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~~DU~~ PH.D. 2023 DIRECT INTERVIEW

POLITICAL SCIENCE

SYNOPSIS

RESEARCH TOPIC

OPPORTUNITIES, INTERNATIONAL MOBILITY, FINANCIAL INCLUSION, INCLUSIVE GROWTH, TECH & DEMOCRACIES

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RESEARCH PROPOSAL

The topic is access to opportunities, intergenerational mobility, financial inclusion, inclusive growth, tech & democracies. The planned research study is how it possible to achieve inclusive growth, development, literacy, civil society, socio economic civil society, system. However that can be proof to achieve India, technological literate India.

Cities and towns have become the primary human living space. Since 2007, more than half of the world's population has been living in urban areas and the figure is estimated to exceed 70 per cent by 2050. This is a hallmark of the transformation of human's economic base and social structure, inasmuch as, previously, populations lived and worked primarily in rural areas.

Cities can provide many socioeconomic benefits. By concentrating people, investment and resources (a process known as agglomeration), cities heighten the possibilities for economic development, innovation and social interaction. More specifically, cities also make it possible to lower unit costs so as to provide public services such as water and sanitation, health care, education, electricity, emergency services and public recreational areas (Polèse, 2009; Satterthwaite, 2010). However, this requires a functioning city government able both to ensure that such benefits are realized, and to adopt a sustainable framework that encourages the city's growth within ecological limits. Along these lines, cities also face challenges that threaten their efforts to achieve sustainability, for example, through improvement of access to, and efficiency in the use of, public services, as well as reduction of their ecological footprint and financial fragility, and the building of resilience against the adverse impact of natural hazards.

The present chapter recommends an integrated strategy for making cities thriving centres of sustainable development and innovation. It starts by assessing what a city is, the scale and speed of urbanization in recent decades, and the main trends and projections of urban growth across regions. The trends and projections analysed serve as an introduction to the conception of future urbanization as a process that can enhance the benefits of cities, while reducing the threats to a more balanced and sustainable development. The evolution of the concept of urban sustainability is described and a framework is proposed based on four pillars: economic development, social development, environmental management and effective urban governance. The following section examines relevant challenges associated to the fulfilment of those objectives by different groups of countries. The last section examines urbanization through the lens of the investment opportunities that addressing those challenges involves. A proposal put forth for an integrated set of investments in infrastructure, public services and capacity development is complemented by an examination of relevant world experiences associated with urban sustainability at the sectoral level (e.g., disaster risk reduction, housing and green infrastructure) as well as a policy framework for a sustainable financing of cities.

The city and main urbanization trends

There is no uniform definition of what constitutes a city, given the diversity of urban realities around the world. Every country defines cities according to its own criteria. It

should also be noted that gaps in and measurement issues connected with urban data limit the accuracy of projections and international comparisons of levels of urbanization and sizes of city populations. Box III.1 discusses the different criteria used in defining cities and data issues.

Cities are diverse in terms of their size, structure, spatial form, economy, wealth, local resources availability and ecological impact. According to population size and conditions, urban centres can be, e.g., small, medium, large or mega. The population of an urban centre can range from a few thousand to over 10 million people or more. According to relevant studies, "small urban centres" have a population less than or equal to 500,000 people; medium urban centres, a population between 1 million and 5 million people; and mega urban centres, a population of 10 million or more (United Nations, Department of Economic and Social Affairs, Population Division, 2012; Dobbs and others, 2011b). For statistical comparison of urban centres' sizes and development, this chapter uses the categories along with "large urban centres" defined as agglomerations with 5 million inhabitants or more.

The scale and scope of urbanization

At the start of the twentieth century, just 16 cities had 1 million or more people, with the majority located in advanced industrialized countries (Montgomery and others, 2004). By 2010, there were 449 cities with 1 million people or more, of which three quarters were located in developing countries (United Nations, Department of Economic and Social Affairs, Population Division, 2012).

Urban population growth is expected to continue setting the pace of world population growth, and in the next 10-15 years, for the first time in history, the world rural population is expected to decline (figure III.1).

Globally, a net 1.3 billion people was added to small urban centres during 1950-2010, more than double the number of people added in medium (632 million) or large urban centres (570 million).1 This trend is important, since different sizes of urban settlements can affect the levels of provision of services needed to sustain growing populations. The challenges and policy implications of the likely continued predominance of small urban centres and the rising significance of middle and large urban centres in the next 15 years are noteworthy and will be further analysed below.

Diverse paths and paces of urbanization

There is considerable regional diversity in the patterns of urbanization and an even greater variation in the level and pace of urbanization of individual countries. For example, on average more than three quarters of the Latin America and the Caribbean region is highly urbanized, whereas least developed countries and landlocked developing countries are still predominantly agricultural—although their path towards urbanization is expected to accelerate in the next decades (table III.1).

Yet, "late urbanization" in Asia and Africa is expected to gain speed and concentrate the majority of the additional 3 billion urbanites during 2010-2050. Similarly, the number of urban agglomerations (750,000 inhabitants or more) and the number of inhabitants per agglomeration are expected to grow significantly in Asia and Africa by 2025 (United Nations, Department of Economic and Social Affairs, Population

Division, 2012). It is expected that over 80 per cent of the urban population added in the next 15 years will be found in middle-income countries such as China, India, South Africa, Nigeria, Indonesia and Pakistan (ibid.).

Changing patterns of urban settlements

Over 50 per cent of the world's urban populations lived in settlements with 500,000 people or less by 2010. Although their significance will remain, the share will have been reduced to 42 per cent by 2025 (United Nations, Department of Economic and Social Affairs, Population Division, 2012). Medium cities (those with 1 million - 5 million people), on the other hand, will increase their share of the urban population, from 21 to 24 per cent over a similar time interval. The share of the urban population in large cities (those with more than 5 million people), including megacities, will grow the most, from 17 to 22 per cent, with an absolute increase of more than 410 million people. By 2010, megacities of 10 million inhabitants or more contained only 10 per cent of the global urban population (ibid.).

All of the types of growing cities will be located largely in low- and middle-income countries. In many developing countries, the main challenge is to provide underserved urban residents, including populations in large cities, with affordable access to adequate public services and job opportunities. Inhabitants in poor urban settlements typically reside on the outskirts as well as within large cities without adequate access to piped water, waste disposal, electricity and good schools. Evidence also suggests that rates of poverty and infant and child mortality can be high in small and large cities, often indicating an inadequate access to public-health facilities and the lack of political will to invest in them (Mitlin and Satterthwaite, 2012).

Cities in low-income countries may often lack the institutional capacity to manage growing populations. Although some national Governments in developing countries have begun to decentralize service delivery and revenue-raising to regional and local levels of government, lower tiers of urban government often do not have enough resources and adequate capacity to manage, e.g., health, education and poverty programmes (Montgomery and others, 2004).

Is there a twin path between urbanization and economic growth?

The economic strength of countries lies in cities; in fact, urban gross domestic product (GDP) represents about 80 per cent of world GDP (Grübler and Fisk, 2013). Cities have been pivotal centres for economic growth, employment creation, innovation and cultural exchange. Cities in many developing countries (e.g., Bangladesh, Brazil, China, Honduras, India, Nigeria, Peru and South Africa) concentrate the core of modern productive activities and are the areas par excellence where income-earning opportunities are to be found (Satterthwaite, 2007). Cities are also the centres where women enjoy the highest labour participation, health access, literacy rates and upward social mobility (Cohen, 2006).

Nonetheless, urban population growth has outpaced economic growth as well as the needed improvement of competence and institutional capacity of city governments in many developing countries, which contrasts with the closer correlation found in de-

veloped countries (figure III.2). Thus, for an equivalent level of urbanization, the level of income per capita in developing regions is several times lower. This trend, which might be explained partly by different criteria used for defining urban centres, has implications for the actual capacities of poor countries to build sustainable cities. Figure III.2 illustrates this trend in relation to the urbanization of the region of Latin America and the Caribbean.

In particular, the urbanization process in least developed countries or countries of sub-Saharan Africa may have occurred with negative or almost no economic growth (figure III.3), which ultimately implies an increased precariousness of urban life. Population in slums almost doubled in sub-Saharan Africa between 1990 and 2010, rising from 103 million to 200 million (United Nations Human Settlements Programme (UN-Habitat), 2010). Even so, Satterthwaite (2010) recommends caution in the interpretation of the negative correlation between economic growth and urbanization in sub- Saharan countries because of data shortcomings, which can prevent accurate measurement of urbanization patterns (see, also, Potts, 2006).

Cities are constantly evolving as a result of dynamic processes heightened by population mobility, natural population growth, socioeconomic development, environmental changes and local and national policies. The trends and projections described above serve as the basis for an introduction to the concept of future urbanization as a process that can enhance the benefits and synergies of cities, while reducing the threats to a more balanced and sustainable development.

A framework for sustainable cities

It has been suggested that the building of a "green" city is equivalent to the building of sustainability (Beatley, ed., 2012). Many countries are planning and engaged in building green cities and "eco-cities" as starting points for the building of sustainable development. Yet, it is important to understand cities' sustainability as a broader concept which integrates social development, economic development, environmental management and urban governance, which refers to the management and investment decisions taken by municipal authorities in coordination with national authorities and institutions. In this regard, chapter II provides guidelines for possible sustainable development paths for countries at different stages of development.

The 1987 report of the World Commission on Environment and Development, also known as the Brundtland Commission, defined sustainable development as development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. The report included a chapter on urban issues. In 1991, the United Nations Centre for Human Settlements (UNCHS) Sustainable Cities Programme attempted to define a sustainable city as one "where achievements in social, economic and physical development are made to last" (United Nations Human Settlements Programme (UN-Habitat), 2002, p. 6). However, this definition was still too general and neglected the fact that a sustainable city must have a low ecological footprint and reduce risk transfer (economic, social and environmental) to other locations and into the future (Rees, 1992).

appraisal and selection capacities as well as maintenance funding which see the weakest scores in the public investment cycle.

Integrating climate change perspectives in public investment management would enable countries to better design and implement climate relevant infrastructure. In this regard, the IMF is also developing the PIMA Climate Change Module (PIMA CC) with a particular focus on the resilience and sustainability aspects—PIMA CC integrates climate change issues into PIMA framework and helps strengthen governments' capacity to address risks related to climate and natural disasters in public investment.

The concept of sustainable cities and its links with sustainable development have been discussed since the early 1990s.2 Sustainable cities should meet their "inhabitants' development needs without imposing unsustainable demands on local or global natural resources and systems" (Satterthwaite, 1992, p. 3). In this sense, consumption patterns of urban middle- and high-income groups as indicated in chapters I and II are responsible for the use of a significant portion of the world's finite resources and contribute significantly to the production of polluting wastes. Sustainable development should focus on better living and working conditions for the poor, including affordable access to, and improvement of, housing, health care, water and sanitation, and electricity.

The first approximations to a concept of city sustainability noted above were reflected in the 1992 Rio de Janiero Conference on Environment and Development (United Nations, 1993) attended by more than 178 Governments. The 1992 Rio Declaration integrated the economic, social, environmental and governability dimensions of sustainability and argued for the eradication of unsustainable patterns of production and consumption, the eradication of poverty, and the role of the State, civil society and international community in protecting the environment.

Another outcome of the United Nations Conference on Environment and Development was Agenda 21 (United Nations, 1993), which aimed at preparing the world for the challenges of the twenty-first century. Agenda 21, which was built upon at subsequent United Nations conferences, defined sustainability in the context of economic, social, environmental and governance issues, noting the decisive role of authorities and civil society at the local, national and international levels for the implementation of sustainable development policies. Yet, Agenda 21 did not explain how the concept of sustainability could become the basis for the creation of sustainable cities.

The Habitat Agenda (United Nations, 1997), adopted by the United Nations Conference on Human Settlements (Habitat II), held in Istanbul from 3 to 14 June 1996, echoed the concerns expressed in Agenda 21 with respect to the multidimensionality of development, and discussed urban sustainability as requiring a harmonious integration of economic, social and environmental issues. At this summit, nations reported on the progress towards achieving the sustainability of their cities. Yet, this Agenda still needed to include climate change as one of the main threats to building sustainable cities and to development in general.

At the first session of the World Urban Forum convened at the headquarters of the United Nations Human Settlements Programme (UN-HABITAT) in Nairobi from 29 April to 3 May 2002, an in-depth discussion was held on urbanization in the context of sustainable development. The Forum affirmed that addressing economic, social, environmental and governance issues was integral to the creation of sustainable cities, and that the inability to address those issues would prevent the achievement of sustainable development (United Nations Human Settlements Programme (UN-HABITAT), 2002). The main messages of the Forum were comprehensively discussed and reaffirmed at the World Summit on Sustainable Development, held in Johannesburg, South Africa, from 26 August to 4 September 2002. More recently, this approach to sustainable cities has been echoed the the Rio+20 Declaration (United Nations, 2012b, p.26) and by the United Nations System Task Team on the Post-2015

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UN Development Agenda (2012), which includes governance under the broader umbrella of peace and security issues. In an increasingly urbanized world which demands more sustainable ways of living, urban governance entails the fostering of urban planning and environmental management, which includes the reduction of ecological footprints, and the decentralization of decision-making, and resource allocation, as well as enhanced policy coordination between local and national authorities.

In this context, achieving the sustainability of cities can be conceived as entailing the integration of four pillars: social development, economic development, environmental management, and urban governance. Figure III.4 presents the four pillars for achieving urban sustainability encompassing the balanced accomplishment of social and economic development, environmental management and effective governance. Yet, the ways in which a city is able to build sustainability will reflect its capacity to adapt, within the context of its particular history, to the policy priorities and goals defined by each pillar.

The integration of the four pillars can generate synergies, for example, between waste and recycling management (environmental management) and access to water and sanitation (social development); between air quality conservation and green public transportation; and among production and distribution of renewable energy sources, green energy access, and adaptation to and mitigation of climate change, as well as between the goal of reducing inequities (urban governance) and that of ensuring adequate access to green housing, education and health (social development). Investment is the catalyst behind the realization of each of the component goals of urban sustainability.

To build upon the four pillars can be a challenge for many cities and countries. Cities are often at different stages of development and have their own specific responses to policy priorities at the local and national levels. In this sense, the sets of sustainability challenges to be overcome by cities are diverse.

RESEARCH METHODOLOGY

There is interconnected population living standard, organization, mobility that is urban mobility say can be or study plan, behavioural methodology, observational literate sense of mind which can proof developed inclusive, achievable India.

Keeping global temperatures to safe levels requires governments to swiftly adopt comprehensive climate policy packages. A growth-friendly strategy consists of four building blocks: a green investment plan, carbon pricing, support to green R&D, and measures to ensure the social fairness of the transition. The green investment push would pave the way for a phased-in rise in carbon prices (by addressing network externalities and market failures), while also boosting demand and employment and helping the recovery from the COVID-19 pandemic. Carbon pricing or regulations are necessary to achieve a deep reduction in emissions, which green investments or R&D alone cannot deliver.

Aligning infrastructure with net zero emissions requires additional public investments in the range of 0.5 to 4.5 percent of GDP cumulatively over the next decade, with most estimates clustered around 2 percent of GDP. Investment has to shift away from

the extraction and combustion of fossil fuels toward renewable energy, electricity networks and storage, electrification of end-uses, and energy efficiency. While the bulk of investment will come from the private sector in most countries, the public sector has a catalytic role to play through direct infrastructure investment and also through other support measures, such as co-funding for projects with large upfront investment costs, and risk-sharing through insurance and guarantees.

Carbon pricing is a cost-effective way of reducing emissions. Carbon pricing, which can take the form of a carbon tax or an emission trading system, is the least-cost option to deliver deep emission cuts. Moreover, it generates revenues that can be used to finance compensatory measures such as transfers to affected households or green infrastructure spending. Delaying action on carbon pricing by ten years would likely imply missing mid-century net zero emission targets by a large margin, since the prices required at that point to reach those goals would appear unviable. That, in in turn would unleash higher temperature increases than could be achieved with a swift introduction of carbon pricing, with potential irreversible damage to the climate and the economy. Where carbon pricing is not politically feasible, regulations can be used to limit emissions—but these would likely come with higher economic costs. In hard-to-decarbonize sectors such as transportation, agriculture, and land use, carbon pricing should be complemented with sector-specific policies.

The transition to a low-carbon economy needs to be just and create opportunities for displaced workers. The shift in investment can create a geographically concentrated loss in employment, for example in coal mining regions. Proven remedies include programs for retraining workers, support for geographic mobility, the active promotion of new industries, and investments in the quality of life in the region. Apart from funding such efforts, revenue from carbon pricing can be used to compensate affected households for higher energy costs. In advanced economics, this can take the form of reduced taxation or direct transfers to these households. In developing economies, providing basic infrastructure in education, health, clean water access, etc. might be the most effective.

Immediate and coordinated climate action, including transfers of green technology and climate finance for developing economics, is needed to prevent catastrophic climate change. Successfully mitigating climate change will require the participation of all countries, including developing economies where carbon emissions are expected to grow substantially. Joint action through a coordinated green investment push would create beneficial demand spillovers and lift global output and pave the way for higher carbon prices. In addition, a global carbon price floor among the G20—differentiated according to level of development to reflect the principle of common but differentiated responsibilities—would decisively curb emissions and limit carbon leakage among the participants. Bringing every country on board, however, will require financial and technological support for developing economies for which the transition costs are more difficult to bear, due to fast-growing energy needs and less fiscal space to finance green investments.

A. Risks from Climate Change

1. Climate change could destabilize economics and threaten global security as well as human welfare. Unmitigated climate change is expected to increase global warming relative to preindustrial levels to around 4°C, raising the average temperature on earth's surface to levels not seen in millions of years.2 This would have significant detrimental effects on macroeconomic stability through lower productivity in agriculture, fishing, and work in non-climatized locations; more frequent disruption of activity and destruction of productive capital due to extreme weather events, natural disasters and rising sea levels; diversion of resources toward adaptation and reconstruction; and possibly increased morbidity and mortality due to more prevalent infectious diseases and natural disasters. According to IPCC (2019), climate change "may lead to increased displacement, disrupted food chains, threatened livelihoods (high confidence), and contribute to exacerbated stresses for conflict (medium confidence)".3 Given the strong interconnectedness of the global economy, no country is likely to remain unscathed even if the worst warming impacts are initially concentrated in hotter regions. Scientists have also warned about the risk of reaching climate tipping points—such as the melting of glaciers and ice caps—which could not be reversed over human time scales and bring catastrophic consequences for life on the planet.

2. Ambitious climate action to reach net zero emissions is necessary to achieve the temperature goals set out in the 2015 Paris Agreement. In the Paris Agreement, countries agreed to "holding the increase in the global average temperature to well below 2°C above pre-industrial levels" to avert catastrophic outcomes. Keeping temperature increases below 2°C, in turn, will require bringing net greenhouse gas emissions to zero by mid-century.5 This means that carbon emissions must be eliminated or that any remaining carbon emissions must be removed from the atmosphere by natural sinks (for example, forests and oceans) or artificial means (for example, carbon capture and storage).

3. Reaching net zero emissions will require much more ambitious policy than has been implemented so far. Almost all countries have defined Nationally Determined Contributions (NDCs) to implement the 2015 Paris Agreement and are expected to adopt more ambitious NDCs over time, including in the 2021 United Nations Climate Change Conference (COP26)
meeting in Glasgow, UK. Current NDCs are insufficient to reduce global warming to 2°C or below, being more compatible with 3°C warming by 2100.6 A growing number of countries (58 to this day, covering 53 percent of global emissions) have since 2015 specified their long-term commitment by announcing "net zero emissions" objectives by mid-century. This includes the G20 members Argentina, Brazil, Canada, China (2060), the EU, France, Germany, Japan, South Africa, Korea, UK, and US. However, few G20 countries have put these targets into policy or law (as reflected in "baseline" emission paths being higher than what would be consistent with NDC targets for most countries in Figure 1). To implement the net zero emissions commitments, countries will need to ramp up action significantly and quickly on carbon pricing and investment in clean technologies from current levels (see below).

RESEARCH PLAN & HYPOTHESIS

Digital financial services enabled by fintech technology, innovation in the financial sector have become an employment driven of financial inclusion emerging market and developing country, case study of India, New Delhi.

Digital financial inclusion on economic growth, poverty elevation, a broad set of micro economic, macro economics, socio economics and financial sector, digital infrastructure, level of internet services and mobile phones.

Intergenerational mobility and income and education, these grants opportunity, growth, though level of education, where intergenerational mobility is low, the analysis also shows that benefits from structural reforms may not be distributed to all individuals and citizens.

Improving educational outcome should focus not only on spending level but also on the quality of education, increasing educational attainment, emerging market economies can growth and reduce inequality.

Income and wealth inequalities between people is inevitable in market based economy as well as process of and circumstances of models of systemic and governance and other quality, improvement of innovation, enterprises essential requirement of human potential, G-20 work (fostering inclusive growth and future of growth) access to opportunity, intergenerational mobility and support inclusive growth.

Access and opportunities to employment, economic growth has been biased towards capital intensive sector showing the pace of job creation. Notably progress in shifting to high productivity, higher wages, sector like Banking, Telecommunication, Transportation and Infrastructure.

Active labour market policies encouraging resources reallocation and may have the potential to increase employability and the productivity of workers, labour market policies include public employment services that training program, private sector wage subsidies and provide opportunity for the job learning.

Product market reform can strengthen the output and employment gains from labour market reforms.

Digital payment has been contributor for a financial inclusion. The internet has provided SMEs with access to small, short duration loan, digital identification system have made it easier for people to open account have been affective in new transactions.

An offer the potential for large productivity increase based on algorithm that help frames, optimize a range of decisions that increase their yield, algorithms depend on crops, soil and weather conditions.

B. The Opportunity to Reset Economies on a More Sustainable Path

4. The current recovery from the Covid-19 crisis presents a unique opportunity to reset economies on a more sustainable path. Where fiscal space is available—bolstered in many economies by historically low interest rates—governments are

considering mobilizing large investments in infrastructure to help economies recover. The type of investments made will influence economies' carbon trajectories for decades. At the same time, debt has climbed to multi-decade highs in both advanced and emerging G20 economies (Figure 2), meaning that investment packages of the magnitude currently planned cannot be repeated any time in the near future. It is therefore best to use the existing fiscal space to meet multiple goals at the same time and in particular to make critical progress toward a low-carbon economy. While this note focuses on investments toward the latter goal, developing economies also face substantial investment needs in adaptation to climate change.

5. So far a moderate share of recovery packages was dedicated to green spending, but some large economies are acting more boldly. In 2020, announced spending on recovery measures (which are distinct from the immediate rescue packages) amounted to US$1.9tn. The low-carbon (or "green") share of the recovery spending increased during the year 2020 but reached only 18 percent by the end of the year7 amidst other crucial needs to sustain livelihoods.8 Recovery packages are very diverse in terms of their size and their greenness (Figure 2). The EU's earmarking of 37 percent of the total disbursement under the 2021/22 Recovery and Resilience Facility for climate-friendly investments and the proposed American Jobs Plan with substantial support to green the economy— if passed—are notable actions to set economies on more sustainable paths.

6. **Climate policy has important co-benefits through improved health and productivity.** Climate policy discourages the burning of fossil fuels, thereby reducing local air pollution. The latter caused 10 million deaths globally in 2012.11 In South Asia, 7 percent of pregnancy losses can be attributed to local air pollution.12 In addition to averting these incalculable losses, reducing local air pollution increases labor productivity and effective labor input.13 By encouraging the use of public transportation over individual transportation, climate policy can also reduce congestion.14 As a result, a considerable amount of climate policy is in the immediate domestic economic interest of countries.

7. **A growth- and employment-friendly transition toward net zero emissions would require a multi-pronged strategy.** A green infrastructure push would have the double benefit of supporting output and employment in the recovery from the Covid-19 crisis and putting in place the conditions to support the transition. At the same time, a green investment push alone is unlikely to reduce emissions to net zero. Carbon pricing is critical to mitigation because it incentivizes both energy efficiency gains and a reallocation of resources from high- to low-carbon activities. At the same time, even a combination of investment and carbon pricing would need to be complemented by an active support of the development and industrial-scale deployment of new low-carbon technologies to achieve a full transition to net zero emissions, since in some sectors, no viable low-carbon technology exists at the moment. Last but not least, a fair transition requires compensating affected households for the impacts of higher carbon prices and supporting the transitions of workers from high- to low carbon
sectors; revenues from carbon pricing could be used to this end (see Section G). Box 1 provides an illustrative example of policy package15 and its elements are discussed below. In addition to this package consisting of fiscal instruments, central banks and financial supervisors have an important role to play by ensuring that the financial

sector takes climate-related risks into account16 and increasing transparency on these risks.

Green Infrastructure Investments

8. Green public infrastructure can take various forms. In the transportation sector, the government can accelerate a transition to low-carbon options by providing the supporting infrastructure like charging stations for electric vehicles, supporting drivers' access to low-carbon transportation. Similarly, in the energy sector, more interconnected and reliable electricity networks would help increase the amount of (intermittent) renewable energy that can be integrated into the grid, catalyzing private investment in wind and solar electricity generation. Providing incentives for energy-saving building retrofits can also help overcome the misaligned incentives, between renters and landlords for example, in that sector.18 Deploying green infrastructure will also facilitate more ambitious climate policy later by facilitating affordable low-carbon alternatives and forming a constituency in favor of climate policy.

9. Green investments can have a significant stimulating effect on GDP and employment.

By adding to demand and the productivity of the low-carbon private sectors, the green supply policies described in Box 1 could raise annual global output by about 2 percent compared to the baseline on average over 2021-30 (Figure 3), and total employment by nearly 1 percent on net —equivalent to 30 million additional people being employed over that period. The investment push reduces emissions by 22 percent in 2030 compared to the baseline. This is equivalent to a 4 percent reduction compared to 2021 emissions (in the baseline, emissions increase by 23 percent between 2021 and 2030).

10. Estimated multipliers of green investments are high. While the scenario analysis mentioned above embeds multipliers estimated for general infrastructure investment,20 emerging evidence suggests that multipliers of green investment could be at least as large as for other energy investments. The median estimate of cumulated multipliers for sustainable energy investments (investments that don't contribute to emissions on net) is larger than one for the first five years and appears to be larger than those of energy investments that are not environmentally friendly.21 In addition, job multipliers—defined as the number of jobs created by a certain amount of energy generation—are higher for renewable energy generation than for fossil fuels.22 Taken together, these findings suggest that the output and employment effects simulated and described above could be a lower bound for actual impacts.

11. The economic and social outcomes of public investment depend crucially on the efficiency of spending, calling for strong public investment management practices. On average, over one-third of public investment value is lost due to inefficiencies, and better public investment management—that is strong public sector institutions that effectively plan, allocate, and implement public investment—can reduce losses by more than half.23 According to the results of 60 conducted Public Investment Management Assessment (PIMA)—the IMF's tool to analyze the strength of public investment management practices—countries need to improve their project

appraisal and selection capacities as well as maintenance funding which see the weakest scores in the public investment cycle.

Integrating climate change perspectives in public investment management would enable countries to better design and implement climate relevant infrastructure. In this regard, the IMF is also developing the PIMA Climate Change Module (PIMA CC) with a particular focus on the resilience and sustainability aspects—PIMA CC integrates climate change issues into PIMA framework and helps strengthen governments' capacity to address risks related to climate and natural disasters in public investment.

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