DISCUSSION PAPER

# Navigating the future

## Four scenarios assessing child well-being in the twenty-first century

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# Contents


**Introduction** 3

**I. What is the current state of the world?** 4

**II. What about the future?** 5

**III. Divided prosperity: Our current path** 6

**IV. Global synergy: A better world** 8

**V. Fragmented world and struggling together: Constrained resources and crises** 11

**VI. Moving to a sustainable world** 15

Annex 1: Methodology note 16

Appendix: Data sources 19

Endnotes 21

# Introduction

As we move through the twenty-first century, humanity faces a complex array of challenges. These mutually reinforcing issues include climate change and geopolitical instability, as well as persistent socioeconomic disparities that have profound implications for children's well-being.[1] At such a critical crossroads, policy choices we make today will determine the welfare of future generations. In their interest, addressing this complex web of collective action problems demands a broad-based, integrated analysis focussed on comprehensive and equitable solutions.

To further our understanding of how these challenges impact human development over time, this study presents four quantified scenarios of the long-term future. These scenarios model the implications on development, climate change and geopolitics of varying levels of technological advancement, resource utilization, and economic and geopolitical cooperation.

Technological advancement and material resources form the backbone of human development. The ability to use machines to do work, share information, and produce and distribute food, energy and knowledge is essential, but the production of these resources has a significant environmental cost. Such resources can be used with greater or less efficiency, and their future availability is a major uncertainty. For example, if energy or food becomes scarce, the most vulnerable people will suffer, and they are often children.

Levels of global cooperation also have significant effects on children's well-being. As more countries cooperate, violent conflict can reduce, and collective action problems, such as climate change, can be more effectively managed. The future of global cooperation is also a major uncertainty that is assessed in this report.

Here we take a journey through these four transitional pathways, with each scenario reflecting unique challenges and opportunities. The objective of this study is to present policymakers and stakeholders with an anticipatory framework for understanding future development pathways. The framework adopts a systemic approach to catalyse proactive strategies that create a resilient and equitable environment for future generations. However, before we move to the future, we begin by describing how we arrived at this point in time.

# I. What is the current state of the world?

In recent decades, human development has made great strides, characterized by improvements in life expectancy, educational attainment and economic growth. Over the last 50 years, average life expectancy has risen by over 17 years, and average years of educational attainment have more than doubled. Today, more babies than ever before are surviving, with mortality rates for under 5s more than halving since 1990.[2]

This improvement in developmental outcomes reflects sustained efforts by governments, international organizations and civil society to promote investment in schools and health systems, pushing more children through processes that shape their worldview.

Despite general progress in human development, challenges persist. In 2023, over 734 million people, or 9.2 per cent of the global population, were living in extreme poverty, with the majority residing in Central and South Asia (CSA) or Sub-Saharan Africa (SSA).[3] Undernutrition affects over 690 million people globally, including 144 million children who suffer from stunting.[4] Of the 85 million children facing malnutrition, over 75 per cent live in CSA or SSA. These regions also face considerable hurdles in providing universal access to education. Although the number of out-of-school children has reduced by over 35 per cent in the past two decades, there is still a long way to go, with 64 million primary-school-age children remaining out of school.[5]

While advancements in resource availability, technology and infrastructure have dramatically improved systemic resilience to disease and early mortality, geographical disparities continue to exist. In 2024, child mortality rates remain alarmingly high in SSA (72 deaths per 1,000 live births) and CSA (37 deaths) against a Sustainable Development Goal (SDG) target of reducing the number of deaths to below 25 by 2030.[6] Similarly, infant mortality rates also remain high in these regions.

Human development comes at a significant cost to the environment. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) reports that approximately 1 million species are at risk of extinction within the coming decades due to human activities.[7] Air pollution causes around 6.7 million premature deaths annually, as well as widespread ecological damage; it presents heightened challenges to young children, with almost 2,000 under 5s dying because of health impacts linked to air pollution.[8] The Sixth Assessment Report of the Intergovernmental Panel on Climate Change also confirms that human activities drive climate change, resulting in species loss, increased disease prevalence, mass mortality events and damaged ecosystem services.[9]

Despite a promising transition to renewable technologies and their cost-effective deployment, fossil fuels, such as coal, oil and gas, remain the dominant global energy sources, with production from these sources increasing from 16.4 billion barrels of oil equivalent (BBOE) in 1960 to 84 BBOE in 2024. This has exacerbated environmental degradation and climate change, contributing to rising

carbon emissions and increased carbon dioxide (CO2) concentrations in the atmosphere.

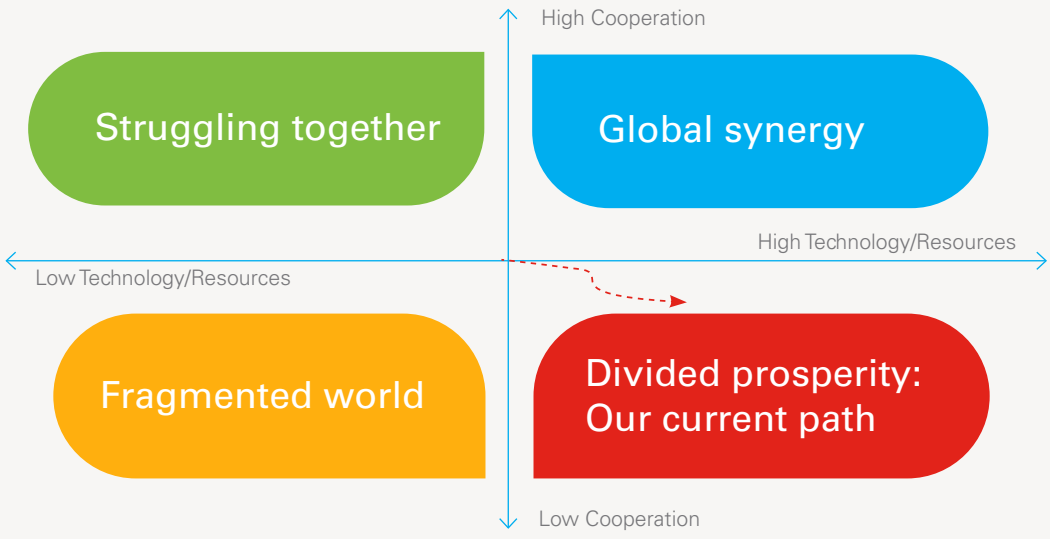
Additionally, the inherent conflict of human development within a fossil-fuel-based economic system has unfolded amid escalating geopolitical tensions. According to the Uppsala Conflict Data Program,[10] 2022 saw the largest number of conflicts – a total of 182 – for any year since the end of the Cold War. Civil wars have mushroomed into internationalized conflicts, the number of *coups d'état* has increased, especially in West Africa, and international conflicts have led to the deaths of hundreds of thousands, including many women and children.

# II. What about the future?

Given the nature of these interconnected challenges, how should we make decisions to promote present and future well-being that do not compromise natural systems? How do we adapt our current development path – marked by improved well-being at the cost of significant environmental damage and persistent violent conflict – to a more sustainable one that benefits current and future generations, as well as the environment?

We present four scenarios constructed using the International Futures (IFs) modelling platform to better understand our current trajectory and alternative paths.[11] These scenarios focus on two primary dimensions of uncertainty – one driven by technology and resources, and the other by patterns of international cooperation – to describe four distinct worlds. While our current path is unsustainable

**Figure 1: The 2 x 2 matrix. The dotted arrow points to the most likely development path in the context of current policies and priorities.**



in terms of environmental stability and social cohesion, we outline some potential ways forward. We present the conceptual framework used here (see Figure 1).

This framework captures the critical interplay between two key dimensions that shape global development and children's welfare: Technological advancements influence productivity and resource utilization, while cooperation determines the ability to manage collective action problems, such as climate change and geopolitical tensions. Together, these uncertainties will significantly shape future patterns of child well-being and sustainable development.

# III. Divided prosperity: Our current path

A world of divided prosperity extends long-term trends and developmental dynamics that have characterized the global system since the end of the Cold War. This is a world with significant technological and material resources, although they are unequally distributed. Indeed, here, technological advances, such as artificial intelligence (AI), drive productivity gains and material progress in developed countries but are more slowly adopted in infrastructure-poor developing nations, reinforcing existing inequalities. The development path we are on is characterized by low levels of international cooperation, leading to persistent violent conflicts, as well as growing threats from a changing climate.

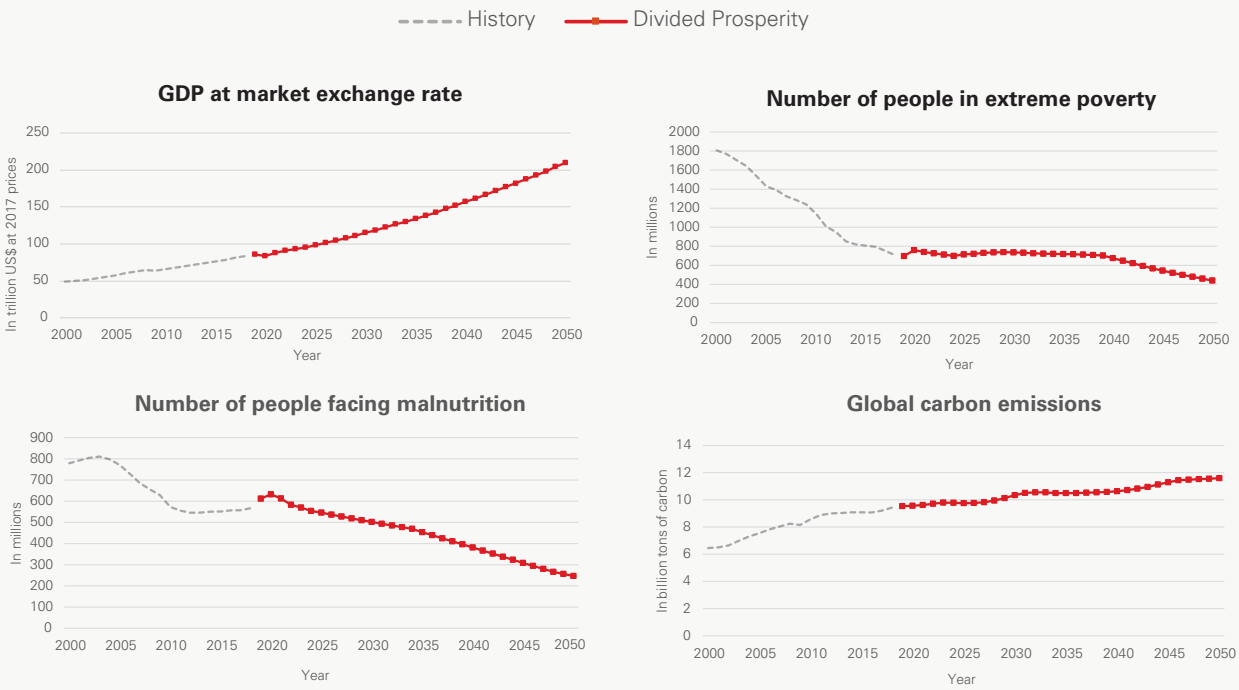
In this scenario, global gross domestic product (GDP) rises from US$95.4 trillion in 2024 to US$210 trillion by 2050, and GDP per capita grows from US$17,100 to US$28,500. Developing economies in regions such as CSA and SSA are poised for significant annual economic growth in the coming decades. However, rapid population growth in these regions drives modest gains only in GDP per capita, which will fall short of the current global average by 2050.

Amid this uneven economic expansion, there are positive improvements in well-being outcomes. By 2050, extreme poverty lowers, with 265 million fewer people living in poverty, and the global percentage declining from 8.6 per cent today to 4.7 per cent. In SSA, extreme poverty rates fall from 35 per cent (423 million) in 2024 to 15 per cent (277 million) in 2050. Malnutrition is also projected to halve globally, with numbers falling from 554 million today to 247 million by 2050. In SSA alone, malnutrition rates decline from 17.2 per cent to 6.1 per cent.

Despite these advances, the elimination of hunger and poverty remains a distant goal. By 2030, only 99 countries are expected to be on track to eliminate extreme poverty, with 75 still struggling by 2050. The goal of eradicating hunger will be achieved by 109 countries by 2030, rising to 126 countries by the middle of the century.

The resources required to drive these mixed developments in well-being significantly exacerbate environmental challenges. The reliance on fossil fuels continues to escalate, with carbon emissions projected to rise from 9.8 billion tons in 2024 to 11.6 billion tons in 2050. By 2050, CO2 levels rise to nearly 500 parts per million (ppm), leading to a 2 C temperature increase from 1990 levels. Moreover, other planetary crises worsen, with biodiversity losses increasing, as well as air and water pollution.

**Figure 2: Historical and projected global trends across four indicators in the divided prosperity scenario. Source: IFs v8.12.**




We present the historical and projected trends across major development indicators for the dividedprosperity scenario (see Figure 2).

Under divided prosperity, children grow up in an environment marked by these rapid technological changes and unevenly distributed benefits. While many see their living standards rise, millions continue to be left behind. We project significant improvements in global primary-school enrolment rates, approaching 100 per cent by the middle of the century. While this suggests that many children will begin with a strong educational foundation, significant regional disparities exist, and SDG4 will only be achieved in 64 per cent of countries by 2050.

Health and nutrition also show a mixed picture of progress and persistent challenges. By 2050, the prevalence of malnutrition among children is expected to drop from 13.7 per cent to 6.6 per cent, and stunting from 22.2 per cent to 11.3 per cent. However, these global gains mask regional disparities. In regions like CSA and SSA, over 28 million children are projected to suffer from malnutrition by 2050 in a world of divided prosperity. We present current and projected outcomes for child well-being globally (see Table 1).

One of the most significant challenges within our current development trajectory is that it is characterized by poor international cooperation. This drives negative outcomes in the form of persistent violent conflict, as well as an inability to solve global collective action problems, such as climate change. On this current path, the challenge remains to understand when poor decisions will lead to crises, tipping points or catastrophic events, which are inherently unpredictable.

**Table 1: Baseline and projected global estimates of child well-being indicators in the divided prosperity scenario. Source: IFs v8.12.**

| DIVIDED PROSPERITY | | |
|---|---|---|
| **Child well-being indicators** | **2024** | **2050** |
| **Malnutrition** | 85 million (13.7 % of total children) | 41 million (9.5 % of total children) |
| **Stunting** | 139 million (22.2 % of total children) | 67 million (11.3 % of total children) |
| **Primary school net enrolment** | 94.2% | 98.1% |
| **Primary school net completion** | 96.1% | 98.7% |
| **Secondary school net enrolment** | 72.4% | 83.6% |
| **Secondary school net completion** | 59.8% | 77.8% |
| **Under 5s mortality** | 34.1 deaths per 1,000 | 15.9 deaths per 1,000 |

Note: 'Children' refers to all children aged between 0 and 5 years old.

# IV. Global synergy: A better world

Recognizing that global human development and environmental impacts are broadly unsustainable on our current trajectory, what would a better development path look like? Here we introduce our second scenario – global synergy – in a narrative about future human development that is connected to divided prosperity, but differs in one important aspect.

Under global synergy, children inherit a planet conducive to sustainable progress and peace, driven by high levels of material resources alongside a thriving multilateral system. This transformation is powered by advances in international cooperation to address collective action problems related to environmental challenges and social cohesion. This is a world in which the multilateral system is revitalized, driven by a recognition that individuals pursuing their own unique agendas will not solve the challenges that face humanity. Such a strengthened foundation of global cooperation fosters the necessary environment for sustained commitments to enhancing green infrastructure, education and

public health. In this world, global redistribution schemes are put into practice, acknowledging that prosperity-enhancing advances, such as AI, can exacerbate existing inequalities if not developed and governed with equity in mind.

However, it is not clear how best to move from a world of divided prosperity to one of global synergy. The current divided-prosperity world is characterized by the entrenchment of political and economic power in the hands of a minority of sovereign and private actors. These actors may not be incentivized to participate in the multilateral, collective efforts necessary to move to the global synergy world unless global challenges threaten their interests (e.g., a global public health crisis). Even then, the experience of the COVID-19 pandemic shows that the cooperation impetus generated by global crises can be limited (e.g., the limited success of global vaccination efforts), and that, even in times of relative unity, the profit motive prevails, and clear winners and losers emerge (e.g., record Big Tech profits versus small business closures; fast economic recovery in the developed world versus ongoing debt sustainability challenges in the least developed countries). Building a movement to strengthen collective decision-making in a world of ample, but poorly distributed, resources is difficult to envision. It requires a multipronged push for harmonization of policies across domains, a recognition that complex negotiations will produce winners and losers, and a fundamental reshaping of economic incentives to prioritize global well-being over short-term profits. This is further complicated by ideas of justice and equity not being universally shared, as well as the need to address historical inequities.

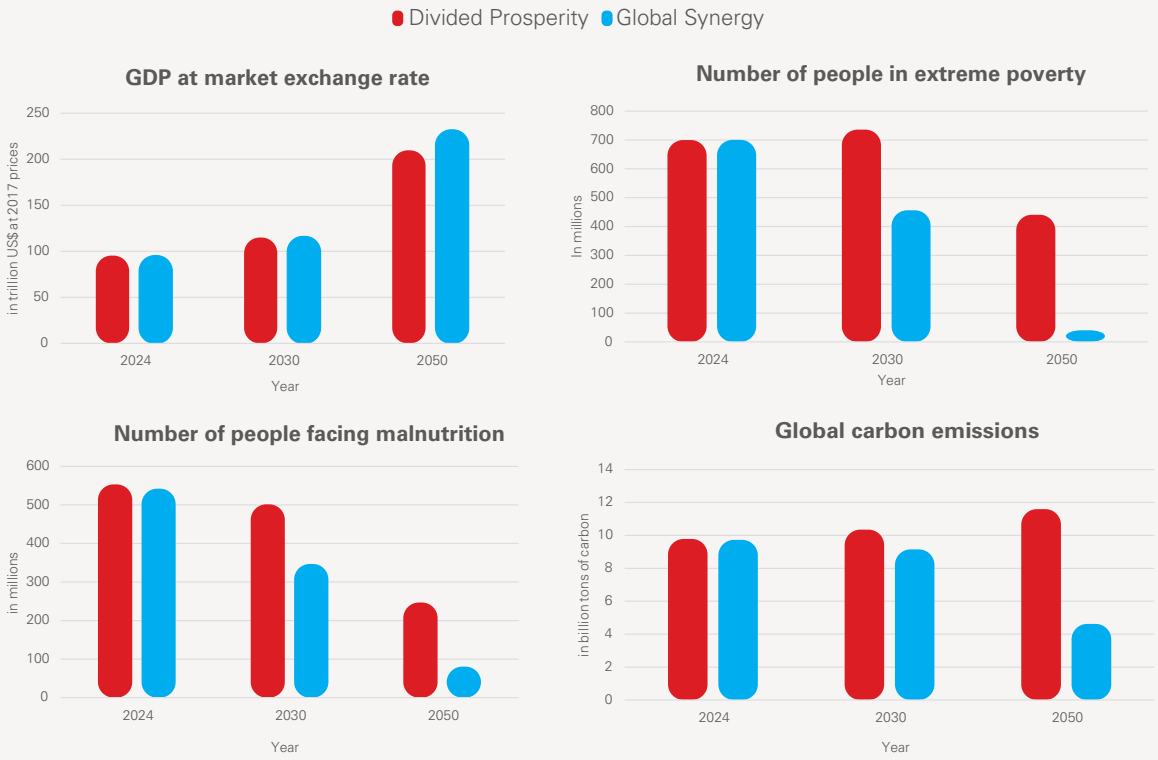
Compared to divided prosperity, under the global synergy scenario, global GDP increases by 10.7 per cent to US$232 trillion in 2050, and GDP per capita increases by 9.8 per cent to US$31,300. The global percentage of impoverished people declines from 8.7 per cent (705.8 million) in 2024 to 0.4 per cent (40.3 million) in 2050. Poverty rates in SSA fall from 35 per cent (423 million) in 2024 to 1.5 per cent (27 million) in 2050.

Advances in technology and global cooperation drive a shift to a low-carbon economy and enable funding for climate initiatives through carbon taxes, halving carbon emissions from 9.7 billion metric tons in 2024 to 4.6 billion metric tons by 2050. This also limits global temperature increase to under 1.5 C. More countries adopt cleaner sources of energy production, with the global percentage of renewable energy growing from 9 per cent in 2024 to over 55 per cent in 2050. We present the benefits of global synergy compared to divided prosperity across four development indicators for 2024, 2030 and 2050 (see Figure 3).

Improved international cooperation, alongside technological advancements, drives better outcomes for the world's children. By 2050, the global number of malnourished children declines significantly, with over 50 million fewer children facing malnutrition compared to current figures. Stunting among children also sees a remarkable reduction, benefiting millions globally.

In SSA, the improvements are even more pronounced. Malnourishment and stunting rates are projected to decrease substantially by 2050. Mortality rates for under 5s falls significantly, meeting SDG targets before 2030. Infant mortality rates are also projected to decline to under 12 deaths by 2030, across all geographical regions. Educational attainment levels also improve, reflecting the positive impact of these collaborative efforts.

**Figure 3: Comparison of development indicators across global synergy and divided prosperity. Source: IFs v8.12.**




International cooperation is crucial in achieving these outcomes. By working together, countries can share resources, knowledge and technologies to tackle common challenges. For example, coordinated efforts in health care can lead to better vaccination programmes, reducing child mortality; joint agricultural initiatives can improve food security, and decrease malnutrition and stunting rates; and education systems benefit from shared best practices and resources, enhancing access to and the quality of education globally.

Technological advancements complement these cooperative efforts. Innovations in health care, agriculture and education drive improvements in child well-being. For instance, new medical technologies and treatments can save more lives, while advanced agricultural practices increase food production and help address food insecurity. Educational technologies enhance learning experiences and outcomes, preparing children for a better future.

We present progress in key child well-being indicators under the global synergy scenario between 2024 and 2050 (see Table 2).

The global synergy scenario is preferable to divided prosperity. But how do we get there? And what happens if we assume that the ample supply of relatively cheap energy, food and technology is somehow disrupted?

**Table 2: Baseline and projected estimates for global and Sub-Saharan Africa child well-being indicators in the global synergy scenario. Source: IFs v8.12.**

| GLOBAL SYNERGY | | | | |
|---|---|---|---|---|
| | WORLD | | SUB-SAHARAN AFRICA | |
| **Child well-being indicators** | **2024** | **2050** | **2024** | **2050** |
| **Malnutrition** | 85 million | 34.7 million | 25.3 million | 8 million |
| **Stunting** | 139 million | 59 million | 50.5 million | 18 million |
| **Primary school net enrolment** | 94.2% | 99% | 82% | 97.1% |
| **Primary school net completion** | 96.1% | 99.7% | 73.2% | 98% |
| **Secondary school net enrolment** | 72.4% | 86.4% | 38.5% | 73% |
| **Secondary school net completion** | 59.8% | 82.6% | 27.8% | 60% |
| **Under 5s mortality** | 34.1 deaths per 1,000 | 13.5 deaths per 1,000 | 71.2 deaths per 1,000 | 25 deaths per 1,000 |

# V. Fragmented world and struggling together: Constrained resources and crises

The previous scenarios assume a continuous availability of resources and technology, with ongoing advancements in renewable energy, information communication technologies and productivity. However, this is far from certain. While exploitable conventional energy resources are still being discovered, these resources are finite, and their depletion could cause significant disruption to patterns of human development. Climate change also threatens the earth's carrying capacity, potentially leading to environmental tipping points that will reduce food production.

In the low technology–low cooperation fragmented world scenario, societal cohesion deteriorates, economic growth stagnates and poor developmental priorities result in significant environmental damage. Economic development stalls due to increasing cybersecurity costs, with disruptive actors leveraging advanced technologies such as quantum computing. Additionally, the potential impacts of unchecked technologies spark fear and concern for children's well-being. This world is characterized by rising trade protectionism, reduced global investments, slow growth in agricultural yields, widespread poverty and civil conflicts.

In the fragmented world, global GDP increases to US$151.8 trillion by 2050, significantly lower than other scenarios, and GDP per capita stagnates at present levels (US$21,100). Poverty rates remain high, with 731.2 million people living in poverty by 2050 – 290 million more than in the divided prosperity scenario at the same point in time. In SSA, poverty rates of 22.2 per cent (451 million people) persist.

Children's health outcomes in this scenario are bleak. Malnutrition rates among children decline slowly from 13.7 per cent today to 10.5 per cent by 2050, still leaving over 50 million children malnourished by the middle of the century. Stunting remains a critical issue with 13 per cent of children (over 19 million) affected by 2050. The mortality rate for under 5s in 2050 is 21.1 deaths per 1,000 live births (down from 34.1 deaths today), with SSA recording over 38 deaths per 1,000 live births by the middle of the century. Educational outcomes for children also lag behind, and universal primary education is a distant reality, with secondary education completion rates projected to remain below 65 per cent by 2050. Educational attainment levels do not grow and remain at 10.6 years.

As well as showing poor developmental outcomes, the projected environmental outlook of this scenario is grim. Currently, renewable energy accounts for only 9 per cent of total energy production. By the middle of the century, this percentage is projected to increase to just 15 per cent. Significant barriers to scaling renewable energy technology, including limited market incentives, infrastructural constraints and poor governance of emerging technologies, hinder its development and broader adoption, thereby limiting access to clean and sustainable sources of energy for the next generation. Instead, energy production from fossil fuels leaps from 82.5 BBOE in 2024 to over 109 BBOE by 2050. Carbon emissions from fossil fuels rise to over 1.4 billion tons, a 150 per cent increase compared to projected developments based on existing policies. The build-up of carbon dioxide in the atmosphere increases to around 531 ppm in 2050, causing temperatures to rise over 2.7 C by the middle of the century compared to 1990 levels.

What would put us on a fragmented world trajectory? Various factors could constrain technological development. It may be challenging to scale renewable energy because of bottlenecks in mineral production or challenges associated with intermittency and grid balancing. AI could be primarily used by bad actors to disrupt deeply interconnected systems and undermine future stability. Environmental crises may disrupt weather patterns, limiting food production systems or undermining coastal communities through extreme weather events.

But what if we were to respond to the resource-constrained and technologically challenged fragmented world with increased international cooperation? Could this be a way to transition from a path of divided prosperity to one of global synergy? We call this scenario 'struggling together'. Like the fragmented world, it arises from a series of crises that disrupt historical patterns of growth and development. However, in struggling together, these enormous challenges become catalysts for new developmental opportunities through enhanced global cooperation.

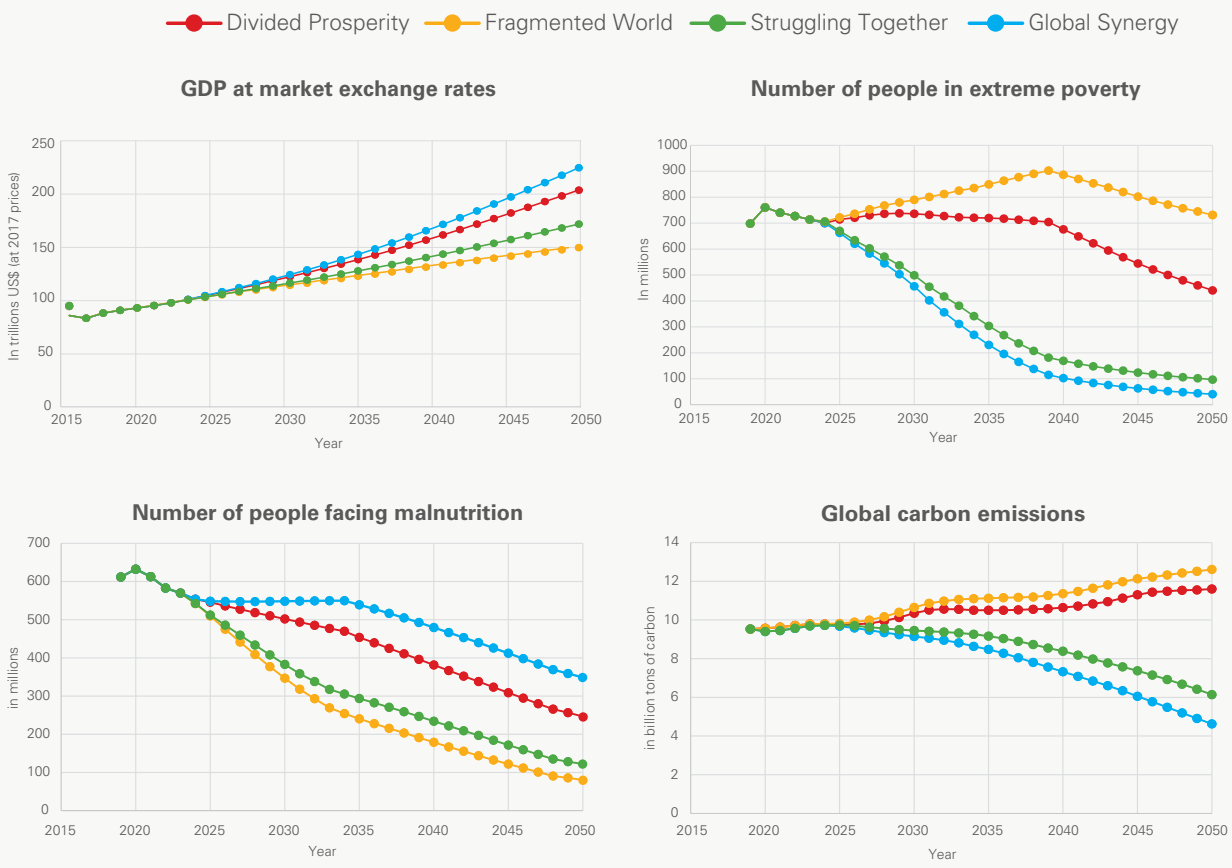
Struggling together highlights the potential for crises to unite people, shifting normative frameworks and encouraging reduced national sovereignty in favour of international decision-making. Here, global efforts focus on solving problems created by previous generations, maximizing children's potential. Although resources are constrained, collective actions drive progress in green infrastructure,

education, health and governance. This scenario underscores the importance of cooperation in addressing global challenges and promoting sustainable development despite resource limitations.

While global systems work collaboratively to combat climate change, there continues to be slow progress in economic growth due to declining levels of productivity. While there are conflicts, they are not as rampant as in other scenarios, as social-media technology has not been further weaponized to divide societies and turn groups of people against one another. This is a world in which government policies are focussed on solving problems through progressive taxation and large-scale cash-redistribution programmes. It is a complex world in which global cooperation needs to be consistently reinforced through a variety of mechanisms that do not exist in today's multilateral system.

Global GDP is projected to rise to US$175.7 trillion in 2050, remaining below the global synergy and divided prosperity projections. Increasing efforts to improve governance over domestic inequalities also raise global GDP per capita to over US$25,100. Global poverty rates fall to around one percentage point in 2050, meaning there are over 343 million fewer people in poverty, compared to the divided prosperity scenario, in 2050. In SSA, poverty rates decline to 3.6 per cent (73 million) by the middle of the century. The extent of malnutrition and stunting reduces to 1.2 per cent and 28.2 per cent, respectively, by 2050. We outline trends across major development indicators across the four scenarios up to 2050 (see Figure 4).

**Figure 4: Historical and projected global trends for four indicators across all scenarios. Source: IFs v8.12.**



Children's health and their nutritional and educational outcomes are improved compared to the divided prosperity and fragmented world scenarios but remain below global synergy projections. Here, the global proportion of malnourished children reduces to around 9.2 per cent, and stunting rates among children decline to around 10.6 per cent by 2050. Primary-school completion rates reach almost 100 per cent globally, with secondary-education rates rising to over 78 per cent by 2050.

With better mechanisms to solve environmental problems collectively, carbon emissions reduce to under 6 billion tons by 2050. While this scenario produces positive and more sustainable impacts on balancing developmental needs with the environment, the reduced long-term contribution of technology and material resources to development remains a constraint on further improving well-being outcomes. We present child well-being indicators in 2024 and 2050 for all four scenarios (*see Table 3*). While the divided prosperity and struggling together scenarios also project improvements for children globally, global synergy has a multifold effect, with rapid advancements in children's health and their educational and nutritional outcomes by the middle of the century.

**Table 3: Baseline and projected estimates for global child well-being indicators in the fragmented world and struggling together scenarios. Source: IFs v8.12.**

| | | Projections in 2050 | | | |
|---|---|---|---|---|---|
| **Child well-being indicators** | **Baseline (2024)** | **Fragmented world** | **Struggling together** | **Divided prosperity** | **Global Synergy** |
| **Malnutrition** | 85 million | 50 million (10.5 %) | 41 million (9.2%) | 41 million (9.5%) | 34.7 million (7.6%) |
| **Stunting** | 139 million | 86 million (13.2%) | 64 million (10.6%) | 67 million (11.3%) | 59 million (9.2%) |
| **Primary school net enrolment** | 94.2% | 96.2% | 98.3% | 98.1% | 99% |
| **Primary school net completion** | 96.1% | 97.3% | 99.2% | 98.7% | 99.7% |
| **Secondary school net enrolment** | 72.4% | 70% | 84.2% | 83.6% | 86.4% |
| **Secondary school net completion** | 59.8% | 64.3% | 78.5% | 77.8% | 82.6% |
| **Under 5s mortality** | 34.1 deaths per 1,000 | 21.1 deaths per 1,000 | 15.5 deaths per 1,000 | 15.9 deaths per 1,000 | 13.5 deaths per 1,000 |

# VI. Moving to a sustainable world

Improving global cooperation is a multifaceted challenge that requires policy and cultural changes at multiple levels, from international organizations to grassroots movements. It is imperative that children are placed at the centre of the work we do to promote our shared future. In the divided prosperity scenario, material resources and advancing technology improve the quality of life for many, but not all. Advancements in this scenario rest on an increasingly strained environmental system, jeopardizing children's long-term well-being.

While technological innovations and advancements hold promise, their potential to ensure a safe and sustainable future for children relies on better governance, as well as cooperative policies that prioritize the rights and development of children in *all* contexts. Global synergy envisions one such world of shared futures in which the implementation of a robust framework for global collaboration enforces investments in social protection, education, health care, renewable energies, closing the digital divide, and better governance and sustainable use of technologies – all factors that are critical to children's futures.

Transitioning to a more sustainable pathway requires strengthening international institutions to secure a better future for children globally. Addressing global environmental issues necessitates the introduction of binding mechanisms that go beyond the Paris Agreement's nationally determined contributions, ensuring robust action on the sustainable use of resources, biodiversity conservation and the reduction of conspicuous consumption. These steps are crucial in preserving the natural world for future generations. Prioritizing economic integration, while being sensitive to historical exploitation and unequal exchange, can create a more equitable global economy. This interconnectedness fosters shared material interests, promoting stability and cooperation that benefit children by providing them with a safer, more prosperous world to inherit.

Multilateral institutions should prioritize democratic decision-making that supports children's well-being now and in the future. Governments should actively build and strengthen these institutions by developing and adhering to binding global agreements that safeguard children's rights. Cultural exchanges are essential for fostering shared understanding among diverse populations, thus promoting a more inclusive world. Global policymaking should also focus on reducing the incentives for states to invest in military technology. Instead, resources should be redirected towards education, health care and sustainable development, ensuring a safer and more nurturing environment for every child.

This shift to a more cooperative world may not happen for many reasons, including entrenched interests, consolidated power and wealth, and the centrality of sovereignty in international decision-making. Indeed, this vision may seem quixotic. But the current trajectory we are on is unsustainable, and, as we do not know when the consequences of our myopic decision-making will be realized, we sit in an uncomfortable position where the future well-being of the world's children sits in the balance.

If a crisis shifts us from our current divided prosperity to a fragmented world, this would be disastrous for development, but it might provide a catalyst for changing how the world is governed. If such a

dramatic and catalysing event occurs, this analysis shows that it would be good to have a plan for the mechanisms and policies that could move us towards global synergy. Developing such a plan would involve many of the policies listed earlier in this section. It could serve a dual purpose by generating conversations about how to build global cooperation now, while laying a roadmap for a future in which it appears to be even more necessary.

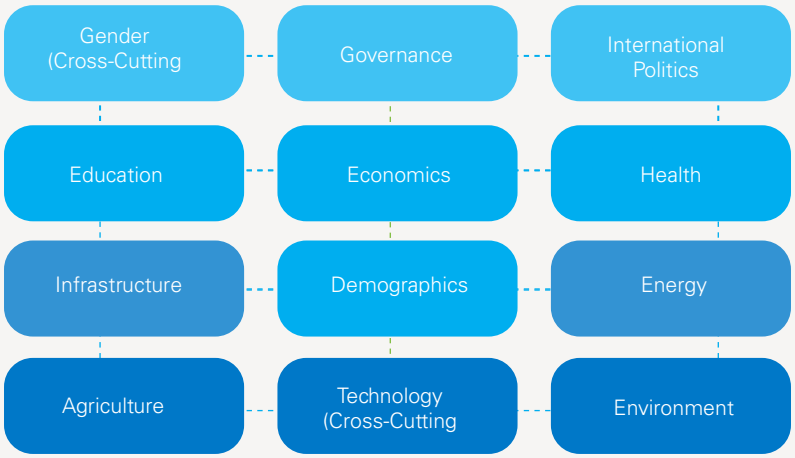
# Annex 1: Methodology note

This methodological note outlines the use of the International Futures (IFs) forecasting system to explore four scenarios concerning the future. The scenarios are based on varying degrees of international cooperation and technological advancements – critical factors that shape the developmental pathways of nations and the well-being of future generations. By envisioning these diverse futures, policymakers and stakeholders can anticipate challenges and harness opportunities to forge a more secure, equitable world for children.

International Futures (IFs) is a comprehensive global modelling system.[12] The primary objective of the IFs forecasting system is to serve as a tool for analysing country-specific, regional and global long-term futures across a wide range of critical areas. These areas encompass agriculture, economics, education, energy, environment, health, infrastructure, population and sociopolitical systems. The IFs model covers interactions among 188 countries and incorporates a vast database of over 5,000 data series spanning from 1960 to the present day. A significant aspect of IFs is its role in evaluating progress towards the Sustainable Development Goals (SDGs).

We present an overview of the main models incorporated into the International Futures (IFs) system (see Figure 1). While it does not comprehensively depict all linkages within or across these

**Figure 5: Conceptual overview of the International Futures (IFs) system**



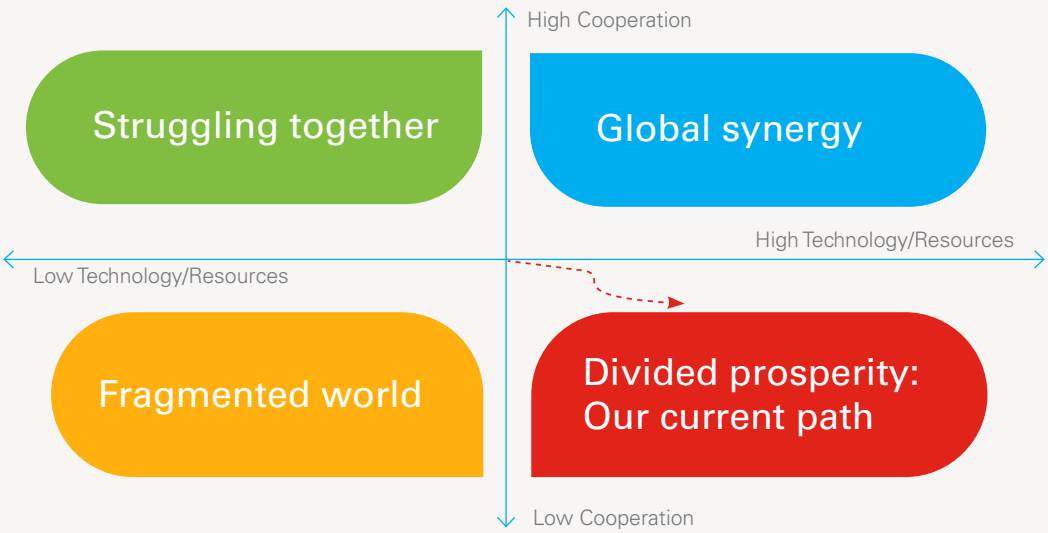
models, detailed technical documentation for each model is accessible on the Pardee Center Wiki (pardeewiki.du.edu). Several published works that employ different IFs sub-models are also accessible online, touching on geopolitical influence,[13] African free trade agreement,[14] poverty and climate change[15], poverty and conflict,[16] growth and climate change,[17] and global infrastructure.[18]

With regard to trade projections, IFs also integrates country-level monadic models into country-paired bilateral models to overcome the limitations of traditional gravity-based approaches.[19] This integration begins with country-level computations that are then distributed to country pairs based on forecasted bilateral interactions, ensuring consistency and accuracy in modelling complex developmental dynamics. Thereby, it employs a gravity approach to forecasting bilateral trade.[20]

The main goals of IFs are to facilitate a deeper understanding of potential development pathways and construct empirically grounded scenarios that reflect pertinent political and strategic considerations. While IFs operates at the macro level, focussing on broad developmental strategies, it also emphasizes the importance of context-specific policies to realize certain described interventions. This tool is intended to inform, rather than dictate, policy strategies by providing a broad, future-focussed perspective on developmental outcomes.

In this study, each scenario is constructed based on two critical dimensions: the level of international cooperation and the pace of technological advancement. The resulting narratives explore diverse futures with specific implications for child well-being, including health, education and overall quality of life. The list of variables that define the scenarios and the corresponding data sources can be found in the Appendix. We present a simple illustration of the conceptualized and modelled scenarios (*see Figure 2*).

**Figure 6: 2x2 scenario matrix**



The four scenarios are:

## 1. Global synergy (high cooperation, high technology)

**Characteristics:** This scenario envisages a world in which technological advancements and geopolitical cooperation converge, leading to broad economic growth and innovation. Strategic carbon taxes, reduced fossil-fuel dependence and policies fostering equitable income distribution are prominent.

**Implications for children:** Enhanced access to quality education and health care, improved nutritional outcomes due to food security, and a healthier environment from reduced carbon emissions and investment in renewable energies. Global commitment to equity and effective governance further ensures that children have greater opportunities for a prosperous future.

## 2. Divided prosperity (high technology, low cooperation)

**Characteristics:** Technological progress outpaces growth in international cooperation, leading to significant advancements in productivity and yields, but is accompanied by increased trade barriers and a fragmented global economic landscape.

**Implications for children:** Children face mixed outcomes; technological gains in health and education are offset by access inequalities and environmental risks exacerbated by inadequate cooperation on climate change. The scenario suggests a world in which children's futures are contingent on navigating a landscape of technological abundance amid geopolitical fragmentation.

## 3. Struggling together (low technology, high cooperation)

**Characteristics:** Characterized by modest technological progress and high levels of global cooperation, this scenario addresses economic and environmental challenges through collective action, despite technological and resource limitations.

**Implications for children:** The focus on international solidarity and commitment to leaving no child behind leads to improvements in basic health and education services. However, children's well-being is challenged by slower technological development, emphasizing the importance of global collaboration in compensating for technological deficits.

## 4. Fragmented world (low technology, low cooperation)

**Characteristics:** This scenario depicts a future with limited technological advancement and low levels of international cooperation, leading to heightened resource scarcity, climate change impacts and geopolitical tensions.

**Implications for children:** The adverse effects on children's development are significant, with increased environmental threats, barriers to accessing essential services, and inequalities. This scenario underscores the critical need for targeted interventions to mitigate the risks to child well-being in a fragmented and resource-constrained world.

# Appendix: Data sources

| Variable | Definition | Source |
|---|---|---|
| **Gross domestic product (GDP)** | GDP (MER) at constant 2017 US$ | History – World Bank World Development Indicators (WDI); short-term forecasts – International Monetary Fund World Economic Outlook (IMF WEO) |
| **Trade (monadic)** | Exports and imports as percentage of GDP | World Bank WDI |
| **Trade (dyadic)** | Exports and imports in constant 2017 US$ | CEPII BACI |
| **Total fertility rate** | Number of children per woman over lifetime | World Bank WDI |
| **Enrolment rates, education** | Percentage of appropriately aged individuals, by sex, enrolled in applicable education levels (primary, lower secondary, upper secondary, tertiary) | United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics |
| **Transition rates, education** | Percentage of appropriately aged individuals, by sex, continuing education from primary to secondary level | UNESCO Institute for Statistics |
| **Intake rates, education** | Gross entry ratio to first tertiary programmes, by sex | UNESCO Institute for Statistics |
| **Civil war event** | Binary indicator of presence of civil conflict events (1 = present; 0 = absent) | Center for Systemic Peace – Integrated Network for Societal Conflict Research (INSCR) |
| **Democracy** | Polity scores converted from scale of -10 to +10 to scale of 0 to 20 | Center for Systemic Peace – Polity |
| **Energy production** | Electricity output by type in billion barrel of oil equivalents (BBOE) | International Energy Agency (IEA) World Energy Balances |
| **Military spending** | Military expenditure data from the Stockholm International Peace Research Institute (SIPRI) are derived from the North Atlantic Treaty Organization (NATO) definition, which includes all current and capital expenditure on the armed forces, including: peacekeeping forces; defence ministries and other government agencies engaged in defence projects; paramilitary forces, if these are judged to be trained and equipped for military operations; military space activities; military and civil personnel, including retirement pensions of military personnel and social services for personnel; operation and maintenance; procurement; military research and development; and military aid (in the military expenditure of the donor country). Excluded are civil defence and current expenditure for previous military activities, such as for veterans' benefits, demobilization, conversion, and destruction of weapons. This definition cannot be applied to all countries, however, as that would require more detailed information than is currently available about what is included in military budgets and off-budget military expenditure items. (For example, military budgets may or may not cover civil defence, reserves and auxiliary forces, police and paramilitary forces, dual-purpose forces such as military and civilian police, military grants in kind, pensions for military personnel and social security contributions paid by one branch of government to another.) | World Bank WDI |

| Variable | Definition | Source |
|---|---|---|
| **Domestic Gini** | Gini index of income inequality | World Bank WDI |
| **Caloric distribution** | For many countries, the coefficient of variation, taken as an indicator of the dispersion of food consumption distribution within the general population | Food and Agriculture Organization (FAO) Food Security and Nutrition |
| **Official development assistance (ODA)** | Percentage of gross national income (GNI) given/ received in donations and ODA receipts | Donations – Organization for Economic Cooperation and Development (OECD) State; receipts – United Nations Statistics Division |
| **Informal labour** | Share of labour in informal sector, by sex | World Bank Gender Statistics |
| **Human Development Index (HDI)** | HDI, 2017 Revision Methodology | United Nations Development Programme Human Development Index (UNDP HDR) |
| **Poverty** | Percentage of the population living on less than US$2.15 a day at 2017 international prices; estimation by World Bank, Poverty and Inequality Platform | World Bank WDI |
| **Infant mortality** | Number of infants dying before the age of one year, per 1,000 live births in a given year | World Bank WDI |
| **Under 5s mortality** | Number of children dying aged 0 to 5, per 1,000 children in that age range | Institute for Health Metrics and Evaluation (IHME) Global Burden of Disease |
| **Severe acute malnutrition** | Prevalence of severe wasting is the proportion of children under 5 whose weight for height is more than three standard deviations below the median for the international reference population aged 0–59 | World Bank WDI |
| **Stunting** | Prevalence of stunting is the percentage of children under 5 whose height for age is more than two standard deviations below the median for the international reference population aged 0–59 months. For children up to 2 years old, height is measured by recumbent length. For older children, height is measured by standing length. The data are based on World Health Organization (WHO) 2006 Child Growth Standards. | World Bank WDI |
| **Carbon emissions** | Carbon emissions from fossil fuels in billion tons of carbon | Carbon Dioxide Information Analysis Center |
| **Population** | Number of people in millions | United Nations World Population Prospects |

# Endnotes

1 See Bryne, Jasmina, et al., *Prospects for Children in 2024: Cooperation in a fragmented world*, United Nations Children's Fund Innocenti, Florence, Italy, January 2024. This related study highlights the pivotal need to work towards proactive policies and collective action focussed on children's future needs and rights through efficient governance, financing and social security reforms.

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7 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, IPBES, Bonn, Germany, 2019, p. 1144.

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14 Kabandula, Abigail, et al., 'Conditions for Success in the Implementation of the African Continental Free Trade Agreement', Reference Report, Pardee Center for International Futures, Josef Korbel School of International Studies, University of Denver, Denver, Colo., 2020.

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16 Moyer, 'Future burden of intrastate conflict on poverty'.

17 Moyer, Jonathan D., 'Modeling Transformational Policy Pathways on Low Growth and Negative Growth Scenarios to Assess Impacts on Socioeconomic Development and Carbon Emissions', *Scientific Reports*, vol. 13, art. 15996, 2023.

18 Rothman, Dale S., et al., *Building Global Infrastructure: Patterns of potential human progress*, Routledge, New York, 2014.

19 See Anderson, James, 'The Gravity Model', Working Paper 16576, NBER Working Paper Series, National Bureau of Economic Research, Cambridge, Mass., December 2010, p. 39. Anderson highlights a concern that gravity models have a limited ability to project returns to scale and market structure. In doing so, he concludes that "gravity is about the distribution of given amounts of goods in each origin drawn by given amounts of expenditure in each destination".

20 Gravity models, in the context of forecasting and economics, are used to predict and analyse types of flow, such as trade and migration, between different entities such as countries or regions. In IFs, the gravity model is used alongside monadic models to distribute country-level projections of trade between different partners. It ensures that bilateral trade forecasts are influenced by the economic capacity of each country and the relationships between countries, while also considering individual country factors such as tariffs and government revenue from trade.

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