amplifying systemic vulnerabilities (Battiston et al., 2022).

Why this matters: Financial fragility constrains governments' ability to invest in long-term transformation, affecting defence capacity, clean-energy deployment and governance of emerging technologies.

5.4 A Worldwide Industrial-Policy Turn: Divergent Strategies and Shared Drivers

Industrial policy has moved to the centre of economic strategy across advanced, emerging and developing economies. This shift reflects structural forces rather than temporary crisis measures (Irwin, 2023). In the United States, initiatives such as the Inflation Reduction Act and the CHIPS and Science Act represent the most expansive return of state-supported industrial investment in decades, integrating climate objectives, national security and technological competitiveness within a coordinated strategic framework (McNamara, 2024). The European Union has similarly departed from its earlier market-liberal paradigm, adopting instruments such as the Net-Zero Industry Act, Important Projects of Common European Interest (IPCEIs) and strengthened investment-screening mechanisms. These developments illustrate the EU's emerging "geopolitical turn," in which industrial policy is increasingly intertwined with strategic autonomy and institutional consolidation (McNamara, 2024).

China represents a third — and analytically distinct — trajectory. While China had limited industrial policy before 2006, it has since undertaken large-scale interventions targeting frontier technologies through programmes such as Strategic Emerging Industries, the Innovation-Driven Development Strategy and expanded industrial guidance funds (Naughton, 2021). These efforts illustrate long-term attempts to build technological self-reliance in response to global competition. Emerging economies are also repositioning themselves within this shifting landscape. WTO analyses show that supply-chain diversification, exposure to external shocks and new opportunities in green and digital sectors have prompted governments in Southeast Asia, Latin America and parts of Africa to adopt more targeted industrial strategies (WTO, 2023). The OECD notes, however, that these ambitions often confront institutional constraints, including skill shortages and limited technological capacity (Millot & Rawdanowicz, 2024).

Across all these contexts, industrial policy has re-emerged as a central instrument for managing geopolitical uncertainty, climate transitions and technological rivalry. Comparative political-economy research shows that policy effectiveness ultimately depends on domestic institutional capacity, political coalitions and the alignment of state–business relations (Bulfone, 2023; Armstrong, 2021).

> ***Why this matters:*** Industrial policy now shapes technological trajectories, reconfigures global value chains and strengthens economic resilience in an increasingly fragmented world.

5.5 Social and Political Pressures in Advanced Economies

Advanced economies face intensifying social and political pressures as governments navigate the combined demands of defence commitments, climate transitions and demographic change. Rising living costs, widening regional disparities and labour-market volatility have contributed to heightened public debate over fiscal priorities and the distribution of state resources. As the share of older citizens grows, welfare and pension systems face additional strain, requiring governments to balance social expenditure with investment in industrial transformation and public-sector capacity. These pressures interact with demographic shifts, generating complex trade-offs between sustaining social cohesion and financing long-term transitions (Hartley & Abels, 2025; Maravilla & Tan, 2025).

Political fragmentation further complicates these dynamics. Evidence from behavioural studies shows evolving expectations regarding the roles of the state, households and individuals in providing social protection, with shifting perceptions of responsibility shaping the political feasibility of pension reform and welfare restructuring (Streimikienė, 2025). Increased demand on health and social-care systems—particularly in ageing societies—adds further pressure to reconcile capacity constraints with fiscal sustainability (Zhou et al., 2025).

Why this matters: Social and political pressures influence policy continuity, institutional resilience and the long-term viability of industrial and technological strategies.

6. AI, Organisational Adjustment and Industrial Strategy

Artificial intelligence has emerged as a central force reshaping organisational routines, labour-market dynamics and national strategic priorities. Unlike earlier waves of digitalisation, AI acts as a general-purpose technology whose effects extend beyond technical substitution to encompass institutional capacity, workforce adaptability, and long-term capability formation. Its diffusion therefore generates a multi-level transformation that links micro-level organisational change with meso-level labour-market pressures and macro-level industrial strategy. This section synthesises these dynamics across four interrelated themes.

6.1 Organisational Transformation and AI Adoption

Digital technology adoption alters foundational organisational routines, decision-making structures and coordination mechanisms. Early analyses highlight that successful deployment depends as much on internal organisational capability, data governance and cross-functional coordination as on the technical performance of AI systems themselves (Hazarika, 2020; Karabag et al., 2026). AI-supported processes introduce new forms of operational risk, including algorithmic errors and misaligned outputs when contextual information is missing or poorly integrated. These risks necessitate redesigned oversight routines, iterative testing cycles and hybrid forms of team-based judgement that combine human discretion with algorithmic outputs (Bernstein et al., 2023).

Organisations also face tensions between automation and professional judgement—particularly in domains reliant on tacit knowledge, situational awareness or ethical interpretation. These tensions influence how managers prioritise AI deployment, redesign workflows, and reassign responsibilities between automated and human-led tasks (Bernstein et al., 2025). At the same time, firms are integrating emerging competencies such as prompt engineering, data fluency and human–AI interaction into both operational and managerial roles (Korzynski et al., 2023). Effective AI adoption, therefore, requires continuous-learning structures and cognitive adaptivity to accommodate evolving system behaviour and maintain resilience during periods of rapid technological change (Fernández-Miguel et al., 2025).

Why this matters: AI adoption reshapes the internal architecture of organisations, influencing decision authority, operational risk, productivity and organisational learning. It determines not only how firms operate today but how they will compete and adapt in an AI-intensive economic environment.

6.2 Workforce Capacity, Demographic Constraints and Implementation Challenges

Demographic pressures and workforce-capacity constraints heavily shape the organisational transformation driven by AI. Ageing populations, labour shortages and rising service demands intensify the need for automation and AI-enabled assistance, particularly in labour-intensive sectors such as eldercare, diagnostics and public administration (Maravilla & Tan, 2025). As experienced personnel retire and turnover increases, capacity for training, oversight and troubleshooting becomes unevenly distributed across organisations and regions.

Empirical evidence from frontline health and social-care settings shows that AI implementation frequently encounters resistance, uncertainty and capability gaps—especially when staff lack training or when new systems alter established routines (Badawy & Shaban, 2025; Ezeudoka & Fan, 2024). Digital divides, variations in technological literacy and unequal access to training resources further deepen capability disparities. AI deployment, therefore, depends not only on technical tools but on the institutional capacity of organisations to manage training infrastructure, middle-management load, and organisational support systems.

Why this matters: Workforce readiness is a binding constraint on AI diffusion. Without adequate training, institutional bandwidth and workforce adaptability, AI systems fail to deliver promised gains and can even amplify inequalities, reduce service quality or strain public-sector delivery systems.

6.3 AI as a Strategic Asset in National Industrial Policy

At the macro level, AI has become a foundational pillar of national industrial strategies. Mission-oriented and transformative innovation policies increasingly position AI as an enabling technology that intersects with objectives such as climate transition, advanced manufacturing, health-system modernisation and critical-infrastructure resilience (Mazzucato & Willetts, 2019). Effective AI-intensive industrial strategies require coherent mixes of instruments—public procurement, conditional subsidies, coordinated R&D programmes and new governance arrangements capable of steering innovation (Criscuolo & Lalanne, 2024).

The success of such strategies hinges on the administrative and organisational capacity of the state. Policy durability, coordination capability, and state–business partnerships influence whether AI investments translate into long-term capability formation (Estevez et al., 2025). Comparative political-economy research shows that sustaining industrial strategies across electoral cycles and geoeconomic shocks depends on institutional alignment and stable political coalitions (Bulfone, 2023; Bulfone et al., 2025).

Geopolitical competition reinforces the strategic importance of AI. Concerns about technological sovereignty, supply-chain resilience and foreign digital dependencies have prompted states to link AI policy to semiconductor strategies, data-governance frameworks and reshoring initiatives (McNamara, 2024). Defensive elements of industrial strategy—including protecting national champions and regulating AI-intensive supply chains—reflect broader attempts to manage vulnerabilities in a fragmented global economy (Germann, 2023; Naughton, 2021; Schneider, 2023).

Why this matters: AI now shapes national competitiveness, technological sovereignty and the resilience of industrial systems. States that fail to build AI-capable institutional and industrial capacity risk falling behind in the evolving geoeconomic landscape.

6.4 Education, Skills and the Transformation of Learning Systems

The organisational and strategic significance of AI places new demands on education systems, skill formation and national learning infrastructures. As AI reshapes job roles and competency requirements, education systems must adapt curricula to support digital literacy, interdisciplinary analytical skills and effective engagement with AI-enabled tools (Lindell & Stöhr, 2025; Pedro et al., 2019). Universities, vocational institutions and professional training systems increasingly function as strategic assets for national competitiveness, underpinning society's ability to absorb and steer technological change (Jakob et al., 2025).

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Lifelong learning becomes indispensable as firms rely on internal training, AI-assisted learning platforms and new instructional models to keep pace with evolving technologies (Chen, 2024; Ekuma, 2024). Yet uneven access to training opportunities and differences in digital literacy deepen capability divides across regions and socioeconomic groups. These disparities affect organisational performance (Kassa & Worku, 2025), labour mobility, social inclusion and national economic resilience.

Why this matters: AI-driven transformation depends on the strength of national learning systems. Without robust skill formation, adaptive curricula and coordinated institutional capacity, countries cannot sustain long-term innovation, organisational adaptability or industrial competitiveness in an AI-intensive global economy.

7. Concluding Reflections

The developments traced throughout this editorial point toward a global political economy undergoing a profound and durable transformation. What began as a sequence of shocks early in the decade has evolved into a structural reorientation shaped by the interlocking forces of prolonged conflict, geopolitical fragmentation, climate-induced disruptions and accelerating technological rivalry. The cumulative effect of these pressures is not merely incremental change but the emergence of a new strategic context that reshapes how states, firms and institutions operate.

At the macro level, the transition from efficiency-driven to politically conditioned globalisation has reconfigured the organisation of global value chains and the terms of international economic cooperation. Geopolitical tensions have reinforced this reorganisation, anchoring security considerations at the centre of economic decision-making and industrial-policy design. These shifts have been most visible in defence, pharmaceuticals and the green-energy transition, where crisis conditions and technological imperatives have generated new trajectories for capacity building, innovation and industrial organisation.

At the same time, a set of cross-cutting structural pressures—demographic change, financial vulnerabilities, politicised technology governance and evolving social expectations—has further complicated the landscape in which governments and firms must act. These emergent dynamics shape not only national policy choices but also the distribution of risk and opportunity across regions and sectors. As these pressures intensify and combine, they amplify one another and create new institutional dependencies that require sustained strategic coordination.

Artificial intelligence represents a critical inflection point within this broader transformation. As Section 6 highlighted, AI reshapes organisational routines, labour-market capacity, industrial strategy and national learning systems. Its diffusion exposes the degree to which long-term competitiveness relies on robust institutional infrastructures, adaptive skill systems and the administrative capability to steer innovation. AI therefore acts both as a catalyst of economic transformation and as a stress test for institutional resilience in an era marked by rapid technological change, geopolitical rivalry and deepening socio-economic pressures.

Taken together, these developments signal that the coming decade will require new forms of strategic alignment across organisational, national and international levels. Taken together, these developments reflect the type of system-wide sociotechnical reorientation described by Schot & Kanger (2018) as a deep transition, in which multiple regimes undergo simultaneous and mutually reinforcing structural change. The structural forces analysed in this editorial will continue to shape the direction and pace of global transformation, underscoring the need for sustained analytical attention and informed policy debate.

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Why this matters: The interplay of conflict, climate pressures, technological rivalry and institutional adaptation defines the emerging global economic landscape. Grasping these interdependencies is essential for developing effective industrial strategies, organisational capabilities and policy frameworks capable of sustaining resilience, competitiveness and social stability in the turbulent years ahead.

8. A broad research agenda for JAEBR contributors

The Journal of Applied Economics and Business Research presents opportunities to deepen empirical understanding, refine theoretical perspectives, and support evidence-based policy design in an era defined by accelerating structural change. Together, these research directions reflect the interacting forces of a multi-regime and multi-system transformation — a 'deep transition' (Schot & Kanger 2018). JAEBR will be open for a wide range of theoretical and empirical contributions that advance our understanding of the many challenges and dilemmas specified below.

8.1 Macro-Level Transformations in a Fragmented Global Economy

A. How does the emerging fragmented globalisation influence firms' long-term investment decisions, location strategies, and risk-management practices across advanced and emerging economies?

B. What financial-governance mechanisms are needed to manage climate-induced macroeconomic losses and their distributional effects?

C. In what ways do geopolitical alignments reshape trade flows, supply-chain architectures and the diffusion of strategic technologies?

D. How do the interaction of the geopolitical, climate and technological forces contribute to a "deep transition" across multiple sociotechnical systems?

8.2 Geopolitical Tensions, Security Priorities, and Economic Strategy

A. What are the long-term fiscal and institutional implications of sustained defense commitments for welfare states, public budgets, and industrial-policy renaissance?

B. How do defense-sector innovations and dual-use technologies spill over into civilian industries and affect broader technological trajectories?

C. How do East Asian security tensions alter regional economic integration, industrial planning, and supply-chain reconfiguration?

D. What are the possible pathways for Europe to achieve strategic autonomy in terms of supply-chain management, critical resource assess, cloud computing and self-defense capabilities?

8.3 Sectoral Realignments and Industrial Capabilities

A. Which organisational and institutional capabilities could enable the scaling of green-energy infrastructures under conditions of geopolitical volatility and climate instability?

B. How do pharmaceutical firms and regulatory agencies balance supply-chain resilience, cost efficiency and equitable access in post-pandemic governance arrangements?

C. What combinations of state intervention and private-sector capability building strengthen resilience and long-term innovation in defense-industrial ecosystems?

8.4 Circular Economy (CE), Material Efficiency and Global Production Systems

A. Will circular-economy strategies reshape global value chains and the organisation of material flows across manufacturing sectors?

B. How do CE practices interact with critical mineral dependencies associated with the green-energy transition and advanced manufacturing?

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C. What institutional arrangements, industrial policies and cross-sector collaborations support large-scale circular-economy transitions in resource-intensive sectors?

D. What role do AI, digital platforms, and data governance play in supporting material tracking, recovery, and circular supply-chain management?

8.5 Emerging Structural Pressures and Systemic Risks

A. How do demographic shifts affect productivity, innovation capacity, and sectoral competitiveness in workforce-constrained economies?

B. What forms of macro-financial regulation can mitigate systemic risks associated with decarbonisation, climate-related financial shocks and high public-debt levels?

C. How does the politicisation of digital, data and AI standards shape firm-level strategies, market access and technological upgrading in data-intensive sectors?

8.6 AI, Organisational Adaptation and National Capability Formation

A. What organisational routines and governance arrangements enable a safe and effective integration of AI into managerial and operational processes in open economies?

B. How do national learning systems, vocational institutions and public agencies shape firms' capacity to adopt AI and participate in AI-intensive global value chains?

8.7 AI, Sectoral Institutions and Changing Professional Logics

Healthcare

A. How does AI reconfigure medical decision-making, professional authority and accountability structures within healthcare organisations?

B. In what ways do AI-enabled diagnostic, triage, and administrative systems influence the institutional logics that govern healthcare delivery?

C. How do regulatory and ethical frameworks evolve as algorithmic systems gain a larger role in clinical and managerial decision processes?

Education

A. How does AI challenge existing professional logics around pedagogy, assessment, curriculum design, and academic expertise?

B. How does AI adoption interact with institutional norms concerning academic freedom, professional autonomy, and educational quality?

Public Administration

A. How does AI reshape bureaucratic routines, administrative discretion and the institutional logic of public-sector decision-making?

B. What new accountability and transparency challenges emerge when algorithmic systems mediate public-service delivery?

Finance, Energy, Manufacturing

A. How does AI influence risk assessment, supervisory practices and compliance routines in highly regulated financial institutions?

B. What institutional frictions arise when AI-enabled predictive systems are deployed in energy management and logistics?

C. How do manufacturing firms incorporate AI-driven quality control, predictive maintenance and robotics into established technological and organisational logics?

8.8 Digital Infrastructure, Cybersecurity, and Data Sovereignty

A. What forms of digital-infrastructure governance are required to manage cybersecurity risks in a world of politicised data flows and rising geoeconomic tensions?

B. What organisational capabilities do firms need to operate securely within increasingly fragmented digital ecosystems, especially in sectors dependent on real-time data?

C. How do cyber vulnerabilities, digital-infrastructure asymmetries, and uneven regulatory regimes influence national security and financial stability?

D. What role do international standards, cross-border data-governance frameworks, and digital-trade agreements play in shaping firms' strategic options and technology pathways?

8.9 Global Migration, Workforce Mobility, and Talent Competition

A. What new forms of migration governance and labour-market policy are required as advanced economies confront acute shortages in strategic sectors such as health care, engineering, defense, energy, and AI-intensive industries?

B. How does the global competition for scientific, technical, and digital talent influence national innovation systems, firm-level productivity, and the distribution of industrial capabilities?

C. What types of restrictions on immigration and international student flows damage countries' long-term ability to sustain innovation and public-sector capacity, and what types minimize this damage while maintaining broad popular support?

Closing Note: Together, these research questions highlight the breadth of analytical and empirical challenges emerging from the transformations analysed in this editorial. Addressing them will contribute to a deeper understanding of the evolving global economy and support the development of strategies that enhance resilience, competitiveness, and long-term societal welfare across sectors, regions, and institutional domains.

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