

Bajaro, Donna Faye; Jinjarak, Yothin; Myoda, Yuho; Park, Donghyun; Quising, Pilipinas

Working Paper

Health spending efficiency in developing Asia

ADB Economics Working Paper Series, No. 699

Provided in Cooperation with:

Asian Development Bank (ADB), Manila

Suggested Citation: Bajaro, Donna Faye; Jinjarak, Yothin; Myoda, Yuho; Park, Donghyun; Quising, Pilipinas (2023) : Health spending efficiency in developing Asia, ADB Economics Working Paper Series, No. 699, Asian Development Bank (ADB), Manila, <https://doi.org/10.22617/WPS230471-2>

This Version is available at:

<https://hdl.handle.net/10419/298145>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/3.0/igo/>

APPENDIX

Health Spending Efficiency in Developing Asia

Donna Faye Bajaro, Yothin Jinjarak, Yuho Myoda,
Donghyun Park, and Pilipinas Quising

ADB Economics Working Paper No. 699

October 2023

A.1 Stochastic Frontier Analysis

The production function of the i^{th} firm takes the form of $Y_i = f(x_i, \beta)$ where Y_i is the output, x_i is a vector of inputs, and β is the vector of technology parameters. However, inefficiencies (i.e., real output is less than the potential output) and random shocks v_i affect production functions. Y_i now becomes

$$y_i = f(x_i, \beta)\psi_i \exp(v_i) \quad (\text{A.1})$$

where ψ_i is the degree of efficiency of the i^{th} firm. In equation (A.1), the output is assumed to be strictly positive $y_i > 0$. That is, firms should produce output using the given inputs and technology. Therefore, ψ_i is also assumed to be strictly positive and must be bounded by $(0,1]$. This implies that if $\psi_i = 1$, then the firm is producing the maximum output using the inputs and technology embodied in the production function $f(x_i, \beta)$; and if $\psi_i < 1$, then the firm is not optimizing the use of inputs and technology.

Taking the natural logarithm of equation (A.1) and defining $\ln(\psi_i) = -v_i$ as the level of inefficiency yields

$$\ln(y_i) = \beta_0 + \sum_{c=1}^k \beta_c \ln(x_{c,i}) + v_i - v_i \quad (\text{A.2})$$

where v_i is the idiosyncratic error, and v_i is the inefficiency. Note that v_i must be greater than or equal to zero to satisfy the restrictions imposed on equation (A.1). v_i and v_i are distributed independently of each other and of the covariates in equation (A.2). Moreover, v_i and v_i are assumed to be independently and identically distributed (iid) and follow the normal distribution (truncated at zero, in the case of v_i) with mean μ and variance σ^2 .

$$v_i \sim N^+(\mu, \sigma_v^2) \quad (\text{A.3})$$

$$v_i \sim N(\mu, \sigma_v^2) \quad (\text{A.4})$$

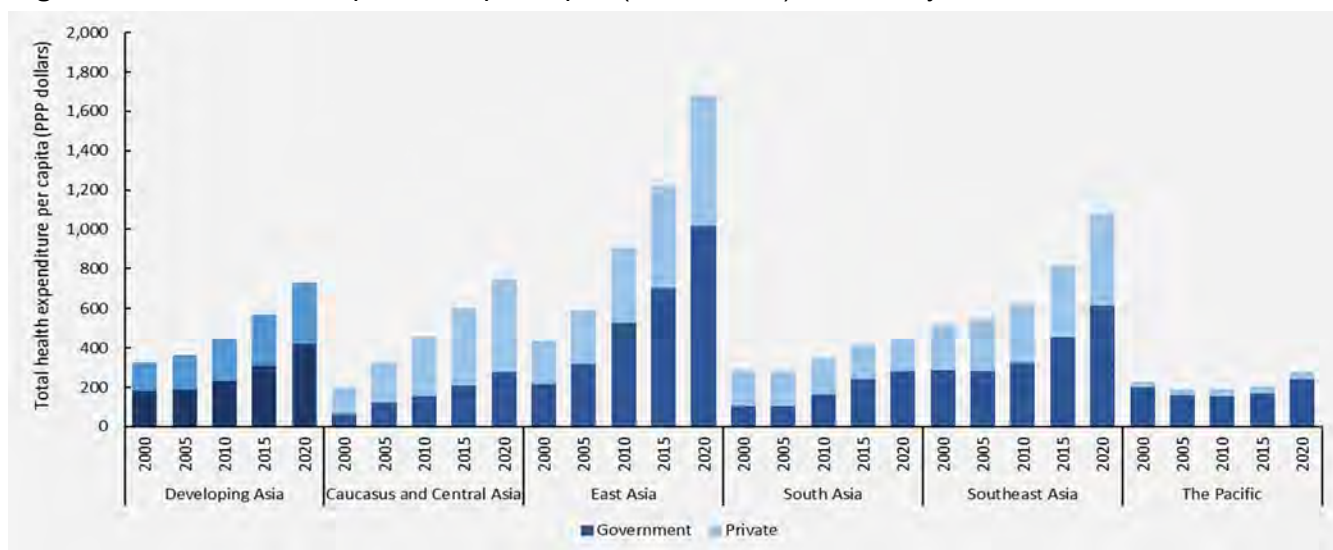
Following equation (A.2), we estimate the following econometric model:¹

$$\ln(LE_i) = \beta_0 + \beta_1 \ln(HE_i) + \beta_2 \ln(EducSh_i) + \beta_3 \ln(PopDens_i) + \beta_4 \ln(Sani_i) + \beta_5 \ln(Drink_i) + \beta_6 \ln(Tob_i) + \beta_7 \ln(TB_i) + \beta_8 \ln(HIV_i) + v_i - u_i \quad (\text{A.5})$$

where *LE* is the life expectancy at birth that serves as the output in the model. *HE* refers to the total and government health expenditures per capita. We also control for other variables such as socioeconomic demographics, use of tobacco, and incidence/prevalence of communicable diseases. *Educ* is the share of primary school enrolment; *PopDens* is the population density; *Sani* and *Drink* are the share of population using at least basic sanitation services and using at least basic drinking water services, respectively; *Tob* is the prevalence of current tobacco use; *TB* is the incidence of tuberculosis per 100,000 people; and *HIV* is the prevalence of human immunodeficiency virus, total (% of population ages 15–49). Appendix Table A.2 has the complete description and sources of data.

¹ The estimation command in Stata is **sfcross**.

Figure A.1 Total health expenditure per capita (PPP dollars), selected years



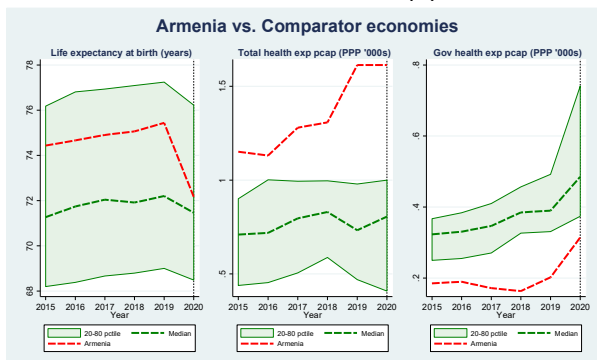
PPP = purchasing power parity.

Notes: The global sample covers 168 economies, comprising 37 Developing Asian economies—Caucasus and Central Asia has 7, East Asia 3, South Asia 7, Southeast Asia 10, and the Pacific 10. Total health expenditure per capita are 2017 real values.

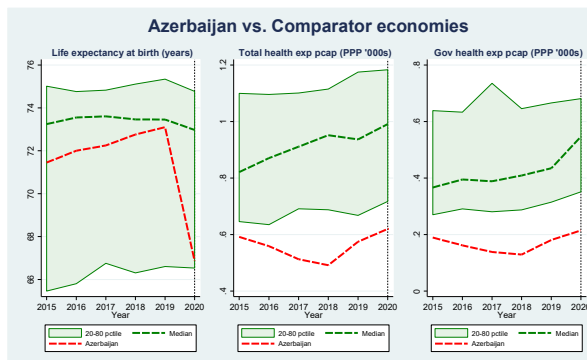
Source: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators> (accessed 31 May 2023).

Figure A.2 Dynamic benchmarking of developing Asia by sub-region, 2015–2020

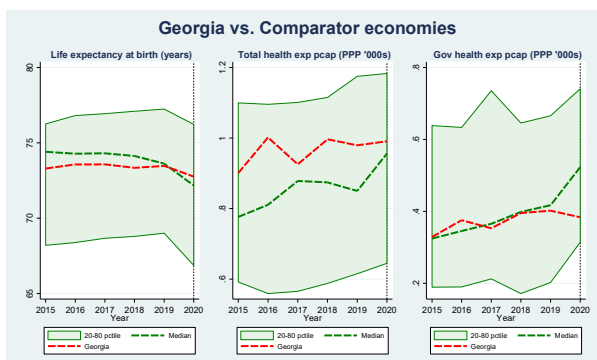
(a) Caucasus and Central Asia



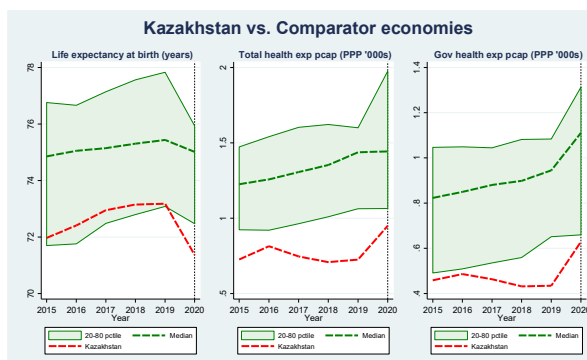
The comparator economies are 8: Albania, Bosnia and Herzegovina, Fiji, Georgia, Guyana, Moldova, Peru, and Turkmenistan.



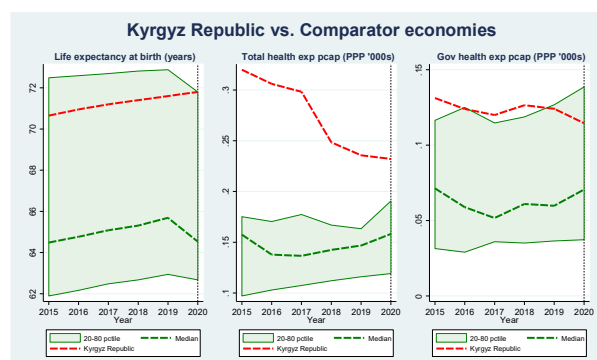
The comparator economies are 12: Bosnia and Herzegovina, Botswana, Brazil, Colombia, Gabon, Georgia, Grenada, Paraguay, South Africa, St. Lucia, St. Vincent and the Grenadines, and Turkmenistan.



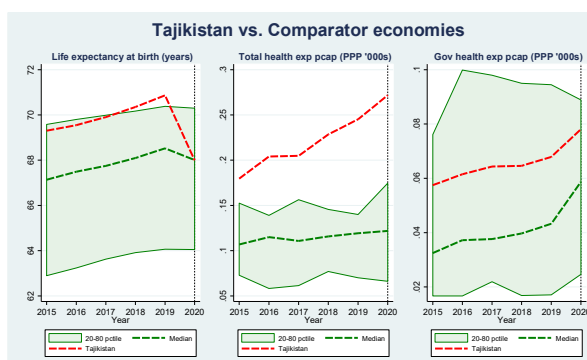
The comparator economies are 13: Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Botswana, Colombia, Grenada, Guyana, Paraguay, People's Republic of China, South Africa, St. Vincent and the Grenadines, and Turkmenistan.



The comparator economies are 8: Argentina, Bulgaria, Costa Rica, Libya, Malaysia, Mauritius, Russian Federation, and Türkiye.



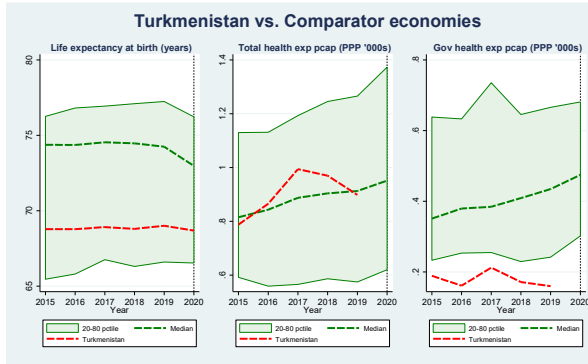
The comparator economies are 11: Bangladesh, Cote d'Ivoire, Djibouti, Ghana, Honduras, Kenya, Mauritania, Nicaragua, Nigeria, Pakistan, and West Bank and Gaza.



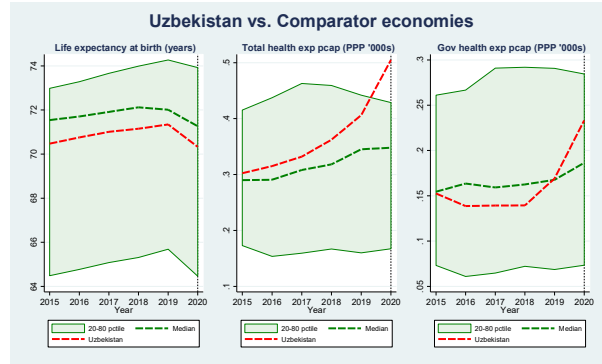
The comparator economies are 13: Benin, Cambodia, Cameroon, Comoros, Federated States of Micronesia, Haiti, Nepal, Sao Tome and Principe, Senegal, Solomon Islands, Tanzania, Timor-Leste, and Vanuatu.

cont...

(a) Caucasus and Central Asia

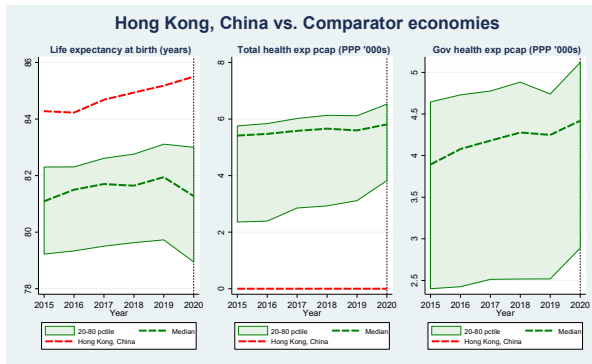


The comparator economies are 14: Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Botswana, Brazil, Colombia, Gabon, Georgia, Grenada, Paraguay, People's Republic of China, South Africa, and St. Vincent and the Grenadines.

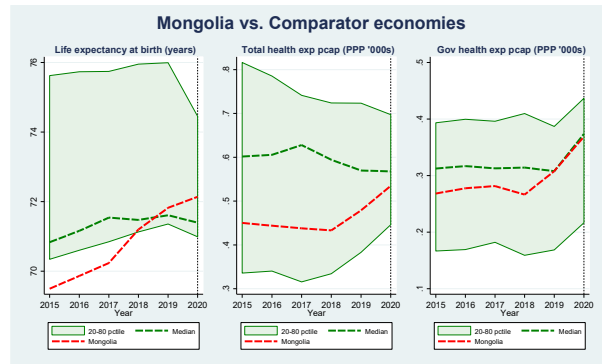


The comparator economies are 14: Angola, Bolivia, Cabo Verde, El Salvador, Eswatini, Honduras, India, Lao PDR, Mauritania, Morocco, Nicaragua, Philippines, Samoa, and West Bank and Gaza.

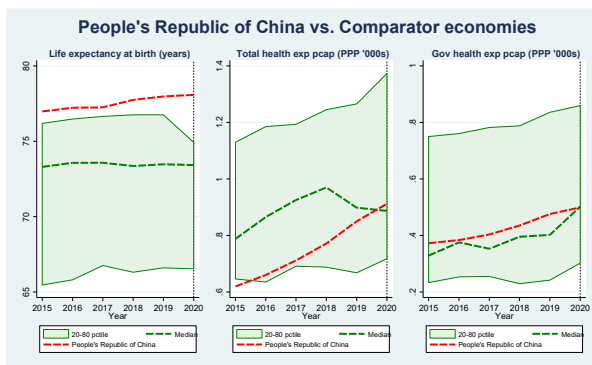
(b) East Asia



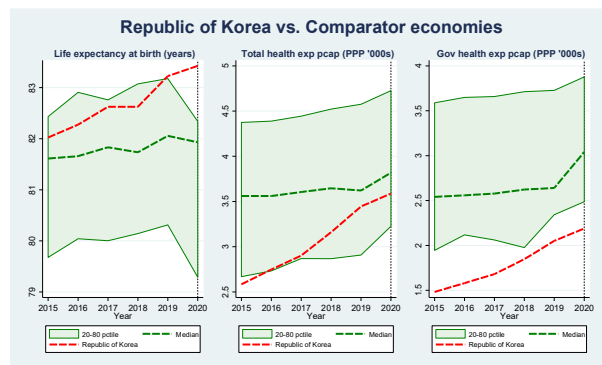
The comparator economies are 16: Austria, Belgium, Bermuda, Brunei Darussalam, Cayman Islands, Denmark, Germany, Iceland, Ireland, Netherlands, Norway, San Marino, Sweden, Switzerland, United Arab Emirates, and United States.



The comparator economies are 6: Algeria, Bhutan, Egypt, Indonesia, Tunisia, and Ukraine.



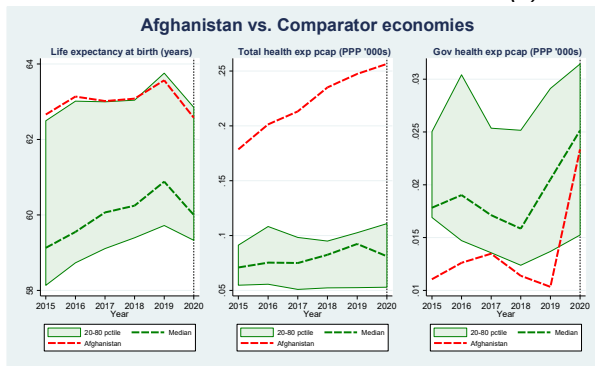
The comparator economies are 9: Bosnia and Herzegovina, Botswana, Brazil, Colombia, Gabon, Georgia, Grenada, St. Lucia, and Turkmenistan.



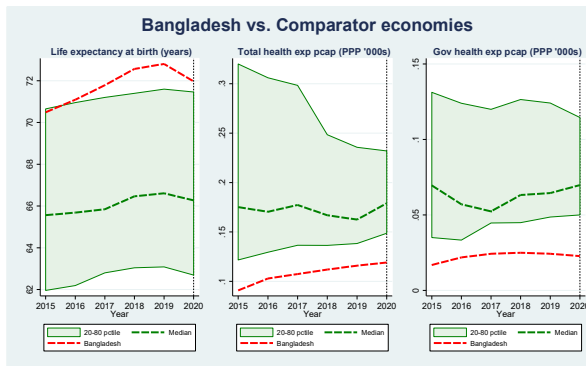
The comparator economies are 15: Aruba, Canada, Cyprus, Czechia, Finland, France, Israel, Italy, Japan, Malta, New Zealand, Saudi Arabia, Slovenia, Spain, and United Kingdom.

cont...

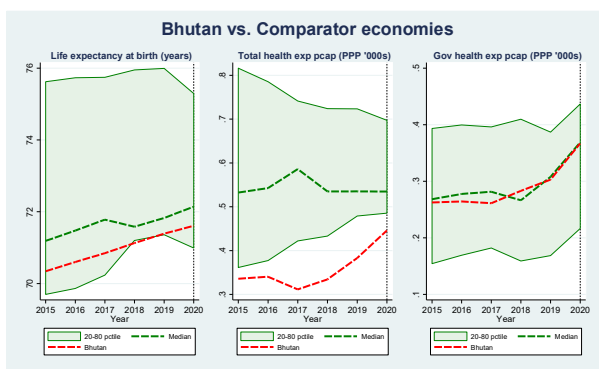
(c) South Asia



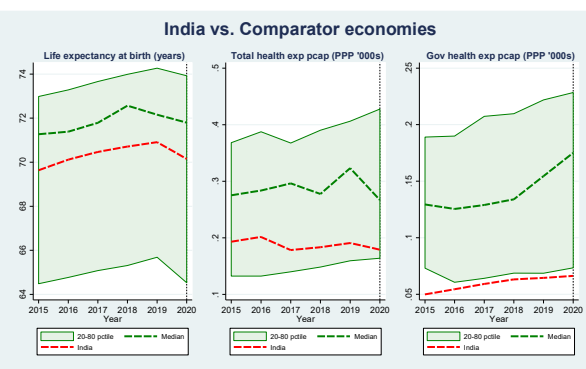
The comparator economies are 11: Burkina Faso, Chad, Ethiopia, The Gambia, Guinea, Guinea-Bissau, Mali, Rwanda, Sierra Leone, Togo, and Uganda.



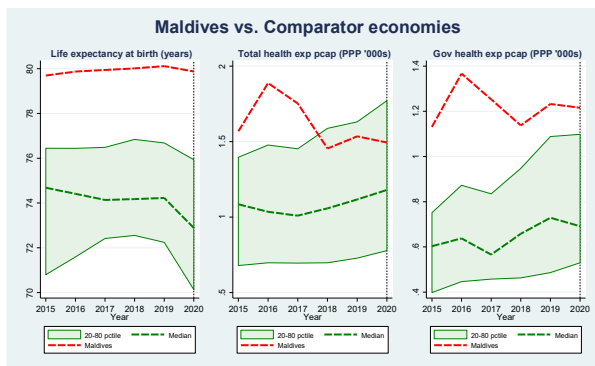
The comparator economies are 11: Cote d'Ivoire, Djibouti, Ghana, Honduras, India, Kyrgyz Republic, Mauritania, Myanmar*, Nicaragua, Nigeria, and Pakistan.



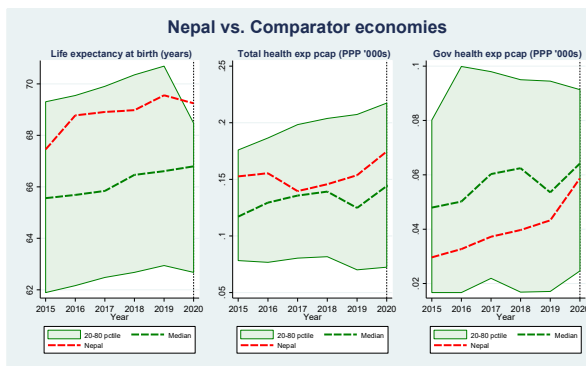
The comparator economies are 7: Algeria, Egypt, Indonesia, Mongolia, Tunisia, Ukraine, and Viet Nam.



The comparator economies are 13: Angola, Bangladesh, Cabo Verde, Ghana, Honduras, Lao PDR, Mauritania, Morocco, Nicaragua, Philippines, Samoa, Uzbekistan, and West Bank and Gaza.



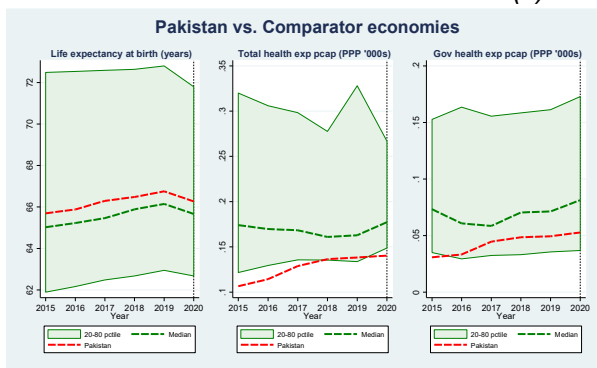
The comparator economies are 10: Belarus, Dominican Republic, Equatorial Guinea, Mexico, Montenegro, North Macedonia, Palau, Serbia, Suriname, and Thailand.



The comparator economies are 13: Benin, Cambodia, Cameroon, Comoros, Federated States of Micronesia, Haiti, Kenya, Myanmar*, Papua New Guinea, Sao Tome and Principe, Senegal, Tajikistan, and Timor-Leste.

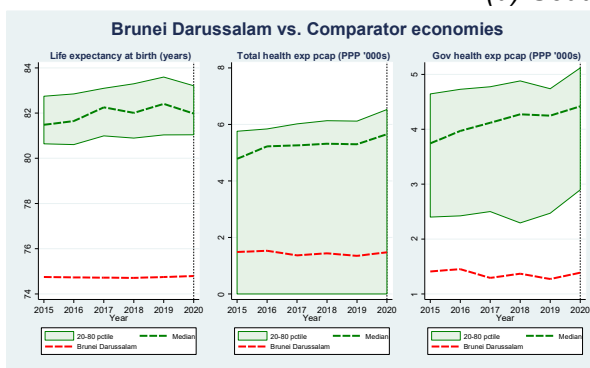
cont...

(c) South Asia

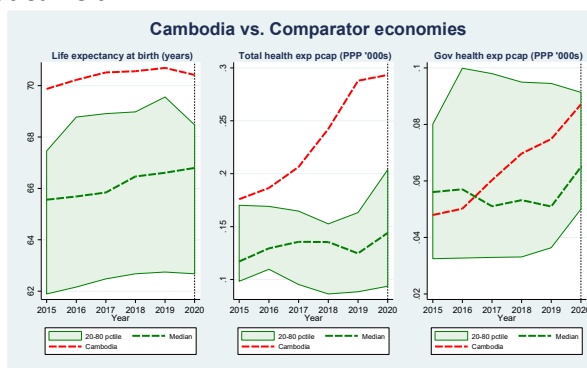


The comparator economies are 12: Bangladesh, Cote d'Ivoire, Djibouti, Ghana, Honduras, Kenya, Kyrgyz Republic, Mauritania, Myanmar*, Nicaragua, Nigeria, and Samoa.

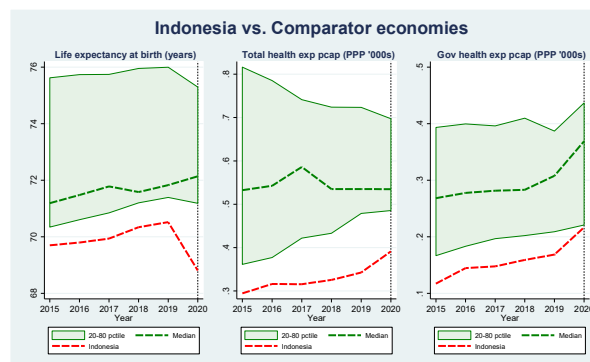
(d) Southeast Asia



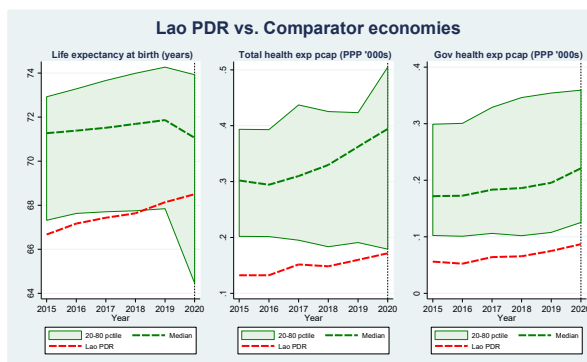
The comparator economies are 18: Austria; Bermuda; Cayman Islands; Denmark; Germany; Hong Kong, China; Iceland; Ireland; Macau, China; Netherlands; Norway; Qatar; San Marino; Singapore; Sweden; Switzerland; United Arab Emirates; and United States.



The comparator economies are 13: Cameroon, Republic of the Congo, Cote d'Ivoire, Djibouti, Federated States of Micronesia, Kenya, Myanmar*, Nepal, Papua New Guinea, Sao Tome and Principe, Senegal, Tajikistan, and Timor-Leste.



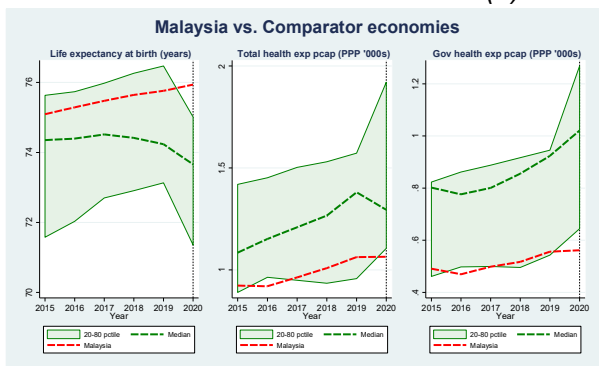
The comparator economies are 7: Algeria, Bhutan, Egypt, Mongolia, Tunisia, Ukraine, and Viet Nam.



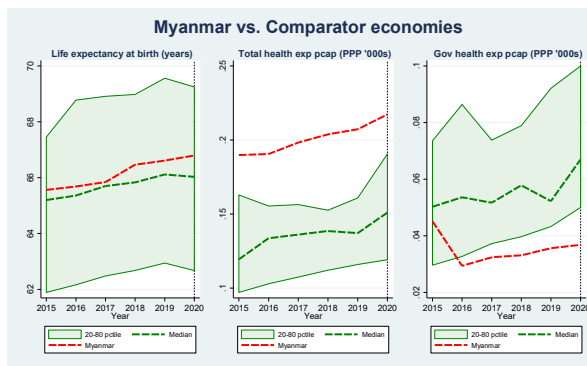
The comparator economies are 11: Angola, Bolivia, Cabo Verde, El Salvador, Eswatini, India, Morocco, Philippines, Samoa, Uzbekistan, and West Bank and Gaza.

cont...

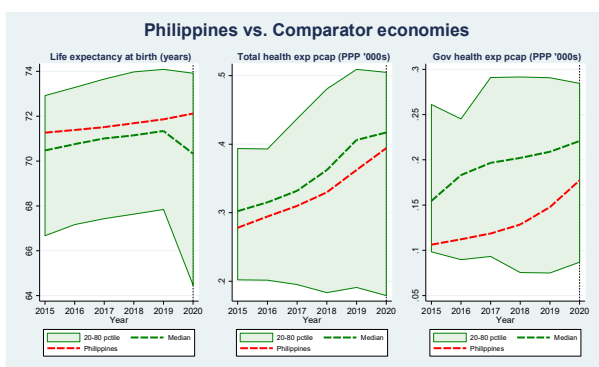
(d) Southeast Asia



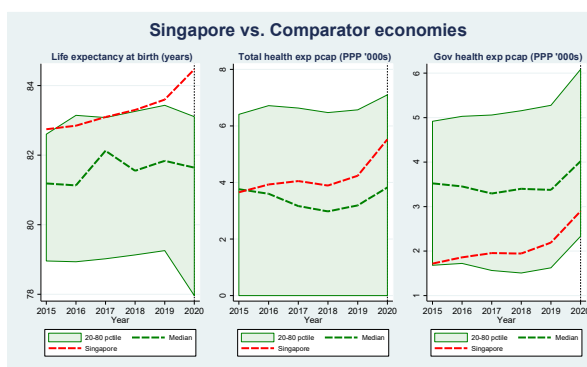
The comparator economies are 5: Bulgaria, Kazakhstan, Mauritius, Russian Federation, and Türkiye.



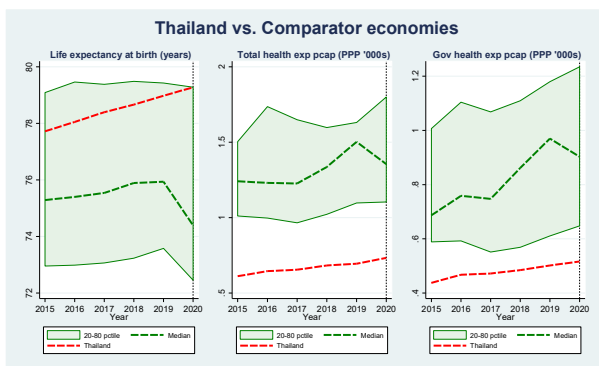
The comparator economies are 12: Bangladesh, Cambodia, Cameroon, Cote d'Ivoire, Djibouti, Ghana, Kenya, Nepal, Pakistan, Papua New Guinea, Sao Tome and Principe, and Timor-Leste.



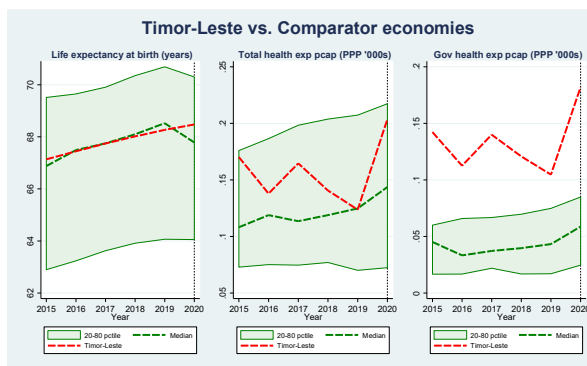
The comparator economies are 11: Angola, Bolivia, Cabo Verde, El Salvador, Eswatini, India, Lao PDR, Morocco, Samoa, Uzbekistan, and Viet Nam.



The comparator economies are 11: Bermuda; Brunei Darussalam; Cayman Islands; Ireland; Luxembourg; Macau, China; Norway; Qatar; Switzerland; United Arab Emirates; and United States.



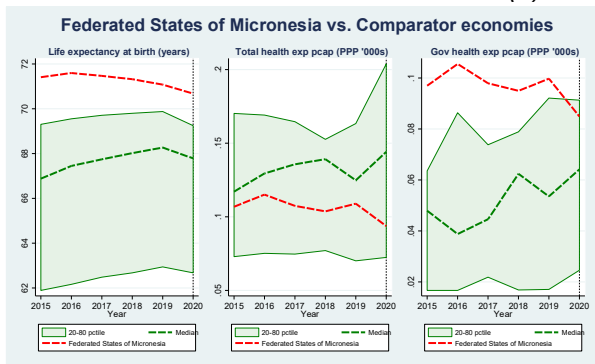
The comparator economies are 10: Belarus, Costa Rica, Dominican Republic, Maldives, Mexico, Montenegro, North Macedonia, Palau, Serbia, and Suriname.



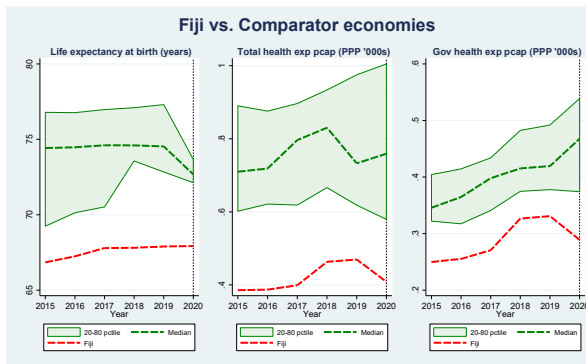
The comparator economies are 13: Benin, Cambodia, Cameroon, Comoros, Federated States of Micronesia, Haiti, Myanmar*, Nepal, Papua New Guinea, Sao Tome and Principe, Senegal, Tajikistan, and Vanuatu.

cont...

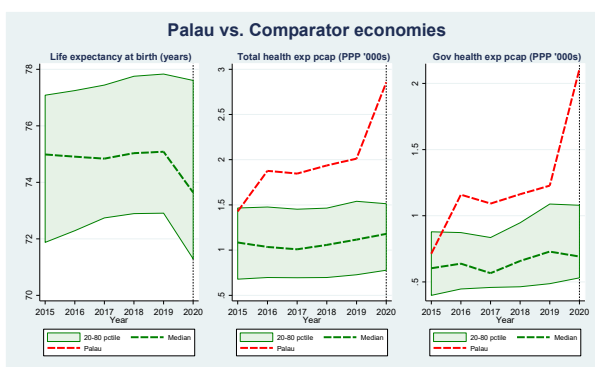
(e) The Pacific



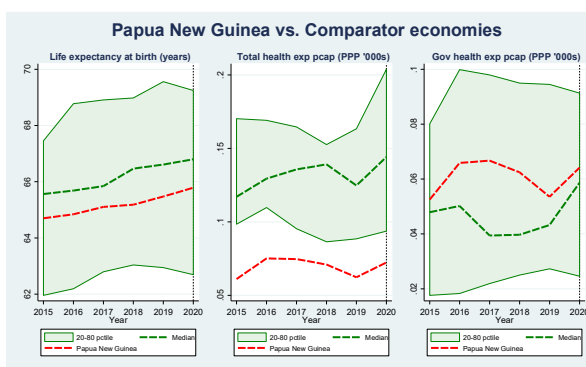
The comparator economies are 13: Benin, Cambodia, Cameroon, Comoros, Haiti, Kenya, Nepal, Papua New Guinea, Sao Tome and Principe, Senegal, Tajikistan, Timor-Leste, and Vanuatu.



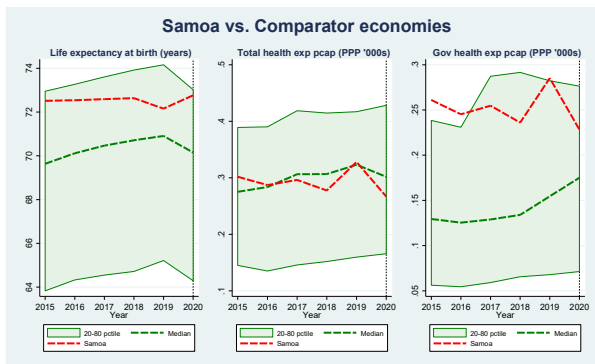
The comparator economies are 8: Albania, Armenia, Dominica, Ecuador, Moldova, Paraguay, Peru, and St. Vincent and the Grenadines.



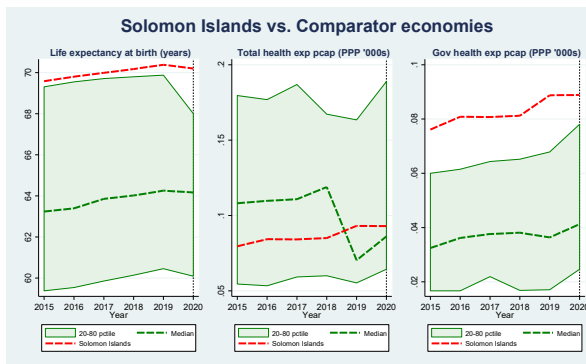
The comparator economies are 10: Belarus, Dominican Republic, Equatorial Guinea, Maldives, Mexico, Montenegro, North Macedonia, Serbia, Suriname, and Thailand.



The comparator economies are 13: Cambodia, Cameroon, Comoros, Republic of the Congo, Djibouti, Federated States of Micronesia, Haiti, Kenya, Myanmar*, Nepal, Sao Tome and Principe, Senegal, and Timor-Leste.

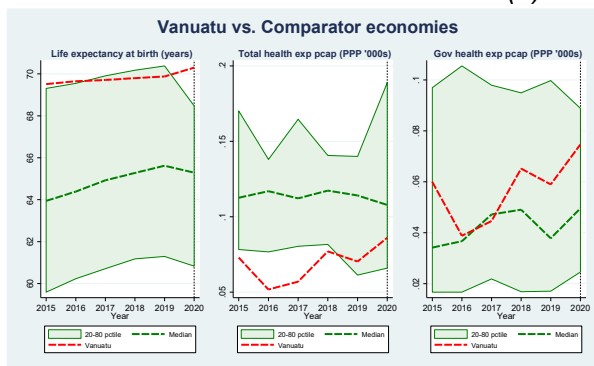


The comparator economies are 15: Angola, Bolivia, Cabo Verde, Eswatini, Ghana, Honduras, India, Lao PDR, Mauritania, Morocco, Nicaragua, Pakistan, Philippines, Uzbekistan, and West Bank and Gaza.



The comparator economies are 9: Benin, Comoros, Haiti, Lesotho, Senegal, Tajikistan, Tanzania, Vanuatu, and Zimbabwe.

cont...

(e) The Pacific

The comparator economies are 12: Benin, Cameroon, Comoros, Federated States of Micronesia, Haiti, Lesotho, Senegal, Solomon Islands, Tajikistan, Tanzania, Timor-Leste, and Zimbabwe.

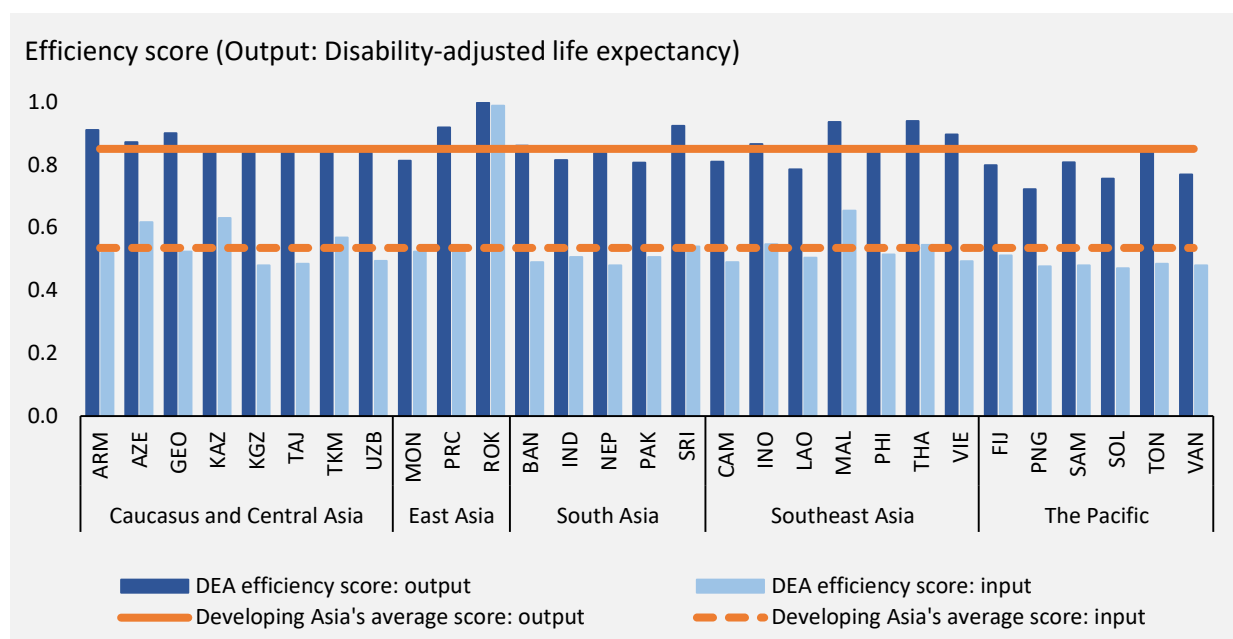
Exp pcap = expenditure per capita, Lao PDR = Lao People's Democratic Republic, pctile = percentile, PPP = purchasing power parity.

Notes: All monetary values are thousand PPP dollars in 2017 real values.

*ADB placed on hold its assistance in Myanmar effective 1 February 2021. ADB Statement on Myanmar | [Asian Development Bank](#) (published on 10 March 2021). Manila.

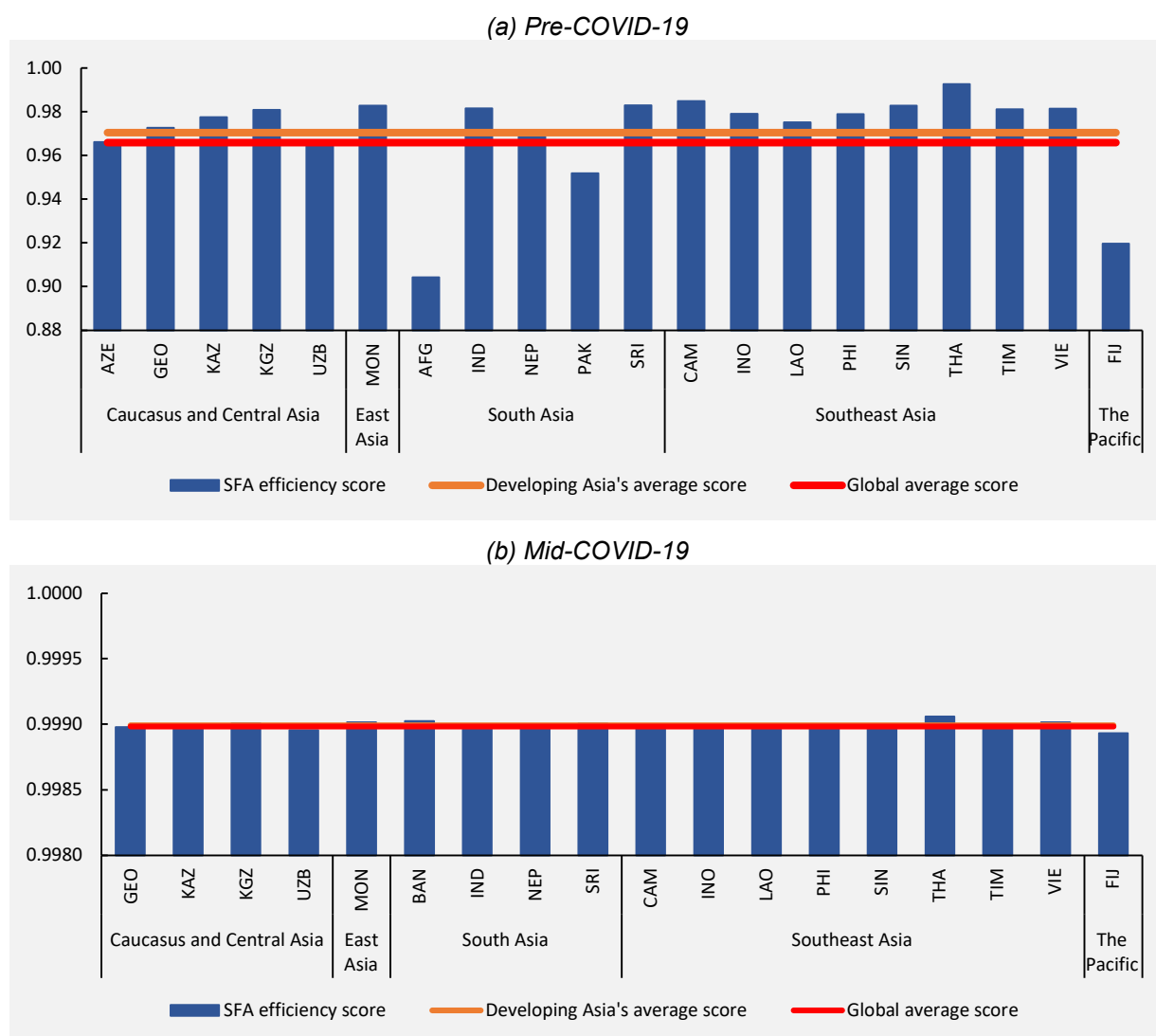
Source: Authors' calculations using Dynamic Benchmarking Tool 2.0 developed by Samer Matta (World Bank Group, Senior Economist) and data from the World Bank. World Development Indicators.

<https://databank.worldbank.org/source/world-development-indicators> (accessed 31 May 2023).

Figure A.3 Input and output efficiency scores in developing Asia, 2006–2016 average

ARM = Armenia, AZE = Azerbaijan, BAN = Bangladesh, CAM = Cambodia, DEA = data envelopment analysis, FIJ =Fiji, GEO = Georgia, IND = India, INO = Indonesia, KAZ = Kazakhstan, KGZ = Kyrgyz Republic, LAO = Lao People's Democratic Republic, MAL = Malaysia, MON = Mongolia, NEP = Nepal, PAK = Pakistan, PHI = Philippines, PNG = Papua New Guinea, PRC = People's Republic of China, ROK = Republic of Korea, SAM = Samoa, SOL = Solomon Islands, SRI = Sri Lanka, TAJ = Tajikistan, THA = Thailand, TKM = Turkmenistan, TON = Tonga, UZB = Uzbekistan, VAN = Vanuatu, VIE = Viet Nam.

Source: Herrera and Ouedraogo (2018).

Figure A.4 Total health spending efficiency scores using SFA

AFG = Afghanistan*, AZE = Azerbaijan, CAM = Cambodia, FIJ = Fiji, GEO = Georgia, IND = India, INO = Indonesia, KAZ = Kazakhstan, KGZ = Kyrgyz Republic, LAO = Lao PDR, MON = Mongolia, NEP = Nepal, PAK = Pakistan, PHI = Philippines, SFA = stochastic frontier analysis, SIN = Singapore, SRI = Sri Lanka, THA = Thailand, TIM = Timor-Leste, UZB = Uzbekistan, VIE = Viet Nam.

*ADB placed on hold its regular assistance in Afghanistan effective 15 August 2021. ADB Statement on Afghanistan | [Asian Development Bank](https://www.adb.org/en/news/2021/11/10/afghanistan) (published on 10 November 2021). Manila.

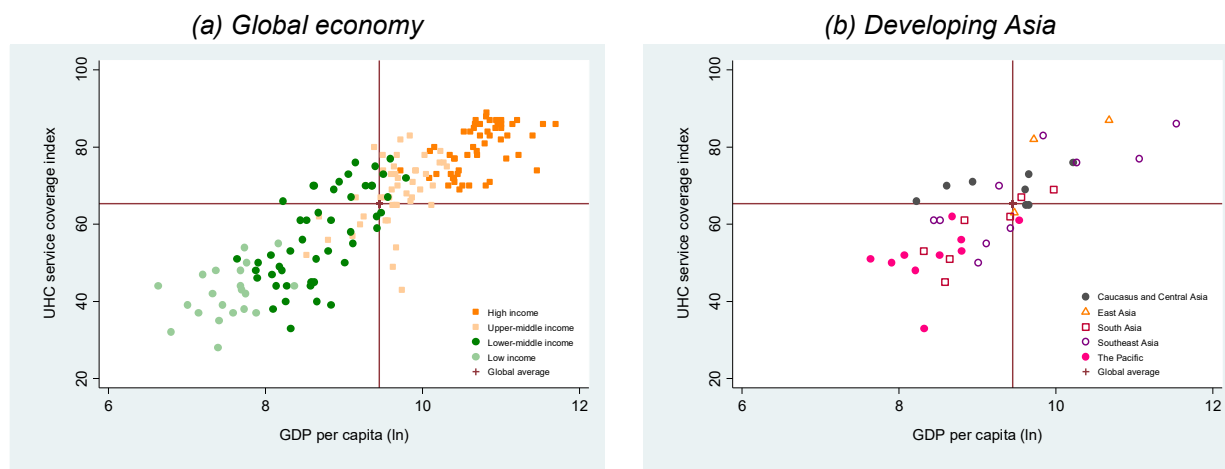
Source: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators> (accessed 31 May 2023).

Figure A.5 UHC service coverage index

Reproductive, maternal, newborn and child health (<i>RMNCH</i>)	
1. Family planning (<i>FP</i>) 2. Antenatal care (<i>ANC</i>) 3. DTP3 immunization (<i>DTP3</i>) 4. Care seeking for suspected pneumonia (<i>Pneumonia</i>)	} $RMNCH = (FP * ANC * DTP3 * Pneumonia)^{\frac{1}{4}}$
Infectious diseases (<i>ID</i>)	
5. TB treatment (<i>TB</i>) 6. HIV therapy (<i>ART</i>) 7. Insecticide-treated nets (<i>ITN</i>) 8. Basic sanitation (<i>WASH</i>)	} $ID = (TB * ART * ITN * WASH)^{\frac{1}{4}}$ if high malaria-risk, or $ID = (TB * ART * WASH)^{\frac{1}{3}}$ if low
Non-communicable diseases (<i>NCD</i>)	
9. Non-elevated blood pressure (<i>BP</i>) 10. Mean fasting plasma glucose (<i>FPG</i>) 11. Tobacco non-use (<i>Tobacco</i>)	} $NCD = (BP * FPG * Tobacco)^{\frac{1}{3}}$
Service capacity and access (<i>SCA</i>)	
12. Hospital bed density (<i>Hospital</i>) 13. Health worker density (<i>HWF</i>) 14. IHR core capacity index (<i>IHR</i>)	} $SCA = (Hospital * HWF * IHR)^{\frac{1}{3}}$
$UHC\ service\ coverage\ index = (RMNCH * ID * NCD * SCA)^{\frac{1}{4}}$	

Source: World Health Organization and World Bank (2022).

Figure A.6 UHC service coverage index and GDP per capita, 2019



GDP = gross domestic product, ln = natural logarithms, UHC = universal health coverage.

Notes: The global sample covers 168 economies, comprising 37 Developing Asian economies—Caucasus and Central Asia has 7, East Asia 3, South Asia 7, Southeast Asia 10, and the Pacific 10. The income classification of all economies in panel (a) are based on the World Bank 2023 update (calendar year = 2021). Total health expenditure per capita are 2017 real values. Appendix Figure A.5 shows the formula of UHC service coverage index.

Source: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators> (accessed 31 May 2023).

Table A.1 Summary of differences between DEA and SFA

Consideration	Data Envelopment Analysis	Stochastic Frontier Analysis
Number of outputs	Accommodates multiple inputs and multiple outputs (measured in different units)	Using multiple outputs require aggregation into a single measure
Production function	Requires less restrictive assumptions on functional form	Imposes certain functional form of production function
Sample size	Less sensitive to small sample size	Sensitive to small sample size
Heterogenous units	Sensitive to variation	Allows number of control variables to account for variation
Outliers	Sensitive, defines the frontiers	Not sensitive
Statistical noise	Not accounted for, presumed part of inefficiency	Accounts for randomness and measurement errors, which are distinguished from measure of inefficiency

DEA = data envelopment analysis, SFA = stochastic frontier analysis.

Source: Authors' compilation (Ji and Lee 2010, Huguenin 2012, Belotti et al. 2013, Grigoli and Kapsoli 2013).

Table A.2 Description and sources of data

Variable	Description	Definition	Source
Data Envelopment Analysis			
	Life expectancy at birth, total (years)	Life expectancy at birth indicates the 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. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators .
	Domestic private health expenditure per capita, PPP (current international \$)	Current private expenditures on health per capita expressed in international dollars at purchasing power parity (PPP).	World Bank.
	Domestic general government health expenditure per capita, PPP (current international dollars)	Public expenditure on health from domestic sources per capita expressed in international dollars at purchasing power parity.	World Bank.
	Total health expenditure per capita, PPP (current international \$)	Derived as the sum of domestic private health expenditure per capita and domestic general government health expenditure per capita.	Authors' calculations.
	Current health expenditure per capita, PPP (current international \$)	Derived as the sum of total health expenditure per capita and external health expenditure per capita.	Authors' calculations.
	Tuberculosis treatment success rate (% of new cases)	Tuberculosis treatment success rate is the percentage of all new tuberculosis cases (or new and relapse cases for some countries) registered under a national tuberculosis control program in a given year that successfully completed treatment, with or without bacteriological evidence of success ("cured" and "treatment completed" respectively).	World Bank.
	Infant survival rate, $ISR = \frac{(1,000-IMR)}{IMR}$ where <i>IMR</i> is the infant mortality rate per 1,000 live births	Ratio of infants that survived to infants that died.	Authors' calculations. Basic data of infant mortality rate is from the World Bank.
	Neonatal survival rate, $NSR = \frac{(1,000-NMR)}{NMR}$ where <i>NMR</i> is the neonatal mortality rate per 1,000 live births	Ratio of neonates that survived to neonates that died.	Authors' calculations. Basic data of neonatal mortality rate is from the World Bank.

Table A.2 Description and sources of data

Variable	Description	Definition	Source
	Under-five children survival rate, $USR = \frac{(1,000 - UMR)}{IMR}$ where UMR is the under-five mortality rate per 1,000 live births	Ratio of under-five children that survived to under-five children that died.	Authors' calculations. Basic data of under-five mortality rate is from the World Bank.
Stochastic Frontier Analysis			
<i>LE</i>	Life expectancy at birth (years)	Life expectancy at birth indicates the 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.
<i>HEPub</i>	Domestic general government health expenditure per capita, PPP (current international dollars)	Public expenditure on health from domestic sources per capita expressed in international dollars at purchasing power parity.	World Bank.
<i>HEPriv</i>	Domestic private health expenditure per capita, PPP (current international dollars)	Current private expenditures on health per capita expressed in international dollars at purchasing power parity.	World Bank.
<i>EducSh</i>	School enrollment, primary (% gross)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music.	World Bank.
<i>PopDens</i>	Population density (people per sq. km of land area)	Population density is midyear population divided by land area in square kilometers. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship—except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. Land area is a country's total area, excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones. In most cases the definition of inland water bodies includes major rivers and lakes.	World Bank.
<i>Sani</i>	People using at least basic sanitation services (% of population)	The percentage of people using at least basic sanitation services, that is, improved sanitation facilities that are not shared with other households. This indicator encompasses	World Bank.

Table A.2 Description and sources of data

Variable	Description	Definition	Source
<i>Drink</i>	People using at least basic drinking water services (% of population)	both people using basic sanitation services as well as those using safely managed sanitation services. Improved sanitation facilities include flush/pour flush to piped sewer systems, septic tanks or pit latrines; ventilated improved pit latrines, composting toilets or pit latrines with slabs. The percentage of people using at least basic water services. This indicator encompasses both people using basic water services as well as those using safely managed water services. Basic drinking water services is defined as drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip. Improved water sources include piped water, boreholes or tubewells, protected dug wells, protected springs, and packaged or delivered water.	World Bank.
<i>Tob</i>	Prevalence of current tobacco use (% of adults)	The percentage of the population ages 15 years and over who currently use any tobacco product (smoked and/or smokeless tobacco) on a daily or non-daily basis. Tobacco products include cigarettes, pipes, cigars, cigarillos, waterpipes (hookah, shisha), bidis, kretek, heated tobacco products, and all forms of smokeless (oral and nasal) tobacco. Tobacco products exclude e-cigarettes (which do not contain tobacco), “e-cigars”, “e-hookahs”, JUUL and “e-pipes”. The rates are age-standardized to the WHO Standard Population.	World Bank.
<i>TB</i>	Incidence of tuberculosis (per 100,000 people)	Incidence of tuberculosis is the estimated number of new and relapse tuberculosis cases arising in a given year, expressed as the rate per 100,000 population. All forms of TB are included, including cases in people living with HIV. Estimates for all years are recalculated as new information becomes available and techniques are refined, so they may differ from those published previously.	World Bank.
<i>HIV</i>	Prevalence of HIV, total (% of population ages 15-49)	Prevalence of HIV refers to the percentage of people ages 15-49 who are infected with HIV.	World Bank.

Table A.2 Description and sources of data

Variable	Description	Definition	Source
Macro-level analysis			
	Current health expenditure (% of GDP)	Level of current health expenditure expressed as a percentage of GDP. Estimates of current health expenditures include healthcare goods and services consumed during each year. This indicator does not include capital health expenditures such as buildings, machinery, IT and stocks of vaccines for emergency or outbreaks.	World Bank.
	Final consumption expenditure (% of GDP)	Final consumption expenditure is the sum of household final consumption expenditure (private consumption) and general government final consumption expenditure (general government consumption).	World Bank.
	General government final consumption expenditure (% of GDP)	General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation.	World Bank.
	Households and NPISHs final consumption expenditure (% of GDP)	Household final consumption expenditure is the market value of all goods and services, including durable products purchased by households. It excludes purchases of dwellings but includes imputed rent for owner-occupied dwellings. It also includes payments and fees to governments to obtain permits and licenses. Here, household consumption expenditure includes the expenditures of nonprofit institutions serving households, even when reported separately by the country. This item also includes any statistical discrepancy in the use of resources relative to the supply of resources.	World Bank.
	Life expectancy at birth, total (years)	Life expectancy at birth indicates the 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.

Table A.2 Description and sources of data

Variable	Description	Definition	Source
	GDP per capita, PPP (current international dollars)	This indicator provides per capita values for GDP expressed in current international dollars converted by purchasing power parity (PPP) factor.	World Bank.
OLS and IV regressions			
<i>DEASc</i>	Scores derived from DEA estimations	Estimated input- and output-oriented technical efficiency scores of (i) total and (ii) government health spending using Data Envelopment Analysis	Authors' calculations.
<i>Gini</i>	Gini index	The Gini index measures the extent to which the distribution of income or consumption among individuals or households within an economy deviates from a perfectly equal distribution. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	World Bank.
<i>UHC</i>	UHC service coverage index	Coverage index for essential health services (based on tracer interventions that include reproductive, maternal, newborn and child health, infectious diseases, noncommunicable diseases and service capacity and access). It is presented on a scale of 0 to 100.	World Bank.
<i>PopDens</i>	Population density (people per sq. km of land area)	Population density is midyear population divided by land area in square kilometers. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship—except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. Land area is a country's total area, excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones. In most cases the definition of inland water bodies includes major rivers and lakes.	World Bank.
<i>EducSh</i>	School enrollment, primary (% gross)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music.	World Bank.

Table A.2 Description and sources of data

Variable	Description	Definition	Source
<i>GovSh</i>	Share of government in total health expenditure	Derived from the ratio of government health expenditure and sum of government and private health expenditures.	Authors' calculations.
<i>ForeignAssist</i>	External health expenditure per capita, PPP (current international dollars)	Current external expenditures on health per capita expressed in international dollars at purchasing power parity. External sources are composed of direct foreign transfers and foreign transfers distributed by government encompassing all financial inflows into the national health system from outside the country.	World Bank.
<i>Debt</i>	Central government debt	Total stock of debt liabilities issued by the central government as a share of GDP.	International Monetary Fund. Global Debt Database. https://www.imf.org/external/datamapper/datasets/GDD . CEIC Data Company.
<i>GDPpcap</i>	GDP per capita, PPP (current international dollars)	This indicator provides per capita values for GDP expressed in current international dollars converted by PPP factor.	World Bank.

GDP = gross domestic product, PPP = purchasing power parity, UHC = universal health coverage.

Source: Authors' compilation.

Table A.3 SFA estimation results

Coefficients of:	Expected sign	Pre-COVID-19			Mid-COVID-19		
		Total (1)	Government (2)	Government and Private (3)	Total (4)	Government (5)	Government and Private (6)
In [Total health exp pcap] (β_1)	+	0.0362*** (0.0074)			0.0423*** (0.0058)		
In [Government health exp pcap] (β_1)	+		0.0372*** (0.0054)	0.0374*** (0.0060)		0.0351*** (0.0052)	0.0263*** (0.0067)
In [Private health exp pcap] (β_1)	+			–0.0004 (0.0067)			0.0153** (0.0076)
In [Primary school enrolment] (β_2)	+	0.0369 (0.0386)	0.0379 (0.0352)	0.0377 (0.0355)	0.0373 (0.0374)	0.0519 (0.0394)	0.0481 (0.0377)
In [Population density] (β_3)	+	0.0055* (0.0029)	0.0073*** (0.0028)	0.0073*** (0.0029)	0.0095*** (0.0030)	0.0109*** (0.0031)	0.0098*** (0.0031)
In [Basic sanitation services] (β_4)	+	0.0269 (0.0120)	0.0262* (0.0176)	0.0261* (0.0176)	0.0532*** (0.0172)	0.0402** (0.0179)	0.0464 (0.0178)
In [Basic drinking water services] (β_5)	+	0.0221 (0.0626)	–0.0008 (0.0580)	–0.0001 (0.0590)	–0.0446 (0.0504)	–0.0107 (0.0510)	–0.0342 (0.0507)
In [Tobacco use] (β_6)	–	–0.0076 (0.0092)	–0.0084 (0.0086)	–0.0083 (0.0088)	–0.0086 (0.0094)	–0.0041 (0.0096)	–0.0074 (0.0094)
In [TB incidence] (β_7)	–	–0.0086* (0.0054)	–0.0045 (0.0049)	–0.0046 (0.0050)	–0.0040 (0.0045)	–0.0051 (0.0046)	–0.0044 (0.0045)
In [HIV prevalence] (β_8)	–	–0.0154*** (0.0047)	–0.0177*** (0.0042)	–0.0178*** (0.0043)	–0.0153*** (0.0041)	–0.0164*** (0.0043)	–0.0163*** (0.0041)
Constant (β_0)		3.7132*** (0.2329)	3.8053*** (0.2219)	3.8048*** (0.2222)	3.7872*** (0.2240)	3.6806*** (0.2485)	3.7501*** (0.2294)
Wald chi-square		357.96	526.41	527.80	615.42	493.87	607.00
Number of observations		93	93	93	83	83	83

COVID-19 = coronavirus disease, Exp pcap = expenditure per capita, HIV = human immunodeficiency virus, In = natural logarithm, SFA = stochastic frontier analysis, TB = tuberculosis.

Note: Standard errors are in parentheses. *** significant at 1%, ** at 5%, * at 10%, and + at 15%. Table A.2 expounds the description of the variables used in the estimation.

Source: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators> (accessed 31 May 2023).

Table A.4 Output-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private health expenditure		Government health expenditure		Total		Current		Private health expenditure		Government health expenditure		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Afghanistan*	0.800204	169	1	1	0.849416	159	0.842325	161	0.787557	170	0.869328	147	0.844428	162	0.842472	161
Algeria	0.960743	49	0.972049	48	0.967732	53	0.967756	50	0.933438	68	0.946803	65	0.943615	76	0.944175	75
Angola	0.826754	160	0.848337	162	0.849886	158	0.850712	156	0.830045	157	0.852641	155	0.856208	157	0.857684	154
Antigua and Barbuda	0.967607	39	0.991994	16	0.989768	17	0.989936	15	0.968691	29	0.991377	11	0.989241	16	0.989224	15
Argentina	0.916161	93	0.942731	92	0.950110	80	0.950707	76	0.900914	98	0.934022	81	0.935987	91	0.935897	86
Armenia	0.894290	117	0.991914	17	0.936795	99	0.936943	95	0.853512	147	0.930823	89	0.895937	135	0.895652	134
Australia	0.982736	19	0.982736	29	0.982736	30	0.982736	28	0.983917	13	0.983917	18	0.983917	20	0.983917	19
Austria	0.970824	35	0.970824	50	0.970824	50	0.970824	48	0.960178	40	0.960178	49	0.960178	53	0.960178	52
Azerbaijan	0.901737	111	0.965660	57	0.937012	96	0.937653	94	0.821730	160	0.880387	142	0.856164	158	0.857495	155
Bahamas, The	0.844098	155	0.875823	152	0.875970	150	0.876429	147	0.859473	143	0.892826	136	0.891810	139	0.891679	138
Bahrain	0.948583	63	0.980933	32	0.986258	21	0.986919	19	0.936306	63	0.971393	35	0.971566	41	0.971571	39
Bangladesh	0.963864	46	1	1	1	1	1	1	0.958337	43	1	1	1	1	1	1
Barbados	0.934491	74	0.984218	27	0.971878	46	0.971868	44	0.943294	57	0.976474	24	0.971869	39	0.971741	38
Belarus	0.923839	80	0.927011	116	0.931807	111	0.931989	109	0.897070	102	0.904157	129	0.905989	132	0.905937	130
Belgium	0.972009	33	0.972009	49	0.972009	45	0.972009	43	0.954294	50	0.954294	57	0.954294	62	0.954294	60
Belize	0.960821	48	0.961029	65	0.962813	61	0.963317	57	0.962833	35	0.942622	71	0.959512	54	0.964008	48
Benin	0.831754	158	0.888655	143	0.893295	141	0.897558	136	0.825864	158	0.833735	163	0.885245	143	0.886628	141
Bhutan	0.952131	56	0.926710	117	0.933414	106	0.932459	104	0.961900	37	0.917146	111	0.938504	86	0.939407	81
Bolivia	0.868762	141	0.868026	155	0.869020	155	0.869109	151	0.836711	156	0.820020	167	0.829070	166	0.828924	164
Bosnia and Herzegovina	0.952219	55	0.957620	70	0.965130	57	0.965047	54	0.934940	66	0.947209	64	0.949591	67	0.949256	65
Botswana	0.834092	157	0.822175	169	0.826356	168	0.824907	166	0.848114	150	0.825419	164	0.827346	167	0.826642	167
Brazil	0.893092	121	0.950405	83	0.939566	93	0.939890	92	0.875225	128	0.929722	92	0.921490	111	0.921462	107
Brunei Darussalam	1	1	0.913293	130	0.933416	105	0.933748	102	0.999964	7	0.918447	108	0.930829	99	0.930836	93
Bulgaria	0.893869	118	0.928384	113	0.931810	110	0.932289	106	0.871080	130	0.910106	122	0.909031	126	0.908381	127
Burkina Faso	0.820137	162	0.819928	170	0.840519	163	0.837950	163	0.814480	162	0.821326	166	0.834478	164	0.828459	166
Burundi	0.872904	136	0.913163	131	1	1	1	1	0.866578	136	0.916778	113	1	1	1	1
Cabo Verde	1	1	0.996817	13	1	1	1	1	1	1	0.985155	16	1	1	1	1
Cambodia	0.892729	122	0.958654	68	0.936825	98	0.936877	96	0.892401	109	0.960602	48	0.942944	79	0.946634	68
Cameroon	0.809290	165	0.921345	123	0.845259	161	0.843470	159	0.808964	165	0.846949	160	0.844777	161	0.843410	160
Canada	0.974779	29	0.975092	41	0.974779	41	0.974779	39	0.965829	32	0.965829	39	0.965829	46	0.965829	44
Central African Republic	0.754386	175	1	1	0.822274	169	0.822475	168	0.748851	175	1	1	0.824334	168	0.808924	170
Chad	0.729532	177	0.835533	165	0.788112	176	0.797616	173	0.720893	177	0.807255	172	0.781656	176	0.781340	175
Chile	0.952222	54	0.984501	25	0.984039	26	0.984842	24	0.938706	61	0.977387	23	0.973300	37	0.973304	36
Colombia	0.951679	58	0.953936	76	0.960948	64	0.961228	61	0.926329	78	0.931382	88	0.934025	95	0.934033	88
Comoros	0.838690	156	0.879313	149	0.875517	151	0.871916	148	0.844101	155	0.891105	137	0.886147	142	0.884631	142
Congo, Rep.	0.857672	147	0.858045	158	0.883258	145	0.899454	134	0.861726	139	0.875638	144	0.883498	145	0.882461	144
Costa Rica	0.975522	28	0.974605	42	0.987488	19	0.987944	18	0.966714	31	0.979576	22	0.983569	21	0.983536	20
Cote d'Ivoire	0.783212	172	0.809275	172	0.809466	171	0.807467	170	0.786840	171	0.809267	171	0.812366	170	0.811024	169
Croatia	0.970690	36	0.950447	82	0.966210	55	0.966864	52	0.958103	44	0.944515	67	0.956219	59	0.956224	56
Cuba	0.973363	31	0.928652	112	0.947211	85	0.948006	79	0.978120	17	0.928923	93	0.948418	69	0.948399	67

Table A.4 Output-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private health expenditure		Government health expenditure		Total		Current		Private health expenditure		Government health expenditure		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Cyprus	0.964919	44	0.987710	19	0.985735	23	0.986421	20	0.967059	30	0.972165	31	0.984905	18	0.984775	17
Czechia	0.966571	40	0.943677	90	0.953932	75	0.954720	72	0.954342	49	0.925759	96	0.936709	89	0.936709	85
Denmark	0.965561	42	0.965561	58	0.965561	56	0.965561	53	0.965024	33	0.965024	41	0.965024	48	0.965024	47
Djibouti	0.871160	138	0.861161	157	0.893280	142	0.896343	138	0.870295	131	0.864333	150	0.904186	133	0.902881	131
Dominica	0.927618	78	0.941579	96	0.936764	100	0.936717	97	0.940581	60	0.940996	73	0.948105	70	0.943758	77
Dominican Republic	0.919812	86	0.935185	104	0.930315	114	0.930187	110	0.911638	89	0.918663	107	0.917963	115	0.917861	114
Ecuador	0.960166	50	0.976347	39	0.974677	42	0.974774	40	0.891766	110	0.910139	121	0.907704	130	0.907691	129
Egypt, Arab Rep.	0.881480	130	0.949193	84	0.918373	130	0.918850	125	0.881169	121	0.949176	61	0.924719	107	0.927541	97
El Salvador	0.901321	112	0.927544	114	0.917383	131	0.917386	126	0.882731	120	0.899689	132	0.895183	137	0.895133	136
Equatorial Guinea	0.761636	174	0.829894	167	0.797471	172	0.798253	172	0.743632	176	0.819057	168	0.784015	175	0.785301	174
Estonia	0.940971	66	0.948254	85	0.959139	67	0.960014	66	0.936530	62	0.943617	70	0.955735	61	0.955729	57
Eswatini	0.785643	171	0.787199	175	0.788338	175	0.776920	176	0.781802	172	0.774181	176	0.785408	174	0.775125	176
Ethiopia	0.911130	100	0.978575	37	0.991536	16	0.981822	30	0.906403	96	0.913793	116	0.988584	17	0.970223	41
Federated States of Micronesia	1	1	0.957892	69	0.982298	31	0.934624	100	1	1	0.964702	42	0.999861	9	0.944084	76
Fiji	0.878649	133	0.878198	150	0.879724	148	0.877575	146	0.894968	104	0.880164	143	0.894753	138	0.897622	132
Finland	0.971864	34	0.972489	47	0.971864	47	0.971864	45	0.968918	28	0.968918	37	0.968918	43	0.968918	42
France	0.981868	22	0.981868	30	0.981868	32	0.981868	29	0.971802	25	0.971802	33	0.971802	40	0.971802	37
Gabon	0.855149	149	0.871308	154	0.869408	154	0.870984	149	0.860276	141	0.866203	149	0.874425	151	0.871949	148
Gambia, The	0.888886	126	0.875059	153	0.957006	71	0.958241	68	0.876845	127	0.868907	148	0.955902	60	0.978229	26
Georgia	0.885377	127	0.941904	95	0.924652	125	0.924705	122	0.870160	132	0.930352	90	0.913571	121	0.912592	121
Germany	0.963682	47	0.963682	62	0.963682	59	0.963682	56	0.958390	42	0.958390	52	0.958390	56	0.958390	53
Ghana	0.859714	146	0.878120	151	0.880821	147	0.879092	145	0.857929	145	0.870360	146	0.877328	147	0.877739	146
Greece	0.967788	38	1	1	0.997610	11	0.998419	10	0.961303	39	0.999064	10	0.992977	15	0.992913	14
Grenada	0.917472	88	0.970369	51	0.946624	86	0.946658	82	0.913770	88	0.968516	38	0.944609	74	0.944529	74
Guatemala	0.911227	99	0.961843	64	0.943107	90	0.943837	86	0.892721	108	0.948590	62	0.931370	98	0.933800	89
Guinea	0.802720	167	0.827528	168	0.837662	164	0.844781	158	0.807266	166	0.823779	165	0.851074	160	0.848459	158
Guinea-Bissau	0.798707	170	0.967833	52	0.835866	166	0.830487	164	0.795681	169	0.923910	99	0.834050	165	0.829244	163
Guyana	0.869916	140	0.889084	142	0.882351	146	0.881252	144	0.858820	144	0.857881	152	0.859705	156	0.859470	152
Haiti	0.871236	137	0.987199	20	0.920082	128	0.884449	143	0.872447	129	1	1	0.943239	78	0.928146	96
Honduras	0.917359	89	0.967366	53	0.951286	78	0.952100	73	0.896555	103	0.951726	59	0.938793	85	0.939734	80
Hungary	0.912372	96	0.930098	111	0.939609	92	0.940263	91	0.897415	101	0.921298	104	0.926880	103	0.926884	98
Iceland	0.985859	16	0.985859	22	0.985859	22	0.985859	21	0.982301	15	0.982301	20	0.982301	24	0.982301	22
India	0.922630	81	0.964115	60	0.958716	69	0.960767	64	0.927121	76	0.962638	44	0.962281	50	0.965292	46
Indonesia	0.899311	113	0.934327	106	0.925928	123	0.928131	114	0.884247	119	0.905443	126	0.908537	128	0.913304	120
Iran, Islamic Rep.	0.937755	70	0.976590	38	0.961536	63	0.961601	60	0.928418	74	0.955864	55	0.944488	75	0.944618	73
Iraq	0.903125	108	0.939415	98	0.930705	112	0.932149	107	0.879593	124	0.903892	130	0.906885	131	0.910985	124
Ireland	0.980394	25	0.980394	33	0.980394	34	0.980394	32	0.976302	19	0.976302	25	0.976302	31	0.976302	29
Israel	0.981608	23	0.996003	14	1	1	1	1	0.977398	18	0.988349	13	0.996698	11	0.996033	10
Italy	0.989820	13	0.994237	15	0.995941	13	0.995941	12	0.972033	24	0.973100	30	0.981299	27	0.981299	25
Jamaica	0.907004	105	0.919410	125	0.916124	132	0.915688	127	0.918822	82	0.915855	115	0.922335	110	0.923000	106

Table A.4 Output-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private health expenditure		Government health expenditure		Total		Current		Private health expenditure		Government health expenditure		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Japan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jordan	0.945832	64	0.979068	36	0.962827	60	0.962390	58	0.935888	64	0.965554	40	0.958530	55	0.955261	58
Kazakhstan	0.914826	94	0.934356	105	0.926012	122	0.926042	119	0.887266	115	0.897147	133	0.896730	134	0.896739	133
Kenya	0.844713	154	0.849882	161	0.855934	157	0.851536	155	0.847687	151	0.853963	153	0.863585	155	0.860634	151
Kiribati	0.949058	62	0.883735	147	0.905585	136	0.901830	133	0.954974	48	0.893639	135	0.920918	112	0.918012	112
Kuwait	0.994916	9	0.952785	77	0.970803	51	0.971722	46	0.961802	38	0.917116	112	0.935310	92	0.935313	87
Kyrgyz Republic	0.937733	71	0.959120	67	0.959085	68	0.961042	63	0.946882	54	0.971907	32	0.973908	34	0.975149	31
Lao PDR	0.905946	106	0.923993	119	0.927240	119	0.921363	123	0.917304	84	0.934451	79	0.941081	83	0.938896	82
Latvia	0.893683	119	0.922484	122	0.928353	118	0.928893	113	0.889136	113	0.922804	101	0.923439	109	0.923383	105
Lebanon	0.939301	68	0.997724	12	0.989391	18	0.989479	17	0.923468	79	1	1	0.976739	30	0.976601	28
Lesotho	0.744059	176	0.725861	178	0.736651	177	0.721797	178	0.749915	174	0.733757	178	0.748682	177	0.739229	177
Liberia	0.822195	161	0.887482	145	0.862069	156	0.850668	157	0.825666	159	0.863710	151	0.868908	152	0.848267	159
Lithuania	0.904294	107	0.923188	120	0.928449	117	0.929175	111	0.886685	116	0.906262	125	0.911806	122	0.911554	122
Luxembourg	0.979642	26	0.979642	35	0.979642	35	0.979642	33	0.971427	26	0.971427	34	0.971427	42	0.971427	40
Madagascar	0.916650	92	0.947304	86	1	1	1	1	0.909423	93	0.925516	97	1	1	1	1
Malawi	0.895533	116	0.880432	148	0.970874	49	0.944680	84	0.890245	112	0.883921	140	0.966354	45	0.946062	69
Malaysia	0.921175	85	0.956639	74	0.951784	77	0.951982	74	0.920916	80	0.956563	54	0.952128	63	0.952135	61
Maldives	0.999994	8	0.979795	34	0.996516	12	0.996180	11	0.998958	8	0.985973	15	0.993700	12	0.993244	13
Mali	0.827279	159	0.818488	171	0.878001	149	0.867536	152	0.814390	163	0.812665	170	0.874698	150	0.854212	156
Malta	0.982244	21	0.986764	21	0.983156	29	0.983153	27	0.973850	21	0.974837	27	0.973850	35	0.973850	34
Marshall Islands	0.890111	124	0.839328	164	0.849236	160	0.820967	169	0.892901	106	0.841348	161	0.865014	153	0.835745	162
Mauritania	0.868367	142	0.892164	141	0.893395	140	0.891388	141	0.860804	140	0.884287	139	0.888081	141	0.888549	139
Mauritius	0.880027	131	0.932886	108	0.926378	121	0.926645	118	0.887672	114	0.931515	87	0.926709	104	0.926675	99
Mexico	0.898639	114	0.938665	100	0.932292	108	0.932484	103	0.847109	153	0.882436	141	0.878284	146	0.878288	145
Moldova	0.885164	129	0.899268	137	0.896238	139	0.895776	139	0.878947	125	0.884484	138	0.883933	144	0.883525	143
Mongolia	0.916996	90	0.931733	110	0.929743	115	0.927098	115	0.930712	71	0.923779	100	0.934233	94	0.931318	92
Montenegro	0.909036	103	0.941965	93	0.948131	82	0.948695	78	0.897962	99	0.933859	82	0.933746	96	0.933751	90
Morocco	0.934250	75	0.984267	26	0.968284	52	0.969877	49	0.930386	72	0.980797	21	0.972341	38	0.975950	30
Mozambique	0.856146	148	0.844987	163	0.946087	88	0.867047	153	0.860054	142	0.848251	158	0.936020	90	0.888139	140
Myanmar**	0.850237	151	0.912274	132	0.897523	138	0.896706	137	0.856239	146	0.924393	98	0.908870	127	0.911113	123
Namibia	0.776828	173	0.808805	173	0.796763	173	0.796164	174	0.776559	173	0.802271	173	0.792169	173	0.791584	172
Nauru	0.868086	144	0.775002	176	0.792629	174	0.791173	175	0.868125	134	0.786646	175	0.794683	172	0.790098	173
Nepal	0.911508	97	0.950807	81	0.947818	83	0.945793	83	0.913849	87	0.952299	58	0.950782	65	0.950443	62
Netherlands	0.973397	30	0.973397	44	0.973397	44	0.973397	42	0.962140	36	0.962140	46	0.962140	51	0.962140	49
New Zealand	0.972732	32	0.975226	40	0.974888	40	0.974888	38	0.972754	23	0.973291	29	0.974562	32	0.974562	32
Nicaragua	0.949609	61	0.963807	61	0.962307	62	0.962257	59	0.932353	69	0.932592	83	0.943287	77	0.945199	71
Niger	0.868209	143	0.863825	156	0.922929	126	0.940383	90	0.847244	152	0.852457	156	0.909268	125	0.916142	119
Nigeria	0.693479	178	0.729640	177	0.723986	178	0.722632	177	0.695360	178	0.734468	177	0.730200	178	0.729853	178
North Macedonia	0.936398	73	0.960072	66	0.960207	66	0.960460	65	0.904227	97	0.931879	86	0.930009	100	0.930017	95
Norway	0.983430	18	0.983430	28	0.983430	28	0.983430	26	0.984032	12	0.984032	17	0.984032	19	0.984032	18

Table A.4 Output-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private health expenditure		Government health expenditure		Total		Current		Private health expenditure		Government health expenditure		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Oman	1	1	0.957227	72	0.975299	39	0.975615	36	0.963739	34	0.913356	117	0.926229	105	0.926236	100
Pakistan	0.885325	128	0.911088	133	0.912573	133	0.912158	128	0.886066	117	0.912898	118	0.916600	118	0.916903	116
Panama	0.922397	82	0.945351	88	0.946133	87	0.947030	80	0.906540	95	0.938191	75	0.937291	87	0.937182	83
Papua New Guinea	0.921993	83	0.892658	139	0.952942	76	0.943434	88	0.931553	70	0.903312	131	0.958234	57	0.954779	59
Paraguay	0.893294	120	0.937968	102	0.926637	120	0.926787	117	0.892789	107	0.922294	102	0.918569	114	0.918577	110
People's Republic of China	0.964181	45	0.990411	18	0.983970	27	0.984066	25	0.958476	41	0.986600	14	0.981672	25	0.981681	23
Peru	0.957389	52	0.973926	43	0.966775	54	0.966878	51	0.927849	75	0.932188	85	0.931750	97	0.931910	91
Philippines	0.907350	104	0.957063	73	0.941657	91	0.943684	87	0.909732	92	0.959298	50	0.951872	64	0.956676	55
Poland	0.936535	72	0.947020	87	0.957843	70	0.958519	67	0.916420	85	0.935488	77	0.941087	82	0.941070	79
Portugal	0.968221	37	0.981117	31	0.980502	33	0.981010	31	0.957611	45	0.970355	36	0.973501	36	0.973458	35
Qatar	0.960094	51	0.965735	56	0.974177	43	0.974896	37	0.935419	65	0.936395	76	0.945909	72	0.945909	70
Republic of Korea	0.986610	15	0.999997	10	0.998198	10	0.998679	9	0.986599	11	1	1	1	1	1	1
Romania	0.938170	69	0.920982	124	0.936169	102	0.936694	98	0.916036	86	0.907890	124	0.916940	117	0.916897	117
Russian Federation	0.874376	135	0.902515	135	0.907124	134	0.907579	131	0.849828	149	0.872357	145	0.876925	148	0.876929	147
Rwanda	0.914535	95	0.905489	134	0.931913	109	0.909661	129	0.919591	81	0.917816	110	0.942631	80	0.923658	104
Samoa	0.989202	14	0.938765	99	0.948897	81	0.946740	81	1	1	0.954441	56	0.979842	29	0.978067	27
Sao Tome and Principe	0.940378	67	0.924685	118	0.937191	95	0.925643	120	0.928755	73	0.921321	103	0.936900	88	0.930029	94
Senegal	0.909080	102	0.938335	101	0.939450	94	0.935364	99	0.910001	91	0.935450	78	0.939873	84	0.937046	84
Serbia	0.909702	101	0.941921	94	0.944513	89	0.944443	85	0.891436	111	0.926719	95	0.925500	106	0.925306	101
Seychelles	0.916697	91	0.915583	129	0.924812	124	0.925137	121	0.969464	27	0.948181	63	0.958209	58	0.958152	54
Sierra Leone	0.802633	168	0.857055	159	0.837473	165	0.823766	167	0.803109	167	0.840303	162	0.841659	163	0.828496	165
Singapore	0.990976	12	1	1	0.992372	15	0.992372	14	0.998887	9	1	1	0.998887	10	0.998887	8
Slovak Republic	0.950950	59	0.940007	97	0.954045	73	0.954761	71	0.942168	59	0.934200	80	0.945028	73	0.945033	72
Slovenia	0.966487	41	0.972779	46	0.978146	36	0.978645	34	0.952362	51	0.958480	51	0.965670	47	0.965536	45
Solomon Islands	1	1	0.951130	80	0.986574	20	0.973907	41	1	1	0.957147	53	0.993655	13	0.997624	9
South Africa	0.809335	164	0.830982	166	0.830241	167	0.830222	165	0.802374	168	0.818893	169	0.817883	169	0.817671	168
Spain	0.993781	11	0.998769	11	1	1	1	1	0.973648	22	0.976161	26	0.982681	22	0.982681	21
Sri Lanka	0.951820	57	1	1	0.984348	25	0.985073	23	0.956557	46	1	1	0.993200	14	0.995468	11
St. Kitts and Nevis	0.848448	153	0.894071	138	0.889720	144	0.890134	142	0.847055	154	0.897085	134	0.891676	140	0.891683	137
St. Lucia	0.911367	98	0.951313	79	0.932506	107	0.932072	108	0.907071	94	0.941810	72	0.928046	101	0.924441	102
St. Vincent and the Grenadines	0.921220	84	0.932005	109	0.929433	116	0.928994	112	0.918773	83	0.915955	114	0.920472	113	0.919092	109
Sudan	0.852483	150	0.900539	136	0.892353	143	0.891498	140	0.877159	126	0.904327	128	0.907821	129	0.907937	128
Suriname	0.888929	125	0.886303	146	0.898374	137	0.898611	135	0.897755	100	0.910901	119	0.910404	123	0.910229	126
Sweden	0.985222	17	0.985222	24	0.985222	24	0.985222	22	0.973937	20	0.973937	28	0.973937	33	0.973937	33
Switzerland	0.994648	10	1	1	0.994648	14	0.994648	13	0.981552	16	0.983055	19	0.981552	26	0.981552	24
Tajikistan	0.902625	110	0.962713	63	0.947420	84	0.949907	77	0.866490	137	0.929927	91	0.914614	119	0.916863	118
Tanzania	0.933136	77	0.916618	127	0.977095	37	0.957474	69	0.926423	77	0.917840	109	0.981265	28	0.961074	51
Thailand	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Timor-Leste	0.953156	53	0.918901	126	0.936117	103	0.926961	116	0.956265	47	0.909683	123	0.934367	93	0.918232	111
Togo	0.807831	166	0.887571	144	0.843454	162	0.843286	160	0.817213	161	0.847355	159	0.853049	159	0.851148	157

Table A.4 Output-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private health expenditure		Government health expenditure		Total		Current		Private health expenditure		Government health expenditure		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Tonga	0.982379	20	0.935543	103	0.953980	74	0.940394	89	0.983219	14	0.939241	74	0.963909	49	0.949502	64
Trinidad and Tobago	0.879934	132	0.927459	115	0.920792	127	0.921246	124	0.879920	123	0.932271	84	0.924143	108	0.924140	103
Tunisia	0.949897	60	0.985290	23	0.971187	48	0.971573	47	0.943607	56	0.963101	43	0.961161	52	0.962094	50
Türkiye	0.978058	27	0.967275	54	0.976561	38	0.976795	35	0.951995	52	0.944199	68	0.948757	68	0.948765	66
Turkmenistan	0.817982	163	0.916229	128	0.869922	153	0.870013	150	0.812287	164	0.919931	106	0.864458	154	0.864443	150
Tuvalu	0.892239	123	0.801092	174	0.811329	170	0.807250	171	0.894194	105	0.801058	174	0.808400	171	0.806121	171
Uganda	0.866219	145	0.957581	71	0.936279	101	0.909517	130	0.864362	138	0.945889	66	0.947919	71	0.917885	113
Ukraine	0.877316	134	0.922582	121	0.906325	135	0.906306	132	0.868945	133	0.904773	127	0.895283	136	0.895292	135
United Arab Emirates	0.945110	65	0.966230	55	0.960246	65	0.961069	62	0.933609	67	0.943893	69	0.942487	81	0.942487	78
United Kingdom	0.965012	43	0.965012	59	0.965012	58	0.965012	55	0.950227	53	0.950227	60	0.950227	66	0.950227	63
United States	0.933988	76	0.933988	107	0.933988	104	0.933988	101	0.910365	90	0.910365	120	0.910365	124	0.910365	125
Uruguay	0.918816	87	0.943016	91	0.951086	79	0.951824	75	0.943196	58	0.961639	47	0.966843	44	0.966849	43
Uzbekistan	0.898107	115	0.945168	89	0.930550	113	0.932402	105	0.880401	122	0.921285	105	0.914449	120	0.917774	115
Vanuatu	0.981469	24	0.951384	78	1	1	0.989828	16	0.992072	10	0.962386	45	1	1	0.993258	12
Venezuela, RB	0.903037	109	0.956424	75	0.936962	97	0.938515	93	0.884862	118	0.928858	94	0.917713	116	0.920207	108
Viet Nam	0.925056	79	0.973370	45	0.956122	72	0.956844	70	0.944526	55	0.990738	12	0.982659	23	0.985980	16
Zambia	0.869969	139	0.852130	160	0.873887	152	0.852971	154	0.867900	135	0.853223	154	0.876370	149	0.858672	153
Zimbabwe	0.848450	152	0.892291	140	0.919493	129	0.841195	162	0.851161	148	0.848829	157	0.927358	102	0.865535	149

COVID-19 = coronavirus disease, DEA = data envelopment analysis, Lao PDR = Lao People's Democratic Republic.

Notes: The global sample covers 178 economies. Pre-COVID-19 and mid-COVID-19 scenarios use 2019 and 2020 data, respectively.

*ADB placed on hold its regular assistance in Afghanistan effective 15 August 2021. ADB Statement on Afghanistan | [Asian Development Bank](#) (published on 10 November 2021). Manila.

**ADB placed on hold its assistance in Myanmar effective 1 February 2021. ADB Statement on Myanmar | [Asian Development Bank](#) (published on 10 March 2021). Manila.

Source: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators> (accessed 31 May 2023).

Table A.5 Input-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private		Government		Total		Current		Private		Government		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Afghanistan*	0.018298	172		1	0.147199	153	0.168284	152	0.017646	170	0.502391	38	0.132421	152	0.154150	152
Algeria	0.455828	31	0.520922	43	0.527965	51	0.554761	45	0.304699	54	0.326038	66	0.400031	69	0.458194	59
Angola	0.047351	150	0.146330	133	0.208657	135	0.291821	113	0.043815	143	0.159003	118	0.196050	127	0.264079	109
Antigua and Barbuda	0.437912	35	0.802245	20	0.654009	35	0.656592	32	0.502515	22	0.747801	15	0.674654	26	0.678500	24
Argentina	0.185135	85	0.244443	100	0.230694	125	0.236558	130	0.180129	81	0.161182	113	0.205780	121	0.222662	127
Armenia	0.063515	138	0.824471	19	0.177628	145	0.188269	145	0.023087	165	0.103754	137	0.081995	164	0.086975	167
Australia	0.420470	39	0.478494	48	0.584945	43	0.595092	39	0.406471	36	0.496618	39	0.610082	33	0.610088	30
Austria	0.322295	55	0.296378	89	0.413786	77	0.421354	80	0.271371	62	0.278028	75	0.337995	80	0.338047	85
Azerbaijan	0.116074	111	0.222802	108	0.235111	121	0.248869	126	0.010145	175	0.073706	152	0.092874	162	0.117660	161
Bahamas, The	0.011720	174	0.020244	175	0.044139	175	0.052248	176	0.041938	146	0.041425	165	0.072953	167	0.079948	170
Bahrain	0.356237	47	0.662999	29	0.665518	30	0.673804	29	0.254285	69	0.356186	62	0.320714	87	0.321417	90
Bangladesh	0.440583	34	1	1	1	1	1	1	0.281116	59	1	1	1	1	1	1
Barbados	0.252393	71	0.719275	24	0.479540	60	0.488831	58	0.349260	43	0.591692	26	0.562784	40	0.578146	36
Belarus	0.203400	78	0.130555	142	0.189277	142	0.201784	141	0.096869	116	0.053558	160	0.123915	156	0.134602	155
Belgium	0.361090	46	0.319285	81	0.445297	69	0.453515	71	0.296480	56	0.246458	83	0.306470	90	0.306538	96
Belize	0.469848	28	0.291631	91	0.448557	68	0.464579	65	0.359108	42	0.220004	92	0.429553	62	0.471481	56
Benin	0.113703	113	0.539213	39	0.597673	40	0.651681	33	0.107452	109	0.407829	53	0.458389	55	0.530961	44
Bhutan	0.185267	84	0.073125	157	0.245063	117	0.266855	121	0.277845	60	0.060643	156	0.251161	106	0.259967	110
Bolivia	0.026574	168	0.040211	167	0.097022	165	0.132208	162	0.026940	161	0.028926	172	0.069772	170	0.088385	166
Bosnia and Herzegovina	0.345874	52	0.351705	74	0.362123	86	0.366838	89	0.307509	52	0.227853	88	0.309274	89	0.326734	88
Botswana	0.024585	170	0.019920	176	0.049721	173	0.062983	173	0.025245	163	0.022831	174	0.060588	171	0.072930	172
Brazil	0.104937	121	0.280356	93	0.198701	138	0.212374	137	0.085893	120	0.186417	105	0.172924	142	0.196555	140
Brunei Darussalam	1	1	0.101609	150	0.179377	143	0.191771	143	0.999244	7	0.114521	133	0.204090	122	0.234843	123
Bulgaria	0.122208	109	0.151663	130	0.159808	151	0.170983	150	0.079630	123	0.087887	143	0.117494	157	0.130192	158
Burkina Faso	0.091147	129	0.192996	116	0.349189	90	0.425306	78	0.078712	124	0.189723	102	0.271356	99	0.321814	89
Burundi	0.278986	63	0.566972	36	1	1	1	1	0.293089	57	0.713004	19	1	1	1	1
Cabo Verde	1	1	0.888703	16	1	1	1	1	1	1	0.746082	17	1	1	1	1
Cambodia	0.030522	164	0.281915	92	0.288382	102	0.336320	95	0.030284	159	0.236959	84	0.301343	92	0.349541	79
Cameroon	0.041697	154	0.629307	32	0.276661	105	0.347979	94	0.041406	147	0.506799	37	0.248081	107	0.316643	92
Canada	0.322079	56	0.406981	62	0.504450	56	0.513939	55	0.300885	55	0.344390	64	0.414824	65	0.414867	68
Central African Republic	0.101361	125	1	1	0.659787	33	0.690354	25	0.097813	114	1	1	0.577389	39	0.549522	40
Chad	0.098689	126	0.682115	27	0.604996	39	0.702242	24	0.083609	121	0.747761	16	0.480012	49	0.546346	41
Chile	0.290228	61	0.726967	23	0.659668	34	0.668903	31	0.225517	73	0.430079	47	0.349601	76	0.349848	78
Colombia	0.348986	50	0.314327	84	0.340307	92	0.354579	91	0.251620	70	0.171204	108	0.236283	111	0.271806	106
Comoros	0.038482	158	0.406734	63	0.270171	106	0.315928	100	0.033457	154	0.493508	40	0.269923	101	0.307958	95
Congo, Rep.	0.092778	128	0.240856	103	0.385738	81	0.516297	54	0.059702	132	0.184091	106	0.287196	95	0.340075	82
Costa Rica	0.552289	21	0.543901	38	0.617751	37	0.622570	36	0.469859	27	0.437551	45	0.446984	58	0.446729	62
Cote d'Ivoire	0.045270	152	0.172662	122	0.224904	127	0.283036	114	0.043614	144	0.159144	117	0.184291	133	0.230876	126
Croatia	0.474752	27	0.274270	94	0.314284	98	0.316725	99	0.449738	30	0.189001	103	0.276130	97	0.283778	101
Cuba	0.559786	19	0.165984	124	0.214260	131	0.218477	135	0.764097	9	0.141239	123	0.231167	113	0.238257	119
Cyprus	0.339173	53	0.703870	26	0.753277	22	0.761053	18	0.620511	14	0.572920	29	0.718529	22	0.716845	19
Czechia	0.452069	32	0.212981	111	0.269634	107	0.271091	119	0.406874	35	0.120901	129	0.173341	141	0.176390	146

Table A.5 Input-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private		Government		Total		Current		Private		Government		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Denmark	0.462930	29	0.233926	104	0.378113	83	0.384711	86	0.467139	29	0.284491	73	0.387424	71	0.387466	73
Djibouti	0.130171	105	0.209124	113	0.427979	75	0.499043	57	0.146450	97	0.235047	85	0.440516	61	0.476422	53
Dominica	0.241018	73	0.156892	127	0.258113	112	0.272838	117	0.317027	49	0.265466	79	0.392285	70	0.409923	69
Dominican Republic	0.186913	83	0.140058	135	0.217857	130	0.229257	132	0.148859	94	0.123292	128	0.217030	117	0.238672	118
Ecuador	0.410728	40	0.599155	34	0.544854	49	0.559312	44	0.081702	122	0.061125	155	0.148682	150	0.159021	150
Egypt, Arab Rep.	0.037261	160	0.144928	134	0.174484	146	0.202662	140	0.039855	148	0.134934	124	0.203078	124	0.233133	124
El Salvador	0.105790	119	0.056277	162	0.146593	154	0.157132	155	0.043608	145	0.044783	163	0.125344	155	0.143777	154
Equatorial Guinea	0.011380	175	0.092744	152	0.068040	170	0.097521	166	0.009588	176	0.090268	140	0.054451	172	0.077762	171
Estonia	0.286236	62	0.253483	97	0.263314	110	0.264567	122	0.311181	51	0.202244	98	0.241260	110	0.243894	116
Eswatini	0.032671	161	0.031803	170	0.077949	167	0.083310	168	0.031020	158	0.039440	166	0.072501	168	0.081464	169
Ethiopia	0.142111	102	0.863541	17	0.920798	13	0.846720	15	0.140522	98	0.622357	24	0.878087	13	0.735320	18
Federated States of Micronesia	1	1	0.217356	110	0.817041	20	0.304510	107	1	1	0.247009	82	0.997921	9	0.319960	91
Fiji	0.031276	162	0.050994	164	0.120781	159	0.154428	157	0.034438	153	0.059641	157	0.162389	146	0.199290	139
Finland	0.549220	22	0.378760	70	0.558474	46	0.568734	42	0.525961	19	0.419977	50	0.551177	42	0.551188	39
France	0.433076	36	0.454696	50	0.568565	45	0.579385	40	0.376739	40	0.403367	55	0.500942	47	0.500974	46
Gabon	0.027654	166	0.061740	159	0.120070	160	0.165745	153	0.025547	162	0.058131	158	0.128847	154	0.146224	153
Gambia, The	0.207813	77	0.392120	68	0.770111	21	0.798883	17	0.214844	74	0.433472	46	0.737621	20	0.911486	12
Georgia	0.090623	131	0.149781	132	0.162287	149	0.171794	149	0.063211	130	0.159272	116	0.171971	143	0.179098	145
Germany	0.290909	60	0.223580	107	0.330315	94	0.335963	96	0.261268	67	0.234768	86	0.292083	94	0.292133	98
Ghana	0.049934	145	0.163655	126	0.246811	115	0.308638	106	0.047715	137	0.115743	132	0.208014	119	0.248782	113
Greece	0.367470	44	1	1	0.951505	11	0.967193	10	0.344616	45	0.977419	10	0.842747	14	0.841591	13
Grenada	0.174899	89	0.430963	57	0.328368	95	0.350824	92	0.198284	77	0.546360	31	0.410134	67	0.465081	58
Guatemala	0.146406	100	0.209101	114	0.265624	109	0.279621	115	0.077080	126	0.111486	134	0.221744	115	0.235531	122
Guinea	0.062802	140	0.383358	69	0.357255	87	0.460978	67	0.073416	128	0.443671	44	0.372516	74	0.418126	66
Guinea-Bissau	0.040220	155	0.927182	12	0.279865	103	0.302365	108	0.039056	149	0.854116	11	0.255114	103	0.280830	102
Guyana	0.018118	173	0.049844	165	0.105930	164	0.141288	160	0.015876	171	0.024308	173	0.071025	169	0.088552	165
Haiti	0.075532	133	0.900479	15	0.547340	48	0.447526	76	0.075878	127	1	1	0.595281	35	0.545412	42
Honduras	0.175279	88	0.175750	121	0.302460	100	0.312054	104	0.077951	125	0.127531	126	0.254562	104	0.265679	108
Hungary	0.172350	90	0.165837	125	0.179083	144	0.189318	144	0.166766	85	0.120772	130	0.164372	145	0.180963	144
Iceland	0.726849	10	0.498642	46	0.674184	27	0.682095	27	0.689973	10	0.506870	36	0.689994	24	0.690005	23
India	0.063462	139	0.332316	76	0.452560	65	0.547884	48	0.036474	150	0.305754	69	0.473805	51	0.592424	34
Indonesia	0.030384	165	0.123596	144	0.234421	122	0.296003	111	0.023530	164	0.085190	147	0.188315	132	0.237084	120
Iran, Islamic Rep.	0.259177	69	0.525458	41	0.421388	76	0.449387	74	0.264145	65	0.408665	52	0.417117	64	0.479182	50
Iraq	0.082869	132	0.103715	148	0.222060	129	0.254667	124	0.020878	168	0.078244	150	0.174136	138	0.219415	129
Ireland	0.385574	42	0.410039	60	0.514886	52	0.524889	53	0.382719	39	0.369281	59	0.473337	53	0.473357	55
Israel	0.555898	20	0.910627	14	1	1	1	1	0.566278	17	0.807522	13	0.941938	10	0.931024	11
Italy	0.648939	14	0.788404	21	0.934645	12	0.939759	11	0.523885	20	0.581825	28	0.716702	23	0.716748	20
Jamaica	0.104426	123	0.055742	163	0.162240	150	0.181370	148	0.137839	100	0.054309	159	0.194484	129	0.204175	136
Japan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jordan	0.310962	58	0.546738	37	0.470621	62	0.487505	59	0.316980	50	0.521715	33	0.518263	44	0.554826	38
Kazakhstan	0.162150	95	0.102405	149	0.193256	140	0.205294	139	0.057988	133	0.034884	168	0.112972	160	0.126099	160
Kenya	0.060940	141	0.109761	147	0.212261	132	0.248390	127	0.061518	131	0.128651	125	0.217009	118	0.246348	114

Table A.5 Input-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private		Government		Total		Current		Private		Government		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Kiribati	0.625110	15	0.080307	155	0.254143	113	0.299600	110	0.636864	12	0.089967	141	0.323485	85	0.339435	84
Kuwait	0.869636	9	0.304026	87	0.440177	74	0.444663	77	0.532498	18	0.109145	136	0.182560	135	0.191319	142
Kyrgyz Republic	0.166821	93	0.181075	120	0.412125	78	0.463251	66	0.210424	75	0.196453	99	0.499108	48	0.486213	49
Lao PDR	0.051051	144	0.230052	106	0.365193	85	0.396024	85	0.048524	135	0.207311	96	0.414140	66	0.443790	63
Latvia	0.110009	116	0.135610	138	0.140660	156	0.150172	158	0.123037	103	0.126653	127	0.153283	148	0.171905	147
Lebanon	0.294492	59	0.926463	13	0.628170	36	0.625591	35	0.262899	66	1	1	0.593458	36	0.603861	31
Lesotho	0.107368	118	0.058796	161	0.201908	137	0.170615	151	0.096959	115	0.070534	153	0.160091	147	0.154673	151
Liberia	0.064123	137	0.515569	44	0.383972	82	0.419178	81	0.064320	129	0.549385	30	0.356649	75	0.351284	77
Lithuania	0.122469	108	0.133932	139	0.138838	157	0.146451	159	0.108721	108	0.087817	144	0.115124	159	0.130234	157
Luxembourg	0.687877	12	0.317959	82	0.468645	63	0.471354	61	0.638697	11	0.295064	71	0.422086	63	0.416865	67
Madagascar	0.184254	86	0.714366	25	1	1	1	1	0.179311	82	0.655341	21	1	1	1	1
Malawi	0.233180	74	0.439803	56	0.862586	15	0.690308	26	0.191301	79	0.421192	49	0.765977	18	0.651248	26
Malaysia	0.189995	82	0.330848	77	0.289216	101	0.309777	105	0.239996	71	0.380760	58	0.386088	72	0.418127	65
Maldives	0.999841	8	0.637490	30	0.892070	14	0.881600	13	0.973116	8	0.623757	23	0.767148	17	0.754475	16
Mali	0.154821	97	0.306339	86	0.577632	44	0.554170	46	0.149570	92	0.350789	63	0.512955	45	0.478810	51
Malta	0.351514	48	0.672329	28	0.697904	23	0.710611	22	0.332470	48	0.590847	27	0.639251	31	0.639285	29
Marshall Islands	0.110737	115	0.038663	169	0.112615	162	0.082046	169	0.106866	110	0.045201	162	0.129147	153	0.091488	164
Mauritania	0.046203	151	0.197252	115	0.260645	111	0.320863	98	0.044389	142	0.177441	107	0.251215	105	0.302302	97
Mauritius	0.090700	130	0.155972	128	0.151068	152	0.160809	154	0.120812	104	0.195581	100	0.206997	120	0.235793	121
Mexico	0.121782	110	0.191682	117	0.194953	139	0.208110	138	0.007723	177	0.033854	169	0.074920	166	0.094593	163
Moldova	0.026937	167	0.043626	166	0.108981	163	0.128259	164	0.015419	172	0.037647	167	0.105472	161	0.129072	159
Mongolia	0.132312	104	0.074089	156	0.210108	133	0.219530	133	0.177952	84	0.084234	148	0.243594	109	0.241677	117
Montenegro	0.170244	92	0.240858	102	0.224220	128	0.234108	131	0.150128	91	0.159857	114	0.191900	131	0.207902	133
Morocco	0.274919	64	0.617089	33	0.513529	53	0.544257	49	0.285538	58	0.626168	22	0.583750	38	0.649582	28
Mozambique	0.274517	65	0.400187	65	0.836454	17	0.467021	63	0.270997	63	0.384983	57	0.671876	27	0.466326	57
Myanmar**	0.025265	169	0.419465	59	0.231140	124	0.294287	112	0.022790	166	0.427026	48	0.262271	102	0.313820	94
Namibia	0.010682	176	0.025389	172	0.043454	176	0.059380	174	0.011317	173	0.029718	171	0.045933	175	0.059924	173
Nauru	0.093813	127	0.007875	178	0.026691	178	0.035313	178	0.089689	119	0.011138	178	0.033372	178	0.034909	178
Nepal	0.039302	157	0.448165	52	0.443644	72	0.534845	52	0.035478	151	0.324529	67	0.442879	59	0.500918	47
Netherlands	0.251601	72	0.372130	71	0.442590	73	0.450724	73	0.206697	76	0.314207	68	0.345414	78	0.345379	81
New Zealand	0.482349	25	0.442081	54	0.607433	38	0.618702	37	0.495999	25	0.520217	35	0.650408	30	0.650446	27
Nicaragua	0.393562	41	0.325165	78	0.445272	70	0.458056	69	0.162809	87	0.081419	149	0.270537	100	0.277889	104
Niger	0.128118	106	0.410037	61	0.590599	42	0.719171	21	0.117311	105	0.405266	54	0.476027	50	0.581696	35
Nigeria	0.039455	156	0.303358	88	0.246718	116	0.314958	101	0.033145	155	0.418936	51	0.203307	123	0.266367	107
North Macedonia	0.256046	70	0.366979	72	0.340528	91	0.356442	90	0.160469	88	0.188198	104	0.224154	114	0.256647	112
Norway	0.594262	18	0.319628	80	0.452309	66	0.459565	68	0.587389	15	0.360555	61	0.505673	46	0.505677	45
Oman	1	1	0.356640	73	0.445013	71	0.451295	72	0.517698	21	0.101100	138	0.173499	140	0.199556	137
Pakistan	0.048791	148	0.306729	85	0.353636	88	0.454593	70	0.046934	140	0.284316	74	0.374686	73	0.446892	61
Panama	0.139370	103	0.252173	98	0.209078	134	0.212528	136	0.146868	96	0.169705	110	0.195403	128	0.205786	134
Papua New Guinea	0.495734	24	0.246877	99	0.670306	28	0.637002	34	0.497953	23	0.223627	89	0.671185	28	0.657810	25
Paraguay	0.105252	120	0.151249	131	0.173043	147	0.184285	146	0.105694	112	0.148636	122	0.196232	126	0.219466	128
People's Republic of China	0.425654	38	0.837312	18	0.668900	29	0.678708	28	0.441493	32	0.734357	18	0.676934	25	0.690772	22

Table A.5 Input-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private		Government		Total		Current		Private		Government		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Peru	0.427317	37	0.504156	45	0.511312	54	0.543048	50	0.264752	64	0.215259	93	0.320301	88	0.361529	75
Philippines	0.109019	117	0.154800	129	0.279457	104	0.313858	103	0.134752	101	0.169207	111	0.326801	82	0.346690	80
Poland	0.263680	68	0.262680	96	0.268390	108	0.272459	118	0.230375	72	0.159574	115	0.219726	116	0.233043	125
Portugal	0.349392	49	0.589370	35	0.693793	24	0.705688	23	0.304766	53	0.545206	32	0.556797	41	0.556478	37
Qatar	0.537468	23	0.405984	64	0.591283	41	0.600939	38	0.272540	61	0.167797	112	0.192352	130	0.192981	141
Republic of Korea	0.442511	33	0.999926	10	0.968932	10	0.979083	9	0.421792	33	1	1	1	1	1	1
Romania	0.267639	67	0.125226	143	0.169849	148	0.181883	147	0.197745	78	0.086886	146	0.139694	151	0.159379	149
Russian Federation	0.071415	136	0.039309	168	0.081880	166	0.086919	167	0.028600	160	0.014356	176	0.049385	173	0.055294	174
Rwanda	0.115722	112	0.267502	95	0.505948	55	0.468014	62	0.113542	106	0.259175	81	0.587096	37	0.477256	52
Samoa	0.668687	13	0.081738	154	0.322539	96	0.314778	102	1	1	0.268079	78	0.639238	32	0.596869	33
Sao Tome and Principe	0.104560	122	0.188655	118	0.448950	67	0.402967	84	0.094122	117	0.170536	109	0.453636	56	0.418744	64
Senegal	0.049057	146	0.490256	47	0.489380	58	0.542767	51	0.047707	138	0.299753	70	0.465096	54	0.490324	48
Serbia	0.159859	96	0.212520	112	0.207609	136	0.218774	134	0.133285	102	0.150083	121	0.180182	137	0.204949	135
Seychelles	0.171573	91	0.093780	151	0.146518	155	0.156323	156	0.626546	13	0.210416	95	0.325561	84	0.337605	86
Sierra Leone	0.052851	143	0.445368	53	0.321760	97	0.325881	97	0.052399	134	0.520444	34	0.302116	91	0.315419	93
Singapore	0.311050	57	1	1	0.827827	18	0.830972	16	0.259729	68	1	1	0.782092	16	0.782092	15
Slovak Republic	0.332837	54	0.218619	109	0.248928	114	0.253903	125	0.347519	44	0.155346	119	0.232784	112	0.244323	115
Slovenia	0.474942	26	0.470805	49	0.660506	32	0.672139	30	0.339441	47	0.394487	56	0.448175	57	0.447287	60
Solomon Islands	1	1	0.232439	105	0.839905	16	0.854781	14	1	1	0.228792	87	0.916864	11	0.984183	8
South Africa	0.009414	177	0.021445	173	0.039873	177	0.054904	175	0.010261	174	0.020001	175	0.040818	177	0.051473	175
Spain	0.610875	17	0.940176	11	1	1	1	1	0.478856	26	0.621381	25	0.738359	19	0.738399	17
Sri Lanka	0.365675	45	1	1	0.681858	26	0.719372	20	0.496068	24	1	1	0.900018	12	0.941501	10
St. Kitts and Nevis	0.022846	171	0.029138	171	0.061887	172	0.071377	171	0.031296	157	0.029855	170	0.077102	165	0.083988	168
St. Lucia	0.149268	99	0.183843	119	0.235631	119	0.248239	128	0.147998	95	0.263314	80	0.295936	93	0.287092	99
St. Vincent and the Grenadines	0.203195	79	0.062015	158	0.190536	141	0.198700	142	0.150730	90	0.067400	154	0.200553	125	0.208007	132
Sudan	0.031238	163	0.321694	79	0.235901	118	0.301239	109	0.046768	141	0.276649	76	0.339422	79	0.403276	71
Suriname	0.073114	135	0.020698	174	0.069323	169	0.075649	170	0.099677	113	0.076402	151	0.153106	149	0.165816	148
Sweden	0.695392	11	0.398948	66	0.556086	47	0.563218	43	0.582105	16	0.339862	65	0.473696	52	0.473721	54
Switzerland	0.125334	107	1	1	0.481997	59	0.481997	60	0.106422	111	0.702016	20	0.408894	68	0.408901	70
Tajikistan	0.043570	153	0.314821	83	0.349745	89	0.423220	79	0.021234	167	0.222131	91	0.246272	108	0.285847	100
Tanzania	0.196839	81	0.395064	67	0.824091	19	0.721456	19	0.178418	83	0.368348	60	0.836226	15	0.710798	21
Thailand	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Timor-Leste	0.227786	75	0.166569	123	0.479140	61	0.449239	75	0.187082	80	0.098948	139	0.347982	77	0.272994	105
Togo	0.048956	147	0.521668	42	0.309747	99	0.406603	83	0.048321	136	0.445583	43	0.272791	98	0.355442	76
Tonga	0.272996	66	0.116338	145	0.404568	79	0.348871	93	0.419423	34	0.110164	135	0.441787	60	0.339891	83
Trinidad and Tobago	0.073504	134	0.132227	140	0.125107	158	0.133476	161	0.091897	118	0.191181	101	0.174114	139	0.199312	138
Tunisia	0.346910	51	0.629681	31	0.534307	50	0.570032	41	0.387443	38	0.481995	41	0.542483	43	0.602510	32
Türkiye	0.619462	16	0.440641	55	0.491097	57	0.499432	56	0.467178	28	0.222379	90	0.336676	81	0.365988	74
Turkmenistan	0.005872	178	0.116119	146	0.071611	168	0.098105	165	0.005825	178	0.119818	131	0.084642	163	0.106939	162
Tuvalu	0.163174	94	0.013990	177	0.045583	174	0.049893	177	0.149281	93	0.012987	177	0.041225	176	0.046540	177
Uganda	0.111753	114	0.740261	22	0.662925	31	0.551643	47	0.109230	107	0.772933	14	0.661225	29	0.535116	43
Ukraine	0.048245	149	0.058977	160	0.117380	161	0.131837	163	0.035244	152	0.049052	161	0.115623	158	0.131486	156

Table A.5 Input-oriented DEA efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private		Government		Total		Current		Private		Government		Total		Current	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
United Arab Emirates	0.177738	87	0.424284	58	0.365720	84	0.369564	88	0.139038	99	0.203814	97	0.183457	134	0.184472	143
United Kingdom	0.462755	30	0.295948	90	0.457424	64	0.465297	64	0.364005	41	0.214635	94	0.278630	96	0.278674	103
United States	0.037620	159	0.091510	153	0.065597	171	0.065811	172	0.031427	156	0.043822	164	0.046116	174	0.048248	176
Uruguay	0.199722	80	0.241478	101	0.234017	123	0.239418	129	0.340723	46	0.286085	72	0.325682	83	0.330217	87
Uzbekistan	0.059043	142	0.130649	141	0.229327	126	0.269328	120	0.019913	169	0.087956	142	0.171722	144	0.215780	130
Vanuatu	0.382321	43	0.336809	75	1	1	0.936524	12	0.445973	31	0.274175	77	1	1	0.956540	9
Venezuela, RB	0.101740	124	0.139465	137	0.235466	120	0.259655	123	0.047088	139	0.087647	145	0.182211	136	0.208962	131
Viet Nam	0.211653	76	0.449367	51	0.391392	80	0.413555	82	0.395055	37	0.846365	12	0.735207	21	0.810448	14
Zambia	0.149279	98	0.139594	136	0.338666	93	0.274562	116	0.159560	89	0.150447	120	0.321083	86	0.259933	111
Zimbabwe	0.143788	101	0.526253	40	0.684166	25	0.376710	87	0.165196	86	0.463713	42	0.609085	34	0.391210	72

COVID-19 = coronavirus disease, DEA = data envelopment analysis, Lao PDR = Lao People's Democratic Republic.

Notes: The global sample covers 178 economies. Pre-COVID-19 and mid-COVID-19 scenarios use 2019 and 2020 data, respectively.

*ADB placed on hold its regular assistance in Afghanistan effective 15 August 2021. ADB Statement on Afghanistan | [Asian Development Bank](#) (published on 10 November 2021). Manila.

**ADB placed on hold its assistance in Myanmar effective 1 February 2021. ADB Statement on Myanmar | [Asian Development Bank](#) (published on 10 March 2021). Manila.

Source: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators> (accessed 31 May 2023).

Table A.6 Macro-level efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private		Government		Total		Current		Private		Government		Total		Current	
	Score (1)	Rank (2)	Score (3)	Rank (4)	Score (5)	Rank (6)	Score (7)	Rank (8)	Score (9)	Rank (10)	Score (11)	Rank (12)	Score (13)	Rank (14)	Score (15)	Rank (16)
Algeria	0.1809	66	0.3838	47	0.5181	54	0.5204	60	0.1961	62	0.3715	67	0.5242	70	0.5143	76
Angola	0.1384	94	0.1314	123	0.2394	127	0.2018	145	0.1309	100	0.1322	128	0.2319	135	0.2225	145
Antigua and Barbuda	0.1396	91	0.2279	93	0.3352	98	0.3354	110	0.1723	72	0.3033	82	0.4361	86	0.4368	98
Argentina	0.2585	32	0.5598	20	0.7516	17	0.7408	23	0.2560	35	0.6152	25	0.7998	23	0.7865	27
Armenia	0.7977	1	0.1320	122	0.9122	2	0.9225	2	0.7797	2	0.2127	108	0.9741	5	0.9866	6
Australia	0.1938	58	0.6384	13	0.7759	13	0.7860	14	0.2091	55	0.7359	13	0.8888	10	0.8225	24
Austria	0.1895	62	0.6634	11	0.7957	12	0.7928	13	0.1948	63	0.7365	12	0.8742	15	0.8770	14
Azerbaijan	0.2088	52	0.1163	126	0.3024	106	0.3100	122	0.2133	50	0.1311	129	0.3227	115	0.3302	123
Bahamas, The	0.1895	63	0.2477	83	0.4025	85	0.4054	93	0.2133	49	0.3934	57	0.5581	59	0.5476	67
Bahrain	0.1205	107	0.1880	106	0.2857	112	0.2857	126	0.1275	106	0.2396	102	0.3402	108	0.3402	117
Bangladesh	0.1399	90	0.0520	146	0.1758	145	0.2183	141	0.1432	93	0.0476	149	0.1759	145	0.2164	147
Barbados	0.2572	33	0.2673	78	0.4761	65	0.4832	72	0.2626	32	0.3679	68	0.5660	54	0.5701	65
Belarus	0.1255	103	0.3529	54	0.4300	76	0.4430	81	0.1325	98	0.3832	62	0.4651	79	0.4801	85
Belgium	0.1857	65	0.6792	10	0.8132	10	0.8113	11	0.1649	78	0.7228	14	0.8343	20	0.8394	20
Benin	0.0957	125	0.0569	145	0.1367	148	0.1824	148	0.0948	127	0.0896	141	0.1614	147	0.2025	148
Bhutan	0.0513	143	0.2287	92	0.2439	126	0.2717	132	0.0569	141	0.3108	80	0.3208	116	0.3333	120
Bolivia	0.1444	87	0.4527	34	0.5261	53	0.5326	58	0.1468	91	0.5106	36	0.5809	51	0.5992	58
Botswana	0.0838	130	0.3391	61	0.3924	88	0.4366	84	0.0877	129	0.3584	73	0.4150	89	0.4416	93
Brazil	0.4504	5	0.3517	56	0.7703	15	0.7716	16	0.4487	8	0.4131	53	0.8282	21	0.8295	22
Brunei Darussalam	0.0089	150	0.1492	114	0.1486	147	0.1486	150	0.0101	150	0.1620	124	0.1610	148	0.1610	149
Bulgaria	0.2120	50	0.3606	53	0.5280	52	0.5300	59	0.2350	41	0.4269	49	0.6176	46	0.6367	51
Cabo Verde	0.1246	104	0.3289	62	0.3988	86	0.4288	87	0.1292	105	0.3731	66	0.4442	84	0.5154	75
Cambodia	0.4118	9	0.2122	96	0.5617	48	0.6036	49	0.4163	11	0.2534	94	0.5991	48	0.6616	47
Cameroon	0.2184	49	0.0408	150	0.2465	124	0.2849	128	0.2118	51	0.0612	146	0.2563	129	0.2921	130
Canada	0.2423	39	0.6539	12	0.8442	8	0.8422	9	0.2380	40	0.8442	6	1.0219	3	1.0173	3
Central African Republic	0.4438	6	0.1150	127	0.5171	55	0.7124	28	0.4566	7	0.1636	123	0.5673	53	0.8714	16
Chad	0.2285	44	0.0960	132	0.2838	113	0.3678	103	0.2644	31	0.1236	132	0.3393	109	0.4374	97
Chile	0.3568	11	0.4366	37	0.7473	19	0.7449	21	0.3303	14	0.5030	38	0.7826	26	0.7819	28
Colombia	0.1797	67	0.5492	22	0.6466	31	0.6466	36	0.1861	68	0.6131	26	0.7119	36	0.7119	41
Comoros	0.2736	25	0.0901	137	0.3383	96	0.4169	88	0.3073	19	0.0834	142	0.3671	98	0.4286	100
Congo, Dem. Rep.	0.1430	89	0.0775	140	0.1914	141	0.3261	112	0.1743	71	0.0903	140	0.2324	134	0.3775	111
Congo, Rep.	0.1073	120	0.1139	128	0.1977	137	0.2123	142	0.1712	73	0.1860	114	0.3246	114	0.3729	112
Costa Rica	0.1501	82	0.4804	29	0.5633	46	0.5633	53	0.1681	77	0.5184	34	0.6181	44	0.6190	54
Cote d'Ivoire	0.1382	95	0.0959	133	0.2101	132	0.2426	137	0.1375	97	0.1309	130	0.2379	131	0.2766	133
Croatia	0.0911	126	0.4720	30	0.5065	59	0.5087	64	0.1016	124	0.5343	32	0.5776	52	0.5822	60
Cyprus	0.2226	45	0.3265	63	0.5100	57	0.5140	62	0.1244	108	0.5386	31	0.5996	47	0.6081	56
Czechia	0.0843	128	0.5415	24	0.5672	45	0.5661	52	0.0836	132	0.6770	16	0.6943	37	0.6960	43
Denmark	0.1185	111	0.7022	8	0.7635	16	0.7597	18	0.1146	115	0.7414	11	0.7973	25	0.7938	26
Djibouti	0.0552	141	0.0954	134	0.1327	149	0.1523	149	0.0475	143	0.0981	138	0.1252	150	0.1497	150
Dominican Republic	0.1162	115	0.2377	89	0.3077	103	0.3115	121	0.1204	111	0.2950	83	0.3614	101	0.3645	113
Ecuador	0.2430	38	0.4813	28	0.6533	29	0.6540	34	0.2766	25	0.4715	41	0.6867	38	0.6878	44
Egypt, Arab Rep.	0.2693	26	0.1434	118	0.3785	90	0.3646	104	0.2195	45	0.1405	126	0.3258	113	0.3238	124

Table A.6 Macro-level efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private		Government		Total		Current		Private		Government		Total		Current	
	Score (1)	Rank (2)	Score (3)	Rank (4)	Score (5)	Rank (6)	Score (7)	Rank (8)	Score (9)	Rank (10)	Score (11)	Rank (12)	Score (13)	Rank (14)	Score (15)	Rank (16)
El Salvador	0.2941	18	0.4585	32	0.6822	26	0.6841	31	0.3117	18	0.5575	30	0.7982	24	0.7994	25
Equatorial Guinea	0.1607	75	0.0474	148	0.1975	138	0.1984	147	0.1893	65	0.0603	147	0.2376	132	0.2431	141
Estonia	0.1269	102	0.4243	40	0.5053	60	0.5052	65	0.1263	107	0.4889	39	0.5652	56	0.5795	62
Eswatini	0.1105	118	0.2835	71	0.3527	95	0.4864	71	0.1122	119	0.2810	89	0.3529	104	0.4634	88
Ethiopia	0.1186	110	0.0856	139	0.1787	144	0.2847	129	0.1009	125	0.1060	135	0.1758	146	0.3033	128
Fiji	0.0756	135	0.2083	98	0.2537	121	0.2735	131	0.0794	135	0.2195	106	0.2687	126	0.2717	134
Finland	0.1312	100	0.6145	15	0.6899	25	0.6900	30	0.1296	103	0.6523	19	0.7260	33	0.7262	38
France	0.2032	55	0.7145	7	0.8632	6	0.8602	7	0.2091	54	0.8017	10	0.9561	7	0.9557	7
Gabon	0.0808	132	0.1470	115	0.2026	135	0.2038	144	0.0856	130	0.1641	122	0.2231	137	0.2510	139
Gambia, The	0.0838	131	0.1605	111	0.1928	140	0.2668	133	0.0805	133	0.1658	120	0.1945	143	0.2165	146
Georgia	0.2914	20	0.2467	84	0.4988	62	0.5088	63	0.3257	15	0.2493	96	0.5371	64	0.5788	63
Germany	0.1919	60	0.7672	4	0.8960	3	0.8951	5	0.1971	61	0.8463	5	0.9817	4	0.9945	4
Ghana	0.1243	105	0.1493	113	0.2309	129	0.2613	135	0.1231	110	0.2057	110	0.2739	122	0.3096	127
Greece	0.3168	14	0.3464	57	0.6290	36	0.6305	41	0.3316	13	0.4458	44	0.7402	29	0.7434	34
Guatemala	0.2853	21	0.2328	90	0.4705	68	0.4912	70	0.2973	21	0.2399	101	0.4896	75	0.5108	78
Guinea	0.2221	46	0.0935	136	0.2923	111	0.3274	111	0.1882	67	0.1033	136	0.2677	127	0.3226	125
Guinea-Bissau	0.4993	4	0.0580	144	0.5363	50	0.7346	25	0.5083	5	0.0778	144	0.5619	58	0.7336	36
Haiti	0.1385	93	0.0450	149	0.1681	146	0.3130	120	0.1556	88	0.0507	148	0.1891	144	0.2570	137
Honduras	0.3531	12	0.3025	69	0.5995	40	0.6170	45	0.4275	9	0.3591	72	0.7280	31	0.7760	29
Hungary	0.1443	88	0.3523	55	0.4591	70	0.4605	78	0.1505	89	0.4202	50	0.5290	67	0.5318	72
Iceland	0.1054	122	0.5801	16	0.6342	33	0.6348	38	0.1152	114	0.6554	18	0.7183	34	0.7213	39
India	0.1581	76	0.1014	130	0.2362	128	0.2367	138	0.1503	90	0.1098	134	0.2359	133	0.2379	142
Indonesia	0.1108	117	0.1375	120	0.2177	131	0.2190	140	0.1129	117	0.1782	116	0.2532	130	0.2545	138
Iraq	0.1728	70	0.1889	104	0.3353	97	0.3367	108	0.1629	79	0.2258	104	0.3575	103	0.3925	106
Ireland	0.1240	106	0.4156	43	0.4974	63	0.4944	69	0.1110	120	0.4628	43	0.5326	65	0.5301	73
Israel	0.1954	57	0.4264	39	0.5830	44	0.5706	50	0.1831	69	0.5216	33	0.6614	39	0.6441	50
Italy	0.1666	74	0.5547	21	0.6604	28	0.6614	33	0.1681	76	0.6306	20	0.7360	30	0.7406	35
Jamaica	0.1530	80	0.3833	48	0.4644	69	0.4724	77	0.1557	87	0.4307	48	0.5150	71	0.5203	74
Japan	0.1309	101	0.8226	2	0.8668	5	0.8579	8	0.1303	102	0.8362	7	0.8821	12	0.8741	15
Jordan	0.2738	24	0.3743	51	0.5902	42	0.6181	43	0.2661	30	0.3534	75	0.5654	55	0.6027	57
Kazakhstan	0.0785	134	0.1457	116	0.1958	139	0.1984	146	0.0891	128	0.2086	109	0.2637	128	0.2669	135
Kenya	0.1183	112	0.2005	102	0.2722	118	0.3362	109	0.1141	116	0.2029	111	0.2705	125	0.3309	122
Kiribati	0.0287	148	0.9026	1	0.8496	7	0.9042	3	0.0287	148	0.9190	1	0.8530	18	1.0550	2
Kyrgyz Republic	0.1739	69	0.2395	87	0.3674	93	0.3685	102	0.2070	56	0.2432	99	0.4073	92	0.4395	96
Latvia	0.1879	64	0.3235	65	0.4752	66	0.4787	74	0.1883	66	0.3760	64	0.5248	69	0.5441	69
Lebanon	0.3371	13	0.3422	59	0.6299	35	0.6159	46	0.9739	1	0.6167	24	1.5511	1	0.6270	53
Lesotho	0.1182	113	0.4174	42	0.4788	64	0.9033	4	0.1231	109	0.5039	37	0.5550	60	0.9536	8
Lithuania	0.1695	71	0.3760	50	0.4999	61	0.5024	66	0.1601	80	0.4178	51	0.5309	66	0.5384	70
Luxembourg	0.0488	144	0.3653	52	0.3792	89	0.3785	99	0.0458	144	0.3844	61	0.3969	94	0.4030	103
Madagascar	0.1362	96	0.1442	117	0.2444	125	0.3450	106	0.1459	92	0.1650	121	0.2725	123	0.3514	115
Malaysia	0.1316	99	0.1754	109	0.2767	116	0.2766	130	0.1410	96	0.1889	113	0.2989	117	0.2992	129
Maldives	0.1162	114	0.5671	19	0.6083	38	0.6250	42	0.1711	74	0.8888	3	0.9699	6	0.9898	5

Table A.6 Macro-level efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private		Government		Total		Current		Private		Government		Total		Current	
	Score (1)	Rank (2)	Score (3)	Rank (4)	Score (5)	Rank (6)	Score (7)	Rank (8)	Score (9)	Rank (10)	Score (11)	Rank (12)	Score (13)	Rank (14)	Score (15)	Rank (16)
Mali	0.1030	124	0.1363	121	0.2074	134	0.3169	118	0.1052	122	0.1532	125	0.2228	138	0.3515	114
Malta	0.2676	27	0.5111	26	0.7362	20	0.7194	27	0.2751	26	0.6208	23	0.8571	16	0.8584	17
Mauritania	0.1336	97	0.1203	125	0.2281	130	0.2662	134	0.1316	99	0.1236	131	0.2295	136	0.2647	136
Mauritius	0.2219	47	0.2381	88	0.4242	78	0.4494	80	0.2150	48	0.2794	91	0.4557	83	0.4911	83
Mexico	0.2044	54	0.2440	86	0.4062	82	0.4061	92	0.2117	52	0.2905	85	0.4558	82	0.4575	89
Moldova	0.1693	72	0.3430	58	0.4523	71	0.4727	76	0.1586	84	0.3980	56	0.4912	74	0.5053	79
Mongolia	0.1043	123	0.2292	91	0.2925	110	0.3178	117	0.1085	121	0.2907	84	0.3515	105	0.3806	108
Montenegro	0.2371	41	0.4407	36	0.6234	37	0.6326	39	0.3139	17	0.6237	22	0.8793	14	0.8915	11
Morocco	0.2460	37	0.1963	103	0.4113	80	0.4406	83	0.2605	33	0.2400	100	0.4652	78	0.4970	82
Mozambique	0.1124	116	0.2014	101	0.2735	117	0.7462	20	0.1128	118	0.2726	93	0.3291	112	0.7167	40
Myanmar*	0.3026	15	0.0707	142	0.3541	94	0.3840	97	0.3226	16	0.0740	145	0.3767	96	0.3792	110
Namibia	0.2921	19	0.3258	64	0.5836	43	0.6175	44	0.2959	22	0.3645	69	0.6239	43	0.6581	48
Nepal	0.2370	42	0.1281	124	0.3295	99	0.3752	100	0.2529	36	0.1760	117	0.3821	95	0.4344	99
Netherlands	0.2561	34	0.5443	23	0.7715	14	0.7686	17	0.2574	34	0.6250	21	0.8542	17	0.8483	18
New Zealand	0.1690	73	0.6197	14	0.7243	23	0.7248	26	0.1686	75	0.6745	17	0.7772	27	0.7710	30
Nicaragua	0.2536	35	0.5699	17	0.7247	22	0.7532	19	0.2451	39	0.5693	29	0.7154	35	0.7481	33
Niger	0.2626	29	0.2444	85	0.4491	73	0.5350	57	0.2671	28	0.2789	92	0.4811	76	0.5767	64
Nigeria	0.1578	77	0.0496	147	0.1913	142	0.2051	143	0.1792	70	0.0467	150	0.2124	140	0.2370	143
North Macedonia	0.2104	51	0.3904	45	0.5414	49	0.5518	55	0.2263	42	0.4141	52	0.5849	50	0.6097	55
Norway	0.1083	119	0.7494	5	0.7992	11	0.7959	12	0.1186	112	0.8184	9	0.8793	13	0.8771	13
Oman	0.0353	146	0.2698	76	0.2784	114	0.3231	115	0.0351	147	0.3592	71	0.3591	102	0.3794	109
Pakistan	0.1191	108	0.0879	138	0.1842	143	0.2195	139	0.1307	101	0.1026	137	0.2081	141	0.2278	144
Panama	0.2619	30	0.4309	38	0.6383	32	0.6388	37	0.2843	23	0.5168	35	0.7507	28	0.7530	32
Paraguay	0.2966	17	0.3158	67	0.5618	47	0.5622	54	0.2664	29	0.3909	58	0.5968	49	0.5968	59
People's Republic of China	0.1925	59	0.2740	75	0.4328	75	0.4354	85	0.2092	53	0.2808	90	0.4568	81	0.4558	90
Peru	0.1519	81	0.3208	66	0.4161	79	0.4121	89	0.1587	83	0.4129	54	0.5068	72	0.4986	81
Philippines	0.1914	61	0.1651	110	0.3228	100	0.3242	114	0.2207	44	0.2212	105	0.4017	93	0.4052	102
Poland	0.1329	98	0.3896	46	0.4743	67	0.4736	75	0.1296	104	0.3865	60	0.4704	77	0.4712	86
Portugal	0.2776	22	0.5106	27	0.7359	21	0.7357	24	0.2785	24	0.5985	27	0.8215	22	0.8241	23
Qatar	0.0572	140	0.2068	99	0.2467	123	0.2459	136	0.0617	140	0.2440	98	0.2873	120	0.2873	131
Republic of Korea	0.2504	36	0.4205	41	0.6313	34	0.6318	40	0.2478	37	0.4389	46	0.6482	41	0.6511	49
Romania	0.0792	133	0.3820	49	0.4075	81	0.4106	90	0.0850	131	0.4090	55	0.4397	85	0.4455	91
Russian Federation	0.1571	78	0.2826	72	0.4060	83	0.4044	94	0.1578	85	0.4344	47	0.5471	61	0.5460	68
Rwanda	0.1497	83	0.2816	73	0.3687	92	0.5664	51	0.1572	86	0.3373	77	0.4213	88	0.6673	46
Samoa	0.0516	142	0.4428	35	0.4035	84	0.5007	67	0.0491	142	0.3744	65	0.3462	106	0.4403	94
Senegal	0.2207	48	0.1131	129	0.3072	104	0.3840	98	0.2188	46	0.1830	115	0.3630	99	0.4402	95
Serbia	0.2608	31	0.4574	33	0.6604	27	0.6743	32	0.2469	38	0.4706	42	0.6601	40	0.6714	45
Seychelles	0.0885	127	0.2529	82	0.3184	102	0.3415	107	0.0640	139	0.3788	63	0.4128	90	0.4694	87
Sierra Leone	0.4230	8	0.1534	112	0.5296	51	0.7784	15	0.4206	10	0.1709	119	0.5382	63	0.7671	31
Singapore	0.1477	85	0.1807	107	0.3051	105	0.3142	119	0.2026	59	0.2481	97	0.4256	87	0.4434	92
Slovak Republic	0.1059	121	0.4624	31	0.5127	56	0.5146	61	0.1008	126	0.4807	40	0.5252	68	0.5333	71
Slovenia	0.1743	68	0.5338	25	0.6529	30	0.6524	35	0.1907	64	0.5873	28	0.7262	32	0.7272	37

Table A.6 Macro-level efficiency scores

	Pre-COVID-19								Mid-COVID-19							
	Private		Government		Total		Current		Private		Government		Total		Current	
	Score (1)	Rank (2)	Score (3)	Rank (4)	Score (5)	Rank (6)	Score (7)	Rank (8)	Score (9)	Rank (10)	Score (11)	Rank (12)	Score (13)	Rank (14)	Score (15)	Rank (16)
Solomon Islands	0.0143	149	0.3393	60	0.3020	107	0.3985	95	0.0151	149	0.3866	59	0.3374	110	0.3971	105
South Africa	0.2389	40	0.4051	44	0.5965	41	0.6049	48	0.2237	43	0.4451	45	0.6180	45	0.6317	52
Spain	0.2014	56	0.5688	18	0.7129	24	0.7104	29	0.2160	47	0.6918	15	0.8495	19	0.8455	19
Sri Lanka	0.1555	79	0.1414	119	0.2661	119	0.2850	127	0.1593	82	0.1748	118	0.2987	118	0.3196	126
Sudan	0.2986	16	0.0960	131	0.3693	91	0.3899	96	0.1994	60	0.1204	133	0.2970	119	0.2489	140
Sweden	0.1186	109	0.7811	3	0.8409	9	0.8364	10	0.1175	113	0.8251	8	0.8829	11	0.8804	12
Switzerland	0.5883	2	0.3139	68	0.8853	4	0.8675	6	0.5815	3	0.3629	70	0.9283	9	0.9073	10
Tajikistan	0.4368	7	0.2157	95	0.6054	39	0.6141	47	0.4568	6	0.2359	103	0.6442	42	0.7086	42
Tanzania	0.0755	137	0.1885	105	0.2095	133	0.3468	105	0.0795	134	0.1973	112	0.2213	139	0.3333	121
Thailand	0.0840	129	0.2552	81	0.3017	108	0.3020	124	0.1016	123	0.2813	88	0.3433	107	0.3431	116
Timor-Leste	0.0449	145	0.2576	80	0.2767	115	0.4964	68	0.0406	145	0.3538	74	0.3619	100	0.8371	21
Togo	0.3661	10	0.0937	135	0.4340	74	0.4808	73	0.3551	12	0.1354	127	0.4572	80	0.5117	77
Tonga	0.0339	147	0.2743	74	0.2547	120	0.3701	101	0.0358	146	0.2886	86	0.2720	124	0.4157	101
Tunisia	0.2067	53	0.2625	79	0.4294	77	0.4328	86	0.2038	57	0.3462	76	0.5019	73	0.5053	80
Türkiye	0.0714	139	0.2965	70	0.3228	101	0.3224	116	0.0704	136	0.3143	78	0.3367	111	0.3368	119
Uganda	0.1479	84	0.0726	141	0.1982	136	0.3247	113	0.1424	94	0.0790	143	0.1979	142	0.3380	118
Ukraine	0.2768	23	0.2674	77	0.5075	58	0.5398	56	0.2739	27	0.3133	79	0.5460	62	0.5811	61
United Arab Emirates	0.1448	86	0.1793	108	0.3013	109	0.3019	125	0.1599	81	0.2828	87	0.4124	91	0.4009	104
United Kingdom	0.1396	92	0.6888	9	0.7497	18	0.7412	22	0.1417	95	0.8830	4	0.9401	8	0.9191	9
United States	0.5671	3	0.7163	6	1.2648	1	1.2931	1	0.5628	4	0.8913	2	1.4402	2	1.4783	1
Uzbekistan	0.2640	28	0.2217	94	0.4496	72	0.4417	82	0.3020	20	0.3062	81	0.5633	57	0.5513	66
Viet Nam	0.2344	43	0.2049	100	0.3984	87	0.4077	91	0.2032	58	0.2139	107	0.3740	97	0.3812	107
Zambia	0.0737	138	0.2111	97	0.2496	122	0.4538	79	0.0703	137	0.2503	95	0.2766	121	0.4898	84
Zimbabwe	0.0755	136	0.0665	143	0.1199	150	0.3058	123	0.0678	138	0.0969	139	0.1343	149	0.2862	132

COVID-19 = coronavirus disease.

Notes: The sample covers 150 economies, including 32 developing Asian economies, in our estimations. Pre-COVID-19 and mid-COVID-19 scenarios use 2019 and 2020 data, respectively.

*ADB placed on hold its assistance in Myanmar effective 1 February 2021. ADB Statement on Myanmar | [Asian Development Bank](https://www.adb.org/press-releases/20210201) (published on 10 March 2021). Manila.

Source: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators> (accessed 31 May 2023).

Table A.7 The gap between actual and optimal total health expenditures (% of GDP)

	Pre-COVID-19		Mid-COVID-19	
	Actual	Gap	Actual	Gap
Algeria	6.23	5.13	6.44	5.16
Angola	3.14	8.77	3.03	8.85
Antigua and Barbuda	4.37	7.63	5.61	6.38
Argentina	9.60	2.78	10.14	2.22
Armenia	11.27	0.95	12.11	0.28
Australia	10.11	2.55	11.41	1.25
Austria	10.51	2.35	11.44	1.43
Azerbaijan	3.98	8.07	4.51	8.25
Bahamas, The	5.86	7.54	7.73	5.32
Bahrain	3.96	8.65	4.72	7.99
Bangladesh	2.12	8.85	2.15	8.94
Barbados	6.11	5.91	7.15	4.83
Belarus	5.70	6.62	6.22	6.26
Belgium	10.69	2.14	11.01	1.90
Benin	1.75	9.77	2.07	9.53
Bhutan	3.25	8.85	4.21	7.85
Bolivia	6.81	5.39	7.64	4.82
Botswana	5.54	7.46	5.84	7.16
Brazil	9.60	2.52	10.30	1.88
Brunei Darussalam	2.19	10.92	2.39	10.83
Bulgaria	7.06	5.52	8.29	4.48
Cabo Verde	4.73	6.34	5.23	5.82
Cambodia	6.45	4.48	6.85	4.08
Cameroon	3.18	8.56	3.32	8.49
Canada	10.97	1.77	12.99	-0.24
Central African Republic	5.81	4.84	6.33	4.31
Chad	3.49	7.82	4.25	7.31
Chile	9.36	2.78	9.76	2.38
Colombia	8.12	3.90	8.99	3.20
Comoros	4.24	7.34	4.61	7.03
Congo, Dem. Rep.	2.11	8.01	2.53	7.53
Congo, Rep.	2.39	8.64	3.91	7.23
Costa Rica	7.22	4.92	7.84	4.26
Cote d'Ivoire	2.86	9.43	3.22	9.05
Croatia	6.78	5.78	7.71	4.93
Cyprus	6.90	5.79	7.99	4.66
Czechia	7.62	5.08	9.22	3.54
Denmark	10.17	2.74	10.57	2.34
Djibouti	1.76	10.15	1.68	10.36
Dominican Republic	4.19	8.25	4.90	7.58
Ecuador	7.81	3.67	8.46	3.40
Egypt, Arab Rep.	5.01	7.22	4.39	7.96
El Salvador	8.48	3.48	9.84	2.19
Equatorial Guinea	3.02	10.59	3.69	10.19
Estonia	6.82	5.84	7.58	5.09
Eswatini	4.98	7.96	5.04	8.03
Ethiopia	2.06	8.45	2.05	8.58
Fiji	3.55	9.12	3.71	8.83
Finland	9.17	3.60	9.61	3.16
France	11.13	1.54	12.21	0.49
Gabon	2.75	9.51	3.06	9.33
Gambia, The	2.30	8.59	2.35	8.67
Georgia	6.54	5.76	7.10	5.35
Germany	11.71	1.18	12.68	0.21
Ghana	3.01	8.84	3.55	8.29
Greece	8.19	4.23	9.47	2.91
Guatemala	5.94	5.89	6.22	5.71
Guinea	3.65	7.82	3.38	8.18
Guinea-Bissau	6.24	4.80	6.57	4.55
Haiti	2.14	9.37	2.39	9.08
Honduras	7.11	4.21	8.52	2.82
Hungary	6.28	6.46	7.22	5.60

Table A.7 The gap between actual and optimal total health expenditures (% of GDP)

	Pre-COVID-19		Mid-COVID-19	
	Actual	Gap	Actual	Gap
Iceland	8.52	4.28	9.52	3.26
India	2.94	8.42	2.93	8.42
Indonesia	2.89	9.13	3.40	8.80
Iraq	4.24	7.42	4.65	7.36
Ireland	6.71	5.93	7.13	5.47
Israel	7.62	4.78	8.52	3.82
Italy	8.64	3.89	9.58	3.00
Jamaica	6.00	6.08	6.55	5.43
Japan	10.85	1.46	10.99	1.29
Jordan	7.25	4.45	7.04	4.77
Kazakhstan	2.75	9.87	3.74	9.11
Kenya	3.56	8.38	3.54	8.40
Kiribati	9.70	1.52	9.63	1.47
Kyrgyz Republic	4.48	6.84	4.89	6.32
Latvia	6.58	6.32	7.20	5.68
Lebanon	8.06	4.16	17.61	-5.50
Lesotho	6.39	6.09	7.21	5.07
Lithuania	6.97	6.06	7.44	5.71
Luxembourg	5.45	7.74	5.69	7.50
Madagascar	2.71	7.51	3.04	7.27
Malaysia	3.84	8.77	4.12	8.45
Maldives	7.47	4.25	11.14	0.31
Mali	2.57	8.73	2.78	8.58
Malta	9.43	2.96	10.82	1.58
Mauritania	2.88	8.63	2.92	8.67
Mauritius	5.87	6.95	6.21	6.48
Mexico	5.45	6.97	6.22	6.48
Moldova	6.11	6.47	6.60	5.98
Mongolia	3.84	8.18	4.58	7.44
Montenegro	8.22	4.34	11.28	1.35
Morocco	5.03	6.38	5.63	5.74
Mozambique	3.07	7.31	3.65	6.67
Myanmar*	4.33	7.00	4.60	6.74
Namibia	8.03	4.98	8.47	4.45
Nepal	3.93	7.11	4.58	6.58
Netherlands	10.17	2.63	11.21	1.67
New Zealand	9.48	3.15	10.10	2.53
Nicaragua	8.26	2.79	8.28	2.93
Niger	4.80	5.30	5.23	5.06
Nigeria	2.79	10.25	3.04	9.82
North Macedonia	6.94	5.17	7.59	4.72
Norway	10.57	2.31	11.44	1.37
Oman	3.81	8.64	5.06	7.86
Pakistan	2.40	9.38	2.70	9.08
Panama	8.32	4.13	9.64	2.80
Paraguay	7.16	4.91	7.58	4.50
People's Republic of China	5.32	6.17	5.61	5.90
Peru	5.26	6.51	6.40	5.49
Philippines	4.15	7.67	5.07	6.67
Poland	6.46	6.25	6.48	6.36
Portugal	9.52	2.99	10.52	2.00
Qatar	3.52	9.38	4.18	9.01
Republic of Korea	8.13	4.17	8.33	3.96
Romania	5.70	7.22	6.20	6.86
Russian Federation	5.67	7.22	7.61	5.48
Rwanda	4.21	6.45	4.75	5.83
Samoa	4.91	6.43	4.24	7.09
Senegal	3.63	7.29	4.29	6.70
Serbia	8.50	3.83	8.60	3.87
Seychelles	4.56	8.49	5.66	7.03
Sierra Leone	6.19	4.89	6.31	4.81
Singapore	4.29	8.52	5.82	6.86

Table A.7 The gap between actual and optimal total health expenditures (% of GDP)

	Pre-COVID-19		Mid-COVID-19	
	Actual	Gap	Actual	Gap
Slovak Republic	6.92	5.75	7.13	5.62
Slovenia	8.53	3.97	9.44	3.11
Solomon Islands	3.42	7.07	3.79	6.67
South Africa	8.14	4.79	8.41	4.53
Spain	9.17	3.23	10.76	1.67
Sri Lanka	3.43	8.34	3.81	7.90
Sudan	4.40	6.68	3.58	7.53
Sweden	10.88	1.80	11.41	1.32
Switzerland	11.49	1.30	12.04	0.81
Tajikistan	6.86	3.98	7.49	3.67
Tanzania	2.38	8.04	2.52	7.94
Thailand	3.85	7.88	4.36	7.36
Timor-Leste	3.41	7.90	4.51	7.04
Togo	5.12	5.94	5.36	5.66
Tonga	3.32	8.55	3.54	8.36
Tunisia	5.43	6.37	6.30	5.52
Türkiye	4.37	8.02	4.62	7.95
Uganda	2.35	8.49	2.36	8.52
Ukraine	6.70	5.69	7.19	5.23
United Arab Emirates	4.29	8.66	5.82	7.22
United Kingdom	9.98	2.90	12.22	0.68
United States	16.37	-2.97	18.42	-4.87
Uzbekistan	5.52	5.98	6.88	4.72
Viet Nam	4.93	6.58	4.60	6.82
Zambia	3.00	8.02	3.25	7.58
Zimbabwe	1.47	9.58	1.64	9.39

COVID-19 = coronavirus disease, GDP = gross domestic product.

Notes: The sample covers 150 economies, including 32 developing Asian economies, in our estimations. Pre-COVID-19 and mid-COVID-19 scenarios use 2019 and 2020 data, respectively.

*ADB placed on hold its assistance in Myanmar effective 1 February 2021. ADB Statement on Myanmar | [Asian Development Bank](#) (published on 10 March 2021). Manila.

Source: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators> (accessed 31 May 2023).

Table A.8 Summary statistics

	Pre-COVID-19 (N ₁ = 106)				Mid-COVID-19 (N ₂ = 99)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Dependent variables								
DEA output-oriented scores:								
(i) Total health spending	0.9307	0.0575	0.7240	1	0.9294	0.0558	0.7302	1
(ii) Government health spending	0.9279	0.0586	0.7259	1	0.9212	0.0584	0.7338	1
DEA input-oriented scores:								
(i) Total health spending	0.4225	0.2565	0.0435	1	0.4068	0.2578	0.0412	1
(ii) Government health spending	0.3564	0.2707	0.0140	1	0.3257	0.2589	0.0130	1
Independent variables								
Gini index	37	7	25	59	36	6	24	53
UHC service coverage index	64	15	28	89	65	16	28	89
Population density (people per sq. km. of land area)	230	802	2	7,966	245	826	2	7,919
Primary school enrolment rate (% of gross)	104	11	71	145	103	11	70	144
Foreign health assistance per capita (PPP dollars)	23	41	0	258	23	39	0	272
Central government debt (% of GDP)	51	30	8	194	60	36	7	226
Share of government in total health expenditure	0.5702	0.2113	0.1253	0.9685	0.6061	0.2042	0.1655	0.9720
Instruments								
Real GDP per capita (PPP dollars) (<i>t</i>)	19,555	21,073	1,217	114,543	20,002	20,737	1,215	111,751
Real GDP per capita (<i>t</i> – 1)	19,218	20,904	1,193	114,165	21,053	21,553	1,217	114,542
Real GDP per capita (<i>t</i> – 2)	18,792	20,596	1,156	114,986	20,668	21,382	1,193	114,165
Real GDP per capita (<i>t</i> – 3)	18,322	20,256	1,144	116,284	20,188	21,064	1,156	114,986
Real GDP per capita (<i>t</i> – 4)	17,958	19,871	1,124	113,183	19,655	20,713	1,144	116,284

COVID-19 = coronavirus disease, DEA = data envelopment analysis, GDP = gross domestic product, N = number of observations, PPP = purchasing power parity, SD = standard deviation, UHC = universal health coverage.

Notes: The estimations use *t* = 2019 cross-section data for pre-COVID-19 scenario and *t* = 2020 cross-section data for mid-COVID-19 scenario.

Table A.9 Determinants of health spending efficiency using IV regression models (15) and (16)

Standard coefficients of:	Expected Sign	Pre-COVID-19				Mid-COVID-19			
		Total		Government		Total		Government	
		Output	Input	Output	Input	Output	Input	Output	Input
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gini (γ_1)	–	0.0718 (0.1456)	0.3586 (0.2707)	0.0485 (0.1277)	0.3315 (0.2420)	0.2078 (0.1821)	0.4714⁺ (0.2949)	0.1074 (0.1457)	0.4319[*] (0.2493)
UHC (γ_2)	+	0.4891^{***} (0.0945)	0.0597 (0.1365)	0.6569^{***} (0.0703)	0.2330[*] (0.1272)	0.4714^{***} (0.1034)	0.0322 (0.1504)	0.6865^{***} (0.0827)	0.1378 (0.1453)
Population density (γ_3)	+	0.0977 (0.0718)	0.2534^{**} (0.1299)	0.0850 (0.0641)	0.2855^{***} (0.1140)	0.1345[*] (0.0749)	0.2752^{**} (0.1257)	0.1069⁺ (0.0707)	0.3499^{***} (0.1203)
Primary school enrolment (γ_4)	+	0.0953 (0.0913)	0.0017 (0.1039)	0.1030 (0.0754)	–0.0493 (0.0865)	0.1699[*] (0.0911)	0.0897 (0.0850)	0.1481[*] (0.0801)	–0.0105 (0.0810)
Share of government in total health expenditure (γ_5)	+	0.2198^{**} (0.1035)	0.1689 (0.1344)			0.2258[*] (0.1175)	0.1786 (0.1373)		
Foreign health assistance per capita (γ_6)	+	–0.1710 (0.1601)	–0.0702 (0.1718)	–0.1276 (0.1390)	–0.1824^{**} (0.0816)	–0.0530 (0.1625)	–0.0159 (0.1895)	0.0062 (0.1352)	–0.1867[*] (0.0991)
Central government debt (γ_7)	+	0.0556 (0.0683)	0.1300 (0.1406)	0.0279 (0.0636)	0.1097 (0.1400)	0.0453 (0.0852)	0.0231 (0.1536)	0.0347 (0.0761)	0.0466 (0.1574)
Number of observations		106	106	106	106	99	99	99	99
Durbin test		0.0301	0.0251	0.0393	0.0653	0.0308	0.0165	0.0773	0.0273
R ²		0.4108	NA	0.5100	0.0787	0.3066	NA	0.4624	0.0003

COVID-19 = coronavirus disease, IV = instrumental variables, NA = not available, UHC = universal health coverage.

Notes: Robust standard errors are in parentheses. *** significant at 1%, ** at 5%, * at 10%, + at 15%.

Sources: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators#>. IMF. Global Debt Database. https://www.imf.org/external/datamapper/CG_DEBT_GDP@GDD/SWE. CEIC Data Company. <https://www.ceicdata.com/en>. (all accessed 31 May 2023).

Table A.10 Determinants of health spending efficiency using IV regression models (15) and (17)

Standard coefficients of:	Expected Sign	Pre-COVID-19				Mid-COVID-19			
		Total		Government		Total		Government	
		Output	Input	Output	Input	Output	Input	Output	Input
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gini (γ_1)	-	-0.2503*** (0.1010)	-0.2097** (0.1079)	-0.2118*** (0.0859)	-0.0694 (0.0940)	-0.1112 (0.0911)	-0.0988 (0.1015)	-0.1256* (0.0745)	-0.0111 (0.0903)
UHC (γ_2)	+	0.6179*** (0.1553)	0.1292 (0.2055)	0.6894*** (0.0799)	0.1746+ (0.1131)	0.4583*** (0.1341)	-0.0360 (0.1752)	0.6593*** (0.0805)	-0.0039 (0.1148)
Population density (γ_3)	+	0.0437 (0.0472)	0.1783** (0.0892)	0.0532 (0.0465)	0.2480*** (0.0887)	0.1036* (0.0558)	0.2265** (0.0938)	0.0900+ (0.0576)	0.3265*** (0.0991)
Primary school enrolment (γ_4)	+	0.1316 (0.0979)	0.0707 (0.1010)	0.1335* (0.0762)	0.0021 (0.0691)	0.2014** (0.0905)	0.1465* (0.0826)	0.1711** (0.0755)	0.0346 (0.0647)
Share of government in total health expenditure (γ_5)	+	0.0026 (0.1669)	-0.0701 (0.2057)			0.1400 (0.1528)	0.0591 (0.1754)		
Foreign health assistance per capita (γ_6)	+	0.2521 (0.2774)	0.3625 (0.3684)	0.1819 (0.1993)	-0.0204 (0.2595)	0.0929 (0.2198)	0.1517 (0.2965)	0.1355 (0.1806)	-0.2089 (0.2311)
Central government debt (γ_7)	+	0.1402** (0.0617)	0.2623*** (0.0999)	0.1076* (0.0575)	0.2037* (0.1163)	0.1139* (0.0596)	0.1359 (0.1098)	0.0904+ (0.0580)	0.1193 (0.1374)
Number of observations		106	106	106	106	99	99	99	99
Durbin test		0.1328	0.3150	0.1148	0.6656	0.7148	0.8510	0.5995	0.7070
R ²		0.3774	0.0717	0.4853	0.1950	0.3790	0.1156	0.4957	0.1724

COVID-19 = coronavirus disease, IV = instrumental variables, UHC = universal health coverage.

Notes: Robust standard errors are in parentheses. *** significant at 1%, ** at 5%, * at 10%, + at 15%.

Sources: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators#>. IMF. Global Debt Database. https://www.imf.org/external/datamapper/CG_DEBT_GDP@GDD/SWE. CEIC Data Company. <https://www.ceicdata.com/en> (all accessed 31 May 2023).

Table A.11 Determinants of health spending efficiency using IV regression models (15) and (18)

Standard coefficients of:	Expected Sign	Pre-COVID-19				Mid-COVID-19			
		Total		Government		Total		Government	
		Output	Input	Output	Input	Output	Input	Output	Input
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gini (γ_1)	-	-0.2090*** (0.0850)	-0.1766* (0.0913)	-0.2075*** (0.0745)	-0.0830 (0.0845)	-0.1148* (0.0789)	-0.1108 (0.0858)	-0.1391** (0.0684)	-0.0469 (0.0837)
UHC (γ_2)	+	0.2544** (0.1136)	-0.2141 (0.1719)	0.4506*** (0.0863)	0.0145 (0.1364)	0.2749*** (0.1114)	-0.2327* (0.1503)	0.5185*** (0.0875)	-0.0799 (0.1200)
Population density (γ_3)	+	0.0977* (0.0591)	0.2287** (0.1007)	0.0835* (0.0514)	0.2673*** (0.0912)	0.1295** (0.0614)	0.2534*** (0.0975)	0.1048* (0.0597)	0.3329*** (0.0979)
Primary school enrolment (γ_4)	+	0.1336* (0.0800)	0.0731 (0.0768)	0.1376** (0.0707)	0.0061 (0.0582)	0.2016** (0.0858)	0.1473** (0.0742)	0.1721** (0.0757)	0.0370 (0.0607)
Share of government in total health expenditure (γ_5)	+	0.2633*** (0.1026)	0.1692 (0.1282)			0.2359** (0.1145)	0.1551 (0.1205)		
Foreign health assistance per capita (γ_6)	+	-0.2017 (0.1686)	-0.0454 (0.1661)	-0.1413 (0.1426)	-0.1653** (0.0734)	-0.0482 (0.1622)	0.0299 (0.1729)	0.0052 (0.1363)	-0.1524* (0.0862)
Central government debt (γ_7)	+	0.1173** (0.0607)	0.2434** (0.1068)	0.0826* (0.0554)	0.1976* (0.1134)	0.1098* (0.0664)	0.1370 (0.1135)	0.0849 (0.0619)	0.1399 (0.1350)
Number of observations		106	106	106	106	99	99	99	99
Durbin test		0.0021	0.0747	0.0004	0.1584	0.0380	0.0916	0.0183	0.2354
R ²		0.4413	0.1144	0.5322	0.1918	0.3707	0.0989	0.4939	0.1703

COVID-19 = coronavirus disease, IV = instrumental variables, UHC = universal health coverage.

Notes: Robust standard errors are in parentheses. *** significant at 1%, ** at 5%, * at 10%, + at 15%.

Sources: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators#>. IMF. Global Debt Database. https://www.imf.org/external/datamapper/CG_DEBT_GDP@GDD/SWE. CEIC Data Company. <https://www.ceicdata.com/en> (all accessed 31 May 2023).

Table A.12 Determinants of health spending efficiency using IV regression models (15) and (19)

Standard coefficients of:	Expected Sign	Pre-COVID-19				Mid-COVID-19			
		Total		Government		Total		Government	
		Output	Input	Output	Input	Output	Input	Output	Input
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gini (γ_1)	–	–0.1309 (0.1971)	0.2983 (0.3373)	–0.1688 (0.1895)	0.2737 (0.3601)	0.0253 (0.2263)	0.4303 (0.3815)	–0.1376 (0.1773)	0.4860 (0.3581)
UHC (γ_2)	+	0.4161* (0.1465)	0.2268 (0.2662)	0.5583*** (0.0931)	0.2534 (0.2175)	0.2901* (0.1730)	–0.0224 (0.2361)	0.5377*** (0.0955)	0.1883 (0.2133)
Population density (γ_3)	+	0.0853* (0.0580)	0.2251* (0.1201)	0.0756* (0.0503)	0.2782* (0.1078)	0.1417** (0.0692)	0.2788** (0.1260)	0.1030* (0.0582)	0.3490*** (0.1221)
Primary school enrolment (γ_4)	+	0.1198 (0.0880)	0.0036 (0.1115)	0.1292* (0.0745)	–0.0443 (0.0923)	0.1881** (0.0881)	0.0939 (0.0868)	0.1718** (0.0804)	–0.0160 (0.0929)
Share of government in total health expenditure (γ_5)	+	0.1616 (0.1535)	–0.0095 (0.2269)			0.2740* (0.1706)	0.1989 (0.1960)		
Foreign health assistance per capita (γ_6)	+	0.0034 (0.1850)	0.3176 (0.3571)	0.0801 (0.1164)	0.0176 (0.1881)	–0.1361 (0.2209)	–0.0581 (0.3238)	0.0531 (0.1518)	–0.1445 (0.2332)
Central government debt (γ_7)	+	0.1109* (0.0688)	0.1633 (0.1335)	0.0944* (0.0642)	0.1408 (0.1517)	0.0751 (0.0817)	0.0276 (0.1605)	0.0903 (0.0642)	0.0409 (0.1666)
Number of observations		106	106	106	106	99	99	99	99
Durbin test		0.0108	0.0619	0.0043	0.1520	0.1405	0.1244	0.1296	0.1483
R ²		0.4418	NA	0.5127	0.0806	0.3539	NA	0.4954	NA

COVID-19 = coronavirus disease, IV = instrumental variables, NA = not available, UHC = universal health coverage.

Notes: Robust standard errors are in parentheses. *** significant at 1%, ** at 5%, * at 10%, + at 15%.

Sources: Authors' calculations using data from the World Bank. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators#>. IMF. Global Debt Database. https://www.imf.org/external/datamapper/CG_DEBT_GDP@GDD/SWE. CEIC Data Company. <https://www.ceicdata.com/en> (all accessed 31 May 2023).