In Search of Productivity

The Next $50 Trillion In the Global Economy

Ideation Center Insight

WORLD GOVERNMENTS SUMMIT 2024

in collaboration with

strategy&

Part of the PwC network

Table of Contents

Executive Summary

Productivity is a catalyst of economic growth, and it underlies the development potential of nations. Boosting productivity creates employment, encourages innovation, and supports the sustainable and equitable development of societies. However, traditional measures of productivity do not include dimensions that we believe are critical for our age, such as environmental impact, health, innovation, and the performance of institutions. This report puts forward a new way of measuring productivity—and thus growth—that is not only robust but also green, equitable, and socially responsible.

If GCC Countries Improve Only Their Weakest Productivity Determinant, It Can Accelerate the Region's GDP Growth Over the Next Decade From 3.8% to 5.4%. This Acceleration Will Create More Than USD 2.5 Trillion Dollars in Additional GDP[1].

The Strategy& Productivity Potential Index consists of 19 variables grouped into six pillars. To the inputs of labor and human capital, physical capital, and innovation and intangible capital that make up traditional measures of total factor productivity (TFP), we add pillars for social capital, natural capital, and institutions. About one-quarter of the Index is based on these additional pillars, while the remaining three-quarters cover the more traditional pillars. We have initially calculated the productivity performance of 25 countries using this new methodology.

The Index is modern not only in its conception but also in its calculations. With the help of a machine learning process, we estimated country-specific potential productivity using all the available data, across all countries and variables. This enabled us to identify those pillars that individual countries would specifically need to focus on if they wanted to boost their own productivity growth. An online simulator published with this report allows users to compare country performance across the key pillars and variables that constitute the Index and to assess the implications for productivity growth of improving critical productivity factors. The Index can thus help leaders identify gaps in their country's productivity performance and develop practical and targeted interventions to address those gaps.

A primary innovation of the Productivity Potential Index (PPI) is to adopt a "multiple capitals" approach to defining, modeling, and measuring productivity. By encompassing human, physical, natural, social, institutional, and intangible capital, it draws on a wide range of economic research and offers insights across the full spectrum of productivity policy. By design, the PPI is also inherently forward looking. Although mainstream productivity analysis describes only the past—inputs used and outputs generated in the last quarter or last year—decision-makers today need economic indicators that can shape the future. The PPI offers insights into the productivity that economies could *potentially* achieve, given their capital endowments.

Redefining Productivity for Sustainable, Socially Responsible Growth

Traditional measures of productivity relied on by economists and policymakers to explain a country's economic performance include total factor productivity (TFP) and labor productivity. TFP focuses on the efficiency with which inputs (such as labor and capital) are used in the production process to generate output. Labor productivity is measured as the average output per hour worked (see "Why productivity matters" on page 05).

However, these traditional measures do not consider negative outputs such as air pollution or the erosion of trust and weakening of equity that a production process may generate. Thus, traditional productivity statistics would be unable to differentiate between two factories, one of which generated twice as much pollution as the other, if they were using the same inputs and generating the same output.

Excluding such production externalities—which could be positive or negative—from productivity calculations means that traditional productivity data has some significant shortcomings:

- It does not distinguish between growth that creates high environmental impact and growth that creates low environmental impact.
- It ignores many of the capital assets that determine an economy's productive capacity, such as health, social capital, and environmental factors including water use and biodiversity.
- It fails to incorporate the quality of institutions in a country.
- It provides only a retroactive view of productivity, lacking a forward-looking perspective that can yield predictive potential to inform policymaking.

The Productivity Potential Index (PPI) seeks to address these shortcomings. The reason to put forth a new Index is fundamentally one of relevance: To support living standards over the 21st century, productivity growth will need to compete with a series of long-term challenges that, for now, are not being measured. These challenges include climate change, biodiversity loss, social change, aging populations, and novel health crises such as pandemics and the rise of lifestyle-related diseases. Understanding the interplay between productivity and these challenges is essential to achieving economic, environmental, and health-related goals. New measures that can address these issues simultaneously are needed.

Some economists have in recent years sought to address the shortcomings in the traditional measurement. The most recent addition to this literature has been the United Nations Environment Programme's Inclusive Wealth Report of 2023, which represented the culmination of decades of research indicating the need to revise economic indicators to accommodate the evolving objectives of government policy, an increased focus on sustainability, and more inclusive measurements. This idea builds on seminal works such as that by the Indian-British economist Partha Dasgupta, who published an influential paper in 2021 commissioned by the UK government on the economics of biodiversity. A review of this literature is summarized in a 2023 paper by Agarwala, Coyle, Peñasco, and Zenghelis. We build on Dasgupta's thinking and that of others in our Productivity Potential Index.[2] We broadened the definition of capital to include not just human-made assets but other forms of capital, including natural capital and social capital.

A capital-oriented view of productivity is inherently forward looking: The value of any capital asset today is merely the net present value of the future income streams it generates.

The PPI presented here builds on these ideas. Three fundamental ideas frame its rationale:

- First, that economics and economic statistics must account for all the assets on which economies rely, including human, natural, social, physical, and institutional capital.
- Second, that productivity analysis can and should incorporate the value of production externalities, including environmental and social change.
- Third, that indicators enabling leaders to identify and address gaps in their economy's productivity are needed to help guide policy.

Why Productivity Matters

Boosting productivity growth directly affects various aspects of society, from global competitiveness and national prosperity to individual quality of life (see Figure 1). Productivity acts as a catalyst for economic growth and wealth, enabling nations to produce more with the same resources. It plays a crucial role in bolstering employment opportunities, leading to better wages and improved economic conditions for individuals at the household level and across the nation. Historically, productivity levels have been demonstrated to increase earnings at the household level and lead to better livelihoods at the national level.

Thus, understanding the levers that impact productivity is critical for policymakers if they are to achieve their public policy objectives, whether these pertain to investments in education, advancements in technology, infrastructural enhancements, or regulatory reform. Such policies, in turn, can effectively bolster productivity growth, steering nations toward sustainable economic development and achieving the desired public policy objectives. This has become ever more important in recent years, given a marked slowdown in productivity in many advanced economies, especially since the 2008 global financial crisis.

There are two primary means through which companies and economies grow: increasing inputs and increasing productivity. In practice, growth is typically a combination of the two. When production processes and inputs such as capital or labor become more productive, firms and economies often adjust to produce more and use more of the inputs. However, in the long run, it is productivity growth that determines increases in real wages, economic competitiveness, and living standards.

FIGURE 1: THE IMPORTANCE OF PRODUCTIVITY

National Productivity Matters Because ...

... it fosters **innovation** and optimizes **resource utilization** ...

- Productivity leads to innovation, which leads to development of new products and services
- It encourages resource optimization, which leads to sustainability and conservation efforts

... which spurs **economic growth** and increases **global competitiveness** ...

- Increased output/GDP of a country leads to economic growth
- More efficient use of resources makes the nation more attractive to businesses and consumers, thus increasing competitiveness

... that supports **fiscal sustainability** and strengthens **trade balance** ...

- Increased productivity generates higher tax revenues for the same government expenditure
- It increases exports and improves the nation's trade position

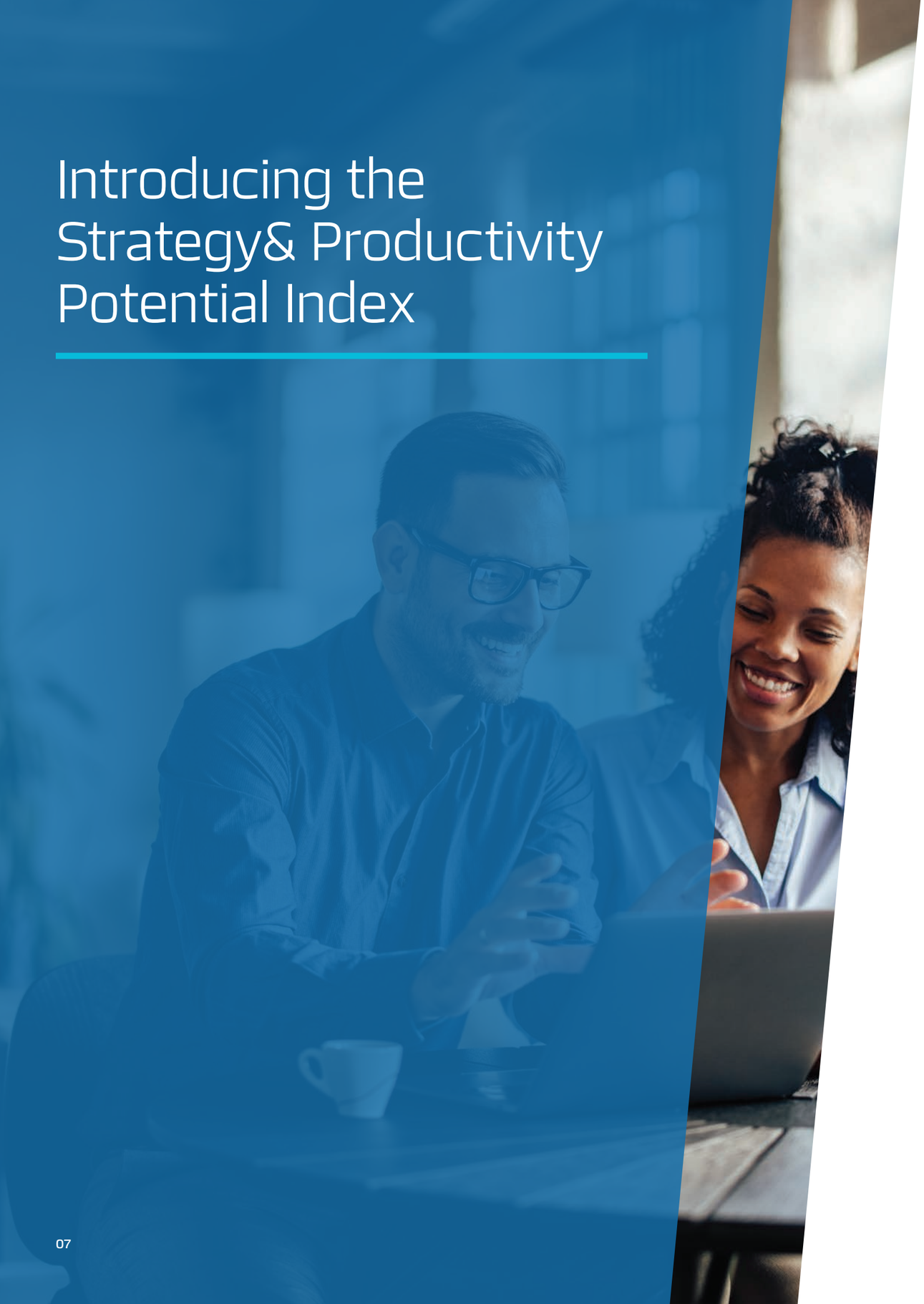
... as well as curbs **supply-side inflationary pressures** and fortifies **business resilience** ...

- Understanding productivity helps policymakers align output growth with input growth, thus curbing inflation
- High productivity prepares economies to better absorb shocks and recover from economic downturns

... ultimately helping in elevating **standard of living** and **quality of life**

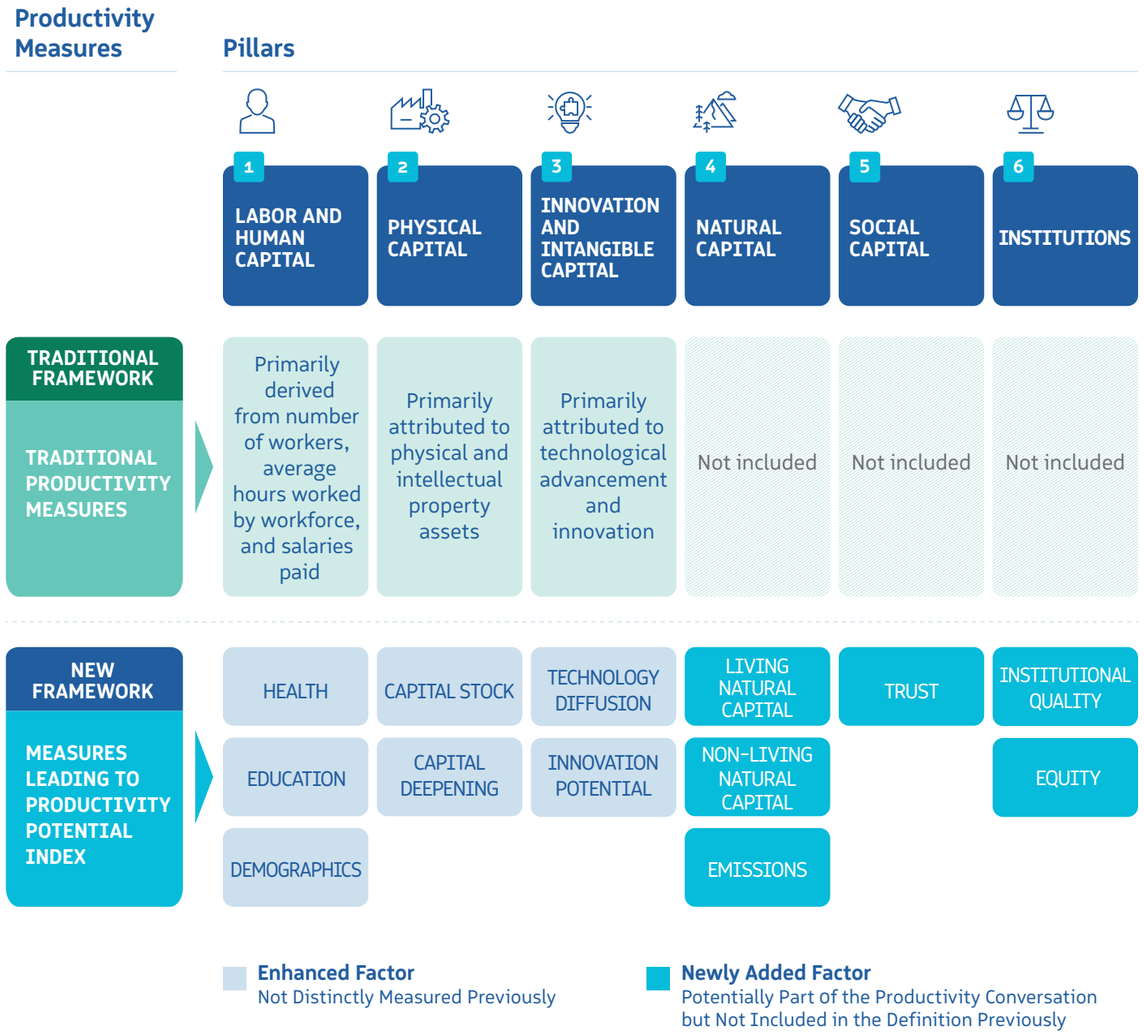
- Productivity improvements can lead to higher wages and incomes, thus elevating standard of living
- A productive economy can support social programs like education, health, and safety, thus enhancing quality of life

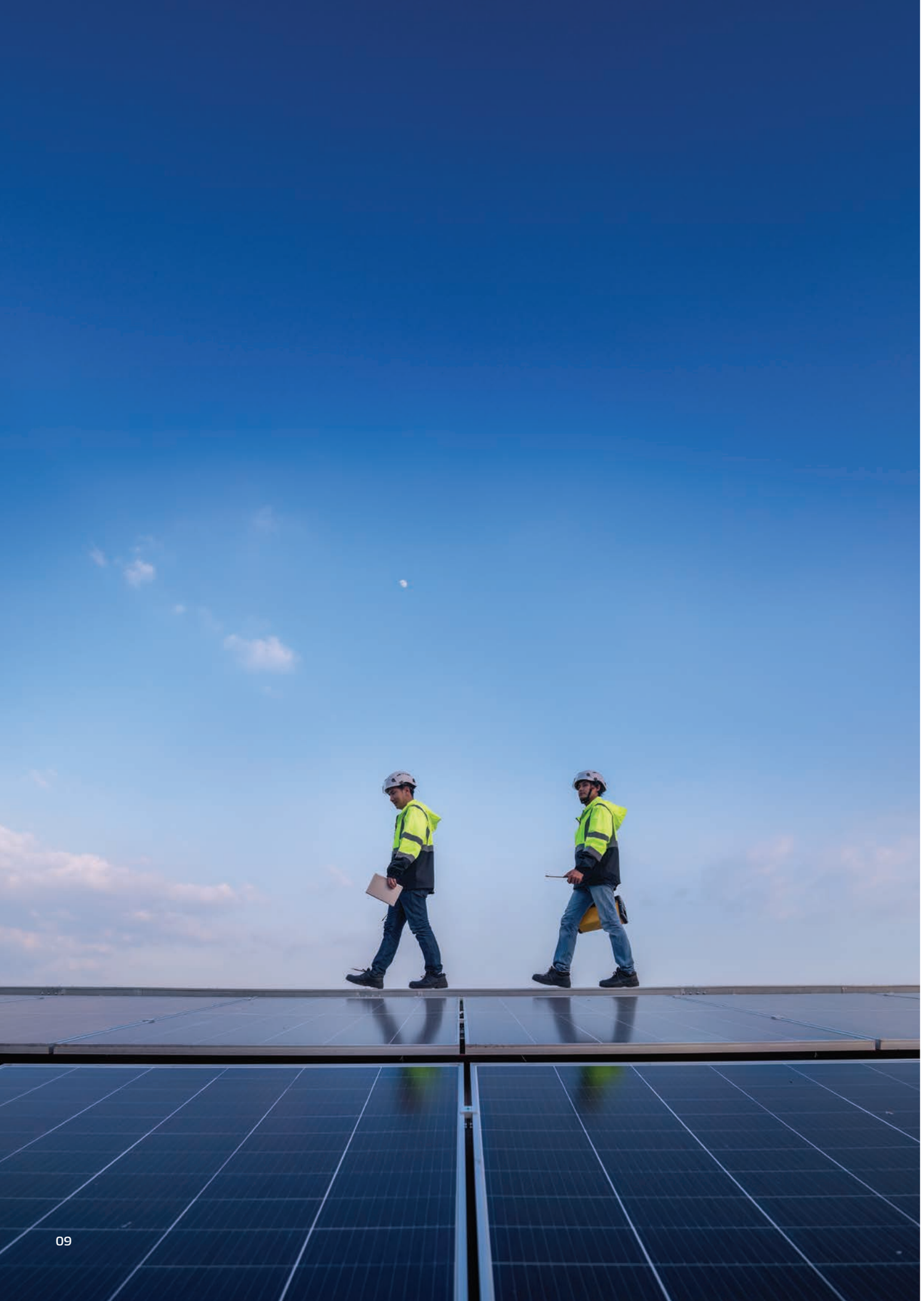
Introducing the Strategy& Productivity Potential Index



Explore the key differences between traditional measures of productivity and our Productivity Potential Index, which is based on a holistic measure of productivity and captures the total productivity potential (see Figure 2).

FIGURE 2: PPI FRAMEWORK AT A GLANCE





The Total Productivity Potential (TPP) calculation underlying our Index uses a much broader range of variables than traditional productivity measures, thereby providing a more multidimensional view of productivity. Each pillar and its underlying variables are separately measured, and the contribution of each to productivity can be measured. It adds entirely new variables for new pillars to the productivity measurement, and it also incorporates more variables in the pillars already captured by traditional parameters.

The categories added are social capital, natural capital, and institutions. Social capital includes indicators for trust. Natural capital includes indicators for living natural capital, non-living natural capital, and emissions. (We use emissions as a proxy for the contribution of negative elements within overall natural capital, as there is no standard variable that does so.) Institutions includes indicators for equity and institutional quality.

The new pillars added to the traditional measures—namely labor and human capital, physical capital, and innovation and intangible capital—cover a range of dimensions that reflect today's socioeconomic imperatives, but that are absent from existing measurements. For example, for labor and human capital, the traditional measurement was primarily derived from the number of workers, the average number of hours worked, and the salaries paid. To this, we have added variables of health, education, and demographics, thereby measuring the *quality of human capital*, as outlined below in the section identifying the constituent variables.

The PPI is constructed using an empirically driven machine learning process known as "random forest" modeling. Random forests are a powerful tool for maximizing predictive capacity. They have previously been used in a wide range of economic applications, but the PPI marks one of the first applications in global productivity analysis. This process leverages all the available data, across all countries, years, and variables listed in Table 1 (see page 11), to create country-specific estimates of potential labor productivity. These estimates are based on data from the entire sample. The Index thus helps identify a country's expected productivity, given its endowments, if it uses those endowments as well as the average country across the sample.

The variables selected for each element of the Index were identified from the literature and then integrated into the machine learning model to identify those with the strongest predictive capability of overall productivity. The variables selected were then tested econometrically to demonstrate practical and statistical significance with respect to traditional measures of productivity.[3]

In the PPI, about three-quarters of the pillars measured are the ones traditionally measured in TFP (labor and human capital, physical capital, and innovation and intangible factors); the additional pillars pertaining to natural capital, social capital, and institutions account for about a quarter of the Index.

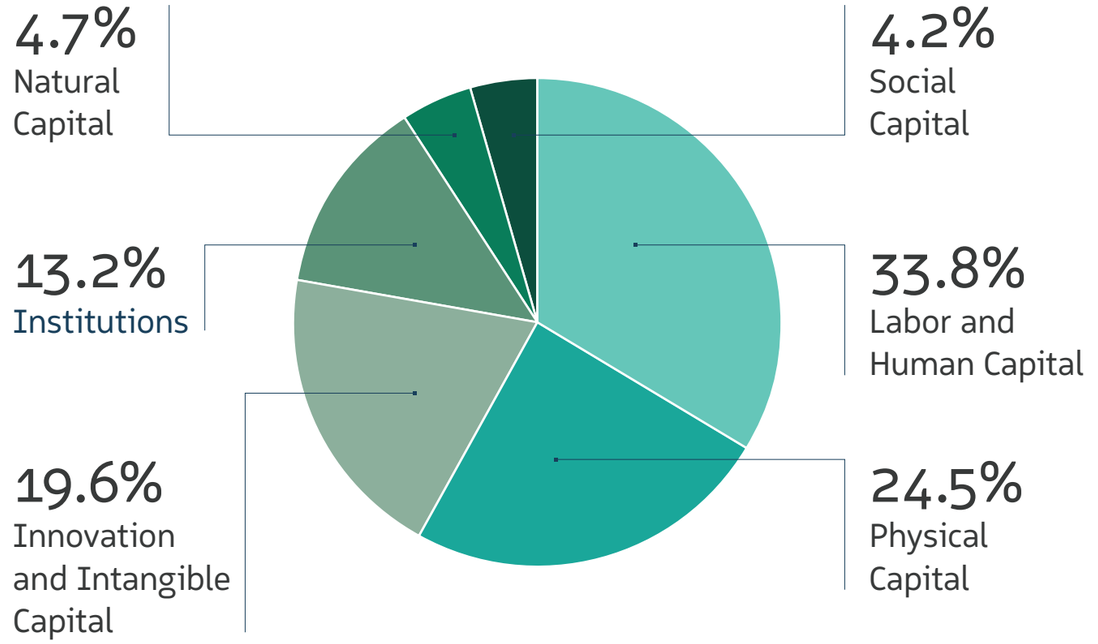
Table 1: List of Variables

	Pillar		Variable	Description	Source
1	Labor and Human Capital	1	Life expectancy at birth (years)	Number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	World Bank
		2	Suicide mortality, per 100,000 population	Suicide mortality rate is the number of suicide deaths in a year per 100,000 population. Crude suicide rate (not age-adjusted).	World Bank
		3	Percentage of population with tertiary education	Percentage of the population age 25-65 who have either completed or partially completed tertiary education.	World Bank
		4	Age dependency ratio	Ratio of dependents—people younger than 15 or older than 64—to the working-age population, age 15-64. Data is shown as the proportion of dependents per 100 working-age population.	World Bank
		5	Human capital per capita	The present value of future earnings for the working population over their lifetimes measured in constant 2018 US dollars, using a country-specific GDP deflator.	World Bank
2	Physical Capital	6	Physical capital per capita	Physical capital includes the value of machinery, buildings, equipment, and residential and nonresidential urban land.	Penn World Tables
		7	Individuals using the internet	Individuals who have used the internet (from any location) in the last 3 months. The internet can be used via a computer, mobile phone, personal digital assistant, gaming devices, digital TV, etc.	World Bank
		8	World Bank Logistics Performance Index	On-the-ground trade logistics performance, helping all trading parties understand the challenges they face in reducing logistical barriers to international commerce.	World Bank
		9	Secure internet servers per million people	The number of distinct, publicly trusted TLS/SSL certificates found in the Netcraft Secure Server Survey.	World Bank
		10	Access to electricity	The percentage of population with access to electricity. Electrification data is collected from industry, national surveys and international sources.	World Bank
3	Social Capital	11	Trust	Share of people agreeing with the statement "most people can be trusted."	Our World in Data
4	Natural Capital	12	Natural capital per capita	Valuation of renewable and nonrenewable natural capital. Values are measured at market exchange rates in constant 2018 US dollars, using a country-specific GDP deflator.	World Bank
		13	Water stress	Ratio between total freshwater withdrawn by all major sectors and total renewable freshwater resources, after considering environmental water requirements.	World Bank
		14	PM2.5 pollution mean annual exposure	Average level of exposure of a nation's population to concentrations of suspended particles measuring less than 2.5 microns in aerodynamic diameter.	World Bank
5	Innovation and Intangible Capital	15	Science journal articles per capita	The number of articles published in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, earth sciences, and space sciences.	World Bank
		16	Herfindahl-Hirschman Index value	Measure of the dispersion of trade value across markets. A value close to 1 means trading in few markets and a value close to 0 entails diversified trading markets.	World Bank
		17	Patent applications per capita	Worldwide patent applications filed through the Patent Cooperation Treaty procedure or with a national patent office for exclusive rights for an invention for a limited period, generally 20 years.	World Bank
6	Institutions	18	World Bank institutional quality	Composite indicator of the World Bank's measures of governance and institutional quality.	World Bank
		19	Inequality principal component	A composite indicator with three specific variables used: p90p100, p0p50, p99p100. These variables represent the share of income given to the top 10%, the bottom 50%, and the top 1%.	World Inequality Database

Components of the Productivity Potential Index

The Productivity Potential Index consists of six major pillars, each composed of several variables. In all, there are 19 indicators (listed in Table 1) that roll up to the six pillars (Figure 3).

FIGURE 3: IMPORTANCE OF PILLARS IN THE PPI TO OVERALL PRODUCTIVITY



To ensure compatibility with conventional productivity analysis, the preliminary PPI framework was tested against a traditional TFP decomposition exercise, extended to incorporate natural, social, and institutional capital. Results confirmed the validity of the approach, and the machine learning model facilitated the inclusion of a broader set of countries and indicators. The final PPI method also enables us to identify differential drivers of productivity across developing and advanced economies.

The machine learning model adopted in the construction of this Index (the random forest model) calculates the weights of different indicators, each in accordance with the indicator's predictive capability in explaining the variations in the productivity levels observed in our country sample. Higher weights are associated with a larger predictive power of that pillar and its variables in explaining the variation of total potential productivity across the sample.

We will elaborate on these differences in a separate technical econometric paper to be published in 2024.

Parental Leave Policies and Childcare Support Can Also Influence Productivity.

1. Labor and Human Capital

Labor and human capital are traditional inputs for calculating TFP. This category, which includes workers' skills and workers' availability to work, is a crucial element influencing productivity. We have nonetheless enhanced this pillar by adding three dimensions that also relate to labor and human capital but that are currently absent from the traditional measurement:

- **Health:** Healthy individuals are likely to have higher tenure and greater capabilities on the job. This includes both physical and mental health.
- **Education:** A well-educated workforce can adapt to technological advancements while engaging in more demanding jobs that require higher technical abilities.
- **Demographics:** This dimension measures whether immigration and retirement ages can affect the labor force, which in turn affects productivity. Family support policies for parental leave and childcare support can also influence parents and their productivity.

For a more comprehensive treatment of labor and human capital, the Index uses the following variables:

- Life expectancy at birth, total in years
- Suicide mortality rate (per 100,000 population)
- Share of the population with tertiary education
- Age dependency ratio (% of working-age population)
- Human capital per capita (constant 2018 US dollars)

2. Physical Capital

This pillar includes the infrastructure and machinery used in production. Reliable infrastructure, well-maintained equipment, and appropriately applied technologies boost productivity.

- **Capital Stock:** A high level of capital stock means that workers have access to the best tools and equipment, increasing output per unit of labor.

- **Capital Deepening:** This is the amount of capital per worker.

The Index uses the following variables to measure physical capital:

- Capital stock at constant 2017 national prices (in 2017 US dollars)
- Individuals using the Internet (% of population)
- Secure Internet servers (per million people)
- World Bank Logistics Performance Index
- Access to electricity (% of population)

3. Innovation and Intangible Capital

Innovation and intangible capital are essential drivers of productivity and make up a large and growing share of global gross domestic product. This category includes factors such as knowledge and intellectual property (IP). We augment the traditional pillar with two new dimensions:

- **Technology Diffusion:** The degree of adoption of breakthrough technologies that contribute to increasing output per unit of input.

- **Innovation Potential:** This is the ability of a country to create new products and services, which can create new industries and business opportunities. Empirical research has been clear in establishing this link.

To measure innovation and intangible capital, our Index uses the following variables:

- Patent applications per capita
- Scientific and technical journal articles per capita
- Herfindahl-Hirschman Index

Polluted Environments Yield Worse Health Outcomes and Therefore Lower Productivity.

4. Natural Capital

This new pillar captures the impact that a country's natural resources and sustainability outcomes have on productivity. For example, polluted environments yield lower health outcomes and therefore lower productivity.

- **Living Natural Capital:** This refers to the biodiversity and ecosystems that exist within a country, including forests, fisheries, and agricultural land.
- **Non-Living Natural Capital:** This refers to the non-living natural resources that exist within a country, such as fossil fuels, rare minerals, and other raw materials, which are inputs to various industries.
- **Emissions:** Emissions in the long term contribute to climate change, which has destructive and disruptive effects on productivity, and emissions' impact on air and water quality affects human health as well.

Our Index uses the following variables to measure natural capital:

- Natural capital per capita in constant 2018 US dollars
- Level of water stress: Freshwater withdrawal as a proportion of available freshwater resource
- PM2.5 air pollution, mean annual exposure (micrograms per cubic meter)

Trust Fosters Cooperation, Information, and Knowledge Sharing.

5. Social Capital

This second new pillar refers to the relationships and norms that govern a society.[4] This cohesion contributes to productivity through trust.

- **Trust:** This fosters cooperation, information, and knowledge sharing, and reduces transaction costs by facilitating transactions between individuals, businesses, and institutions.

To measure social capital, we use data compiled by *Our World in Data* on international survey responses indicating the share of people agreeing with the statement "Most people can be trusted."[5]

6. Institutions

We have added institutions as the third new pillar to our measurement of productivity because of their essential role in overseeing and regulating the economy and thereby contributing to outcomes.

- **Institutional Quality:** This captures how institutions that enhance incentives, governance, and protection of property rights foster confidence, entrepreneurship, and innovation.
- **Equity:** Equity refers to whether the benefits of the economy are shared broadly across the country, which allows a mobile labor market.

To measure institutions, our Index used the following variables:

- World Bank Institutional Quality Index
- The inequality principal component, which is a variable constructed from three inequality variables defined by the World Inequality Database.[6] The specific variables used represent the share of income given to the top 10%, the bottom 50%, and the top 1%.

Five Key Insights from The Strategy& Productivity Potential Index

This first edition of the Productivity Potential Index (PPI), covering 25 diverse economies, reveals five key insights:

1

Across the sample, labor and human capital and physical capital remain the primary determinants of productivity. These are followed closely by intangibles: institutional quality, scientific research, and innovation are all in the top five predictors. Mainstream economic statistics struggle to capture these intangibles, which is one of the reasons the PPI is needed.

2

There are key differences in the primary drivers of productivity across different types of economies. In developing countries, physical capital, life expectancy, institutional quality, and internet access are the most important predictors. In contrast, in Organization for Economic Co-operation and Development (OECD) countries, inequality is the most important predictor, followed by physical and human capital. In the Gulf Cooperation Council countries, chief predictors include human capital (including physical health and education) and natural capital (including water stress, natural resources, and air pollution).

3

The PPI provides an estimated productivity potential, which can be compared against real-world observed productivity. These estimates are based not only on the individual country's data, but also on data from the entire sample. Thus, the estimated potential productivity answers the question, "What would we expect Country A's productivity to be, given its endowments, if it used those endowments as well as the average country across the sample?"

4

Machine learning analytics can offer a nuanced understanding of productivity drivers. PPI's design leverages machine-learning techniques to decompose and analyze the determinants of productivity pillars for each country. The design allows for the further decomposition of the determinants into the different dimensions of the PPI. This provides policy makers with a targeted approach to identifying policy prescriptions to improve their productivity.

5

The innovative PPI is fully aligned with, supports, and responds to the "Beyond GDP" movement, recently highlighted by UN Secretary-General António Guterres.[7] The results indicate that the sources of growth and innovation in economies are increasingly aligned with net zero and social cohesion. Thus, the PPI will be a useful indicator not only for understanding the future sources of growth, but for delivering the UN's Sustainable Development Goals and the 2030 Agenda.

Economic Gains From Greater Productivity

Economies stand to benefit greatly from improved productivity levels. Productivity gains can lead to an acceleration in the growth rate of a country's gross domestic product (GDP) over time. For example, for the 25 economies assessed in this Index, their existing baseline growth rate of real GDP is estimated at 2.6% for the upcoming decade, according to the World Bank.

If each country addressed their weakest productivity determinant, and matched it to the best-in-class among the sample, real GDP growth can accelerate from 2.6% to 3.5%. This acceleration can yield an additional USD 50 trillion in global GDP in 10 years. As for the GCC countries, if they improve their weakest productivity determinant, it can accelerate the region's GDP growth over the next decade from 3.8% to 5.4%. This acceleration will create USD 2.5 trillion in additional GDP.

Estimation Methodology

We calculate the premium to real GDP growth resulting from the increase in the level of productivity from the weakest productivity determinant per country being simulated to that best-in-class among countries assessed. This level difference is then converted to an annual rate. This rate is then added to the baseline forecasted real GDP growth of 25 economies, provided by the World Bank Global Economic Prospects publication of January 2024, between 2025 and 2035 to simulate real GDP growth till 2035. The two growth paths are then applied to a country's real GDP as measured in constant USD to estimate real GDP values over time. The time series of real GDP with productivity enhancement is then compared to the time series forecast of real GDP without the productivity enhancement. The difference by year is then summed to find the incremental GDP over 10 years.

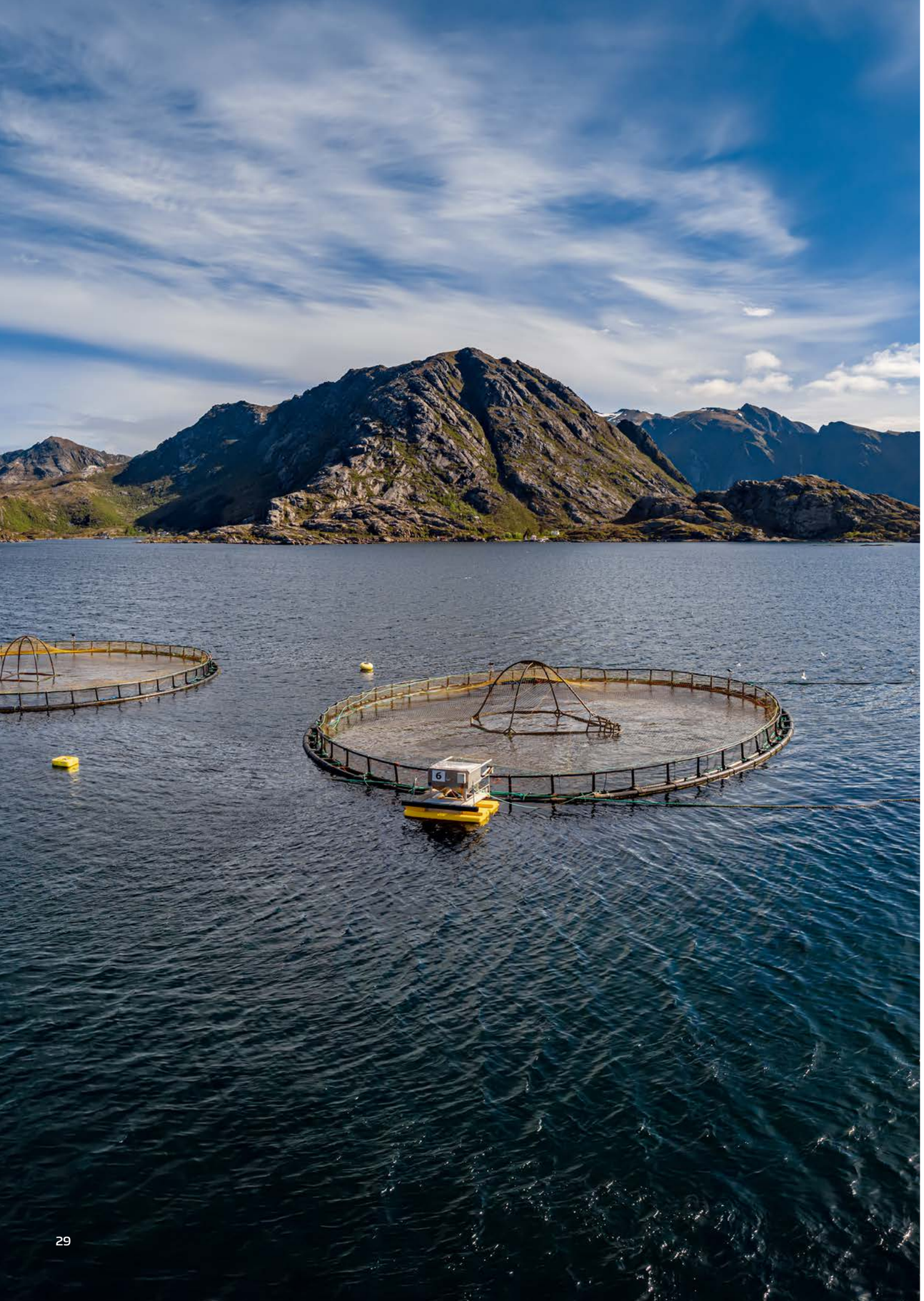
Policy Implications

A wide range of policy options are available to deal with the specific productivity measurement categories in our Index. The specific solutions that could be relevant will vary from country to country, depending on stage of development and individual economic structure. The Productivity Potential Index can help leaders identify and measure gaps in their country's productivity performance, thereby enabling leaders to find actionable measures to close those gaps.

At its core, productivity is a function of the quality of its inputs. To boost productivity, policymakers should focus on enhancing the efficiency with which capital (including physical, natural, and social capital) is used, as well as on the quality and quantity of the workforce. Below, we describe some high-level policy implications.

Labor and Human Capital. Some of the strongest evidence about ways to enhance human capital emphasize the importance of early childhood education and skill development for long-term productivity: Investments in early education yield high returns in terms of cognitive and socioemotional skills.[9] Other research underscores the significance of education quality in shaping human capital.[10] Beyond investments in education, there is also strong evidence of the importance of access to affordable, high-quality physical and mental health services, including strategies that promote employees' well-being.[11] Flexible labor market policies, reskilling programs, and adaptability of education and training institutes are also crucial at a time when technological change is occurring at a fast pace.[12]

Physical Capital. Rigorous research demonstrates the significance of strategic policies such as infrastructure investment, access to capital, tax incentives, trade liberalization, public-private partnerships, regulatory reforms, prudent monetary and fiscal policies, and support for savings and small and medium-sized enterprises in boosting capital stock and capital deepening, ultimately leading to improved productivity.



Innovation and Intangible Capital. Investment in innovation is a crucial driver of productivity. At the national level, implementing R&D tax credits and incentives can strengthen private R&D investment, while a coherent innovation strategy ensures long-term goals and strategic resource allocation. IP regimes should balance innovation encouragement with efficient knowledge dissemination. Industry-specific policies that involve creating innovation hubs and challenge-led programs can foster collaboration and risk-taking.

Natural Capital. Policy levers at national and local levels—including taxes, subsidies, environmental standards, regulations, and the creation of protected areas—can support conservation and enhancement of natural capital. National natural capital and ecosystem service accounts are crucial for measuring, maintaining, and managing natural assets, empowering governments and businesses to plan for environmental risks. Market incentives, such as environmental taxes and pro-environmental subsidies, are effective tools for improving environmental outcomes. Removing harmful subsidies, particularly in agriculture and fossil fuels, can improve economic efficiency and environmental sustainability. Creating environmental markets, implementing direct conservation through protected areas, and redirecting agricultural subsidies toward environmentally friendly practices all contribute to natural capital preservation. Active participation in international environmental agreements, investing in ecosystem restoration, water resource management, pollution reduction policies, and planning regulation are key measures. Lastly, turning government procurement into a tool for innovation, particularly in green public procurement, can drive sustainable economic growth.

Social Capital. Increased effectiveness of government institutions through policies that enhance transparency, accountability, and the rule of law can contribute to a more trusting society, a key component of social capital.[13] Additional policy levers include encouraging community-building activities, civic engagement, and social participation such as volunteering. Reducing economic disparities and promoting social inclusion can contribute to the formation of social capital by fostering a sense of solidarity and shared identity while also addressing equity in an economy. Finally, policies that encourage inclusivity and foster understanding between different cultural and social groups can strengthen social cohesion.[14]

Institutions. In addition to a focus on increasing the effectiveness of government institutions through policies that enhance transparency, accountability, and the rule of law, policies that enhance equity in society such as fair competition laws, a strong social welfare system, and equal access to high-quality government services including health and education are all important policy levers to consider.

References

Acemoglu, D., and Autor, D. "Skills, Tasks and Technologies: Implications for Employment and Earnings," 2011.

Acutt, K., Bassi, L., and McInnes, M. "The Relationship Between Health and Productivity," 2019.

Agarwala, M., Burke, M., Klusak, P., Kramer, M., and Volz, U. "Nature Loss and Sovereign Credit Ratings," 2022. Bennett Institute for Public Policy, University of Cambridge.

Agarwala, M., Cinamon Nair, Y., Cordonier Segger, M.C., Coyle, D., Felici, M., Goodair, B., Leam, R., Lu, S., Manley, A., Wdowin, J., and Zenghelis, D. "Building Forward: Investing in a Resilient Recovery." Wealth Economy Report to LetterOne, 2020. Bennett Institute for Public Policy, University of Cambridge.

Agarwala, M.K., Coyle, D., Peñasco, C., and Zenghelis, D. "Measuring for the Future, Not the Past" (No. c14823), 2023. National Bureau of Economic Research.

Agarwala, M., and Martin, J. "Environmentally Adjusted Productivity Measures for the UK," Working Paper No. 028, 2022. The Productivity Institute.

Agarwala, M., and Zenghelis, D. "Social Capital and the Changing Wealth of Nations." In *The Changing Wealth of Nations 2021,* 2021. The World Bank.

Athey, S., and Imbens, G.W. "Machine Learning Methods That Economists Should Know About," *Annual Review of Economics*, Vol. 11, pp. 685-725, 2019.

Bloom, D.E., Cafiero-Fonseca, E.T., Candeias, V., and Adashi, E.Y. "Economics of Non-Communicable Diseases in India: The Costs and Returns on Investment of Interventions to Promote Healthy Living and Prevent, Treat, and Manage NCDs," 2011.

Bloom, D.E., Canning, D., and Sevilla, J. "The Effect of Health on Economic Growth: A Production Function Approach," 2003.

Brynjolfsson, E., and McAfee, A. "The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies," 2014.

Card, D., and Krueger, A.B. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania," 1994.

Coleman, J.S. "Social Capital in the Creation of Human Capital," 1988.

Currie, J., and Almond, D. "Human Capital Development before Age Five," 2011.

Dasgupta, P. *The Economics of Biodiversity: The Dasgupta Review*, 2021. HM Treasury.

Dasgupta, P., and Maler, K.-G. "Net National Product, Wealth, and Social Well-Being," *Environment and Development Economics*, Vol. 5, No. 1, pp. 69-93, 2000.

Glaeser, E.L., Laibson, D., Scheinkman, J., and Soutter, C. "Measuring Trust," 2000.

Goulder, L.H. "Environmental Taxation and the Double Dividend: A Reader's Guide," *International Tax and Public Finance*, Vol. 2, No. 2, pp. 157-183, 1995.

Hanushek, E.A., and Woessmann, L. "The Role of Cognitive Skills in Economic Development," 2008.

Heckman, J.J. "Schools, Skills, and Synapses," 2008.

Jones, S., Johnstone, D., and Wilson, R. "An Empirical Evaluation of the Performance of Binary Classifiers in the Prediction of Credit Ratings Changes," *Journal of Banking & Finance*, Vol. 56, pp. 72-85, 2015.

Klusak, P., Agarwala, M., Burke, M., Kraemer, M., and Mohaddes, K. "Rising Temperatures, Falling Ratings: The Effect of Climate Change on Sovereign Creditworthiness," *Management Science*, 2023.

Knack, S., and Keefer, P. "Does Social Capital Have an Economic Payoff? A Cross-Country Investigation," 1997.

Putnam, R.D. "Making Democracy Work: Civic Traditions in Modern Italy," 1993.

Stavins, R.N. "Experience with Market-Based Environmental Policy Instruments," *Handbook of Environmental Economics*, Vol. 3, pp. 355-435, 2003.

Tanaka, K., Kinkyo, T., and Hamori, S. "Random Forests-Based Early Warning System for Bank Failures," *Economics Letters*, Vol. 148, pp. 118-121, 2016.

Total Economy Database: Output, Labor, and Labor Productivity. April 2023 version. The Conference Board, 2023.

United Nations Environment Programme. *Inclusive Wealth Report 2023: Measuring Sustainability and Equity*, 2023.

About Strategy&

Strategy& is a global strategy consulting business uniquely positioned to help deliver your best future: one that is built on differentiation from the inside out and tailored exactly to you. As part of PwC, every day we're building the winning systems that are at the heart of growth. We combine our powerful foresight with this tangible know-how, technology, and scale to help you create a better, more transformative strategy from day one.

As the only at-scale strategy business that's part of a global professional services network, we embed our strategy capabilities with frontline teams across PwC to show you where you need to go, the choices you'll need to make to get there, and how to get it right.

The result is an authentic strategy process powerful enough to capture possibility, while pragmatic enough to ensure effective delivery. It's the strategy that gets an organization through the changes of today and drives results that redefine tomorrow. It's the strategy that turns vision into reality. It's strategy, made real.

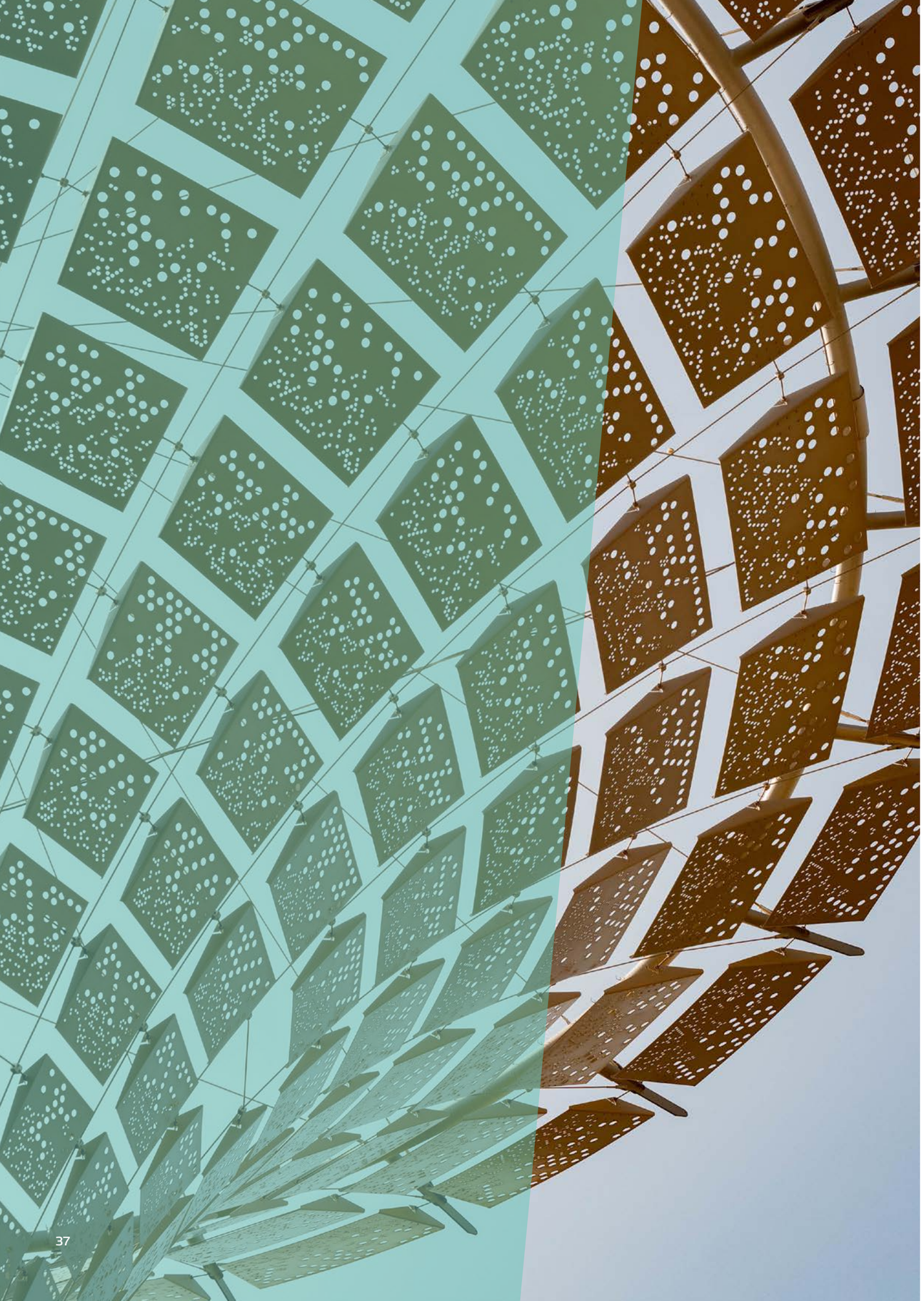
Visit www.strategyand.pwc.com/me

About the Ideation Center

The Ideation Center is the leading think tank for Strategy& Middle East, part of the PwC network. We aim to promote sustainable growth in the region by helping leaders across sectors translate socioeconomic trends into actions and better business decisions. Combining innovative research, analysis, and dialogue with hands-on expertise from the professional community in the private and public sectors, the Ideation Center delivers impactful ideas through its publications, website, and forums. The end result is one that inspires, enriches, and rewards. The Ideation Center upholds Strategy&'s mission to develop practical strategies and turn ideas into action. At the Ideation Center, we enjoy the full support of all practices in the Middle East. Together we bring unsurpassed commitment to the goal of advancing the interests of the Middle East region. To learn more, visit **www.ideationcenter.com.**

Endnotes

1. See page 25 for the estimation methodology of GDP gains.
2. See “The Economics of Biodiversity: The Dasgupta Review,” UK Government, February 2, 2021 (https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review). See also Agarwala, M.K., Coyle, D., Peñasco, C., and Zenghelis, D. (2023). Measuring for the Future, Not the Past (No. c14823). National Bureau of Economic Research and United Nations Environment Programme, 2023. Inclusive Wealth Report 2023: Measuring Sustainability and Equity.
3. A forthcoming paper will provide further detail on the construction and outcomes of the econometric model.
4. Social capital is a broad concept for which there is no obvious unit of measurement. Extensive research into social capital has found that it can be proxied in social survey questions about trust. Observation-based measures include voter turnout, blood donations per capita, and results in “dropped wallet” experiments. As trust is a concept that transcends language, culture, and income level, and because it correlates strongly with other dimensions of social capital, it is common to use trust questions as a proxy for broader social capital measurement.
5. Indicator based on the measure published by Ortiz-Ospina and Roser in 2016, included in “Our World in Data.”
6. https://wid.world/data/.
7. United Nations, “Valuing What Counts: Framework to Progress Beyond Gross Domestic Product,” Policy Brief 4, May 2023.
8. Observed real-world productivity is sourced from the Total Economy Database produced by the Conference Board.
9. Heckmann, 2008.
10. Hanushek et al., 2008.
11. Bloom et al., 2003; Bloom et al., 2011.
12. Acemoglu et al., 2011; Brynjolfsson et al., 2014.
13. Coleman, 1988; Putnam, 1993.
14. Glaeser et al., 2000.



Contacts

Chadi N. Moujaes
Partner, Strategy& Middle East,
Government and Public Sector practice
chadi.moujaes@strategyand.pwc.com

Karim Michel Sabbagh
Managing Director,
Space42
Karim.Sabbagh@g42.ai

Dima Sayess
Partner, Strategy& Middle East,
Ideation Center Lead
dima.sayess@strategyand.pwc.com

Matthew Agarwala
Economist, Cambridge University,
Bennett Institute for Public Policy
mka30@cam.ac.uk

Yacoub Shomali
Economist, Strategy& Middle East,
Ideation Center
yacoub.shomali@strategyand.pwc.com

Nour Shammout
Economist, formerly Strategy& Middle East,
Ideation Center

About the Authors

Chadi N. Moujaes is a partner with Strategy& Middle East and a member of the government and public sector practice. He supports the efforts of communities, countries, and leaders to improve well-being for their constituents through citizen-centric social and economic policies and programs. Based in Dubai, he focuses on delivering impact in the areas of socioeconomic development, innovation, and human capital development. He is a pragmatic believer in the potential of digital technologies to help reinvent the apparatus of government, from policy formulation to service delivery and citizen engagement.

Karim Michel Sabbagh is the Managing Director of Space42, an AI-powered space technology company creating geospatial and mobility solutions, satellite communications and business intelligence. With an extensive history in the innovation sector, his interests include strategy-based formation and transformation of technology-centric global businesses. Karim has authored and contributed to several influential thought leadership reports, such as The Third Billion, 100 Million Youth Challenge and The Global Information Technology Report. Prior to his industry roles, he was a senior partner at Booz&Co (now Strategy&), where he founded the Ideation Center.

Dima Sayess is a partner with Strategy& Middle East and the director of the Ideation Center. She has more than 15 years of experience in public-sector consulting in the region and focuses on socio-economic development, wellbeing, government of the future and innovation in policy making, including actionable foresight, moonshot thinking, life-centered design, behavioral economics, evidence generation, and impact evaluation. She has formerly served as a strategic development advisor for the strategy management and governance sector at Dubai's Executive Council.

Matthew Agarwala is an economist at the Bennett Institute for Public Policy (Cambridge University), where he is working on wealth-based approaches to measuring and delivering sustainability, wellbeing, and productivity. His research is motivated by the belief that 21st century progress cannot be described by 20th century statistics. Matthew leads the Bennett Institute's Wealth Economy project which seeks to transform economic measurement to better reflect sustainability, inequality, and human wellbeing. He regularly consults for governments and organizations and is one of the main contributors to the United Nation's SEEA (System of Environmental-Economic Accounting) framework.

Yacoub Shomali is the economic analytics and impact evaluation lead at the Ideation Center, where he is responsible for advancing measurement capabilities and developing socio-economic impact frameworks to drive innovation in public policy. His current research explores how data and new technologies can support fairer and more effective policymaking, including employment and productivity, healthcare and capital investment. His previous experiences span heading up corporate affairs at Rain, and leading on public sector engagements with a primary focus on public finance during his time at the Boston Consulting Group.

Nour Shammout is the former evidence and evaluation Lead with the Ideation Center at Strategy& Middle East. In that role, she led the development of proprietary tools and frameworks to measure impact and incorporate evidence-based approaches into policy design. She created several thought leadership reports spanning productivity, growth, labor markets, and social development. Prior to joining Strategy&, Nour was the deputy director of the Economic Directorate at the Royal Hashemite Court in Jordan. She also held various roles within the policy team at the Abdul Latif Jameel Poverty Action Lab (J-PAL) at MIT.

WORLD GOVERNMENTS SUMMIT

JOIN THE CONVERSATION

@WorldGovSummit

www.worldgovernmentssummit.org