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# ECONOMIC CONTRIBUTION OF BROADBAND AND DIGITIZATION: ECONOMETRIC MODELLING FOR THE ITU COMMONWEALTH OF INDEPENDENT STATES

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## THIS STUDY USES ECONOMETRIC MODELS TO EXAMINE THE IMPACT OF FIXED AND MOBILE BROADBAND, AS WELL AS DIGITIZATION ON THE ECONOMY THROUGH THE END OF 2020

- A prior study relied on similar methodologies applied to data from 139 countries between 2017 and 2018
- It concluded that:
  - Mobile broadband generates a larger economic contribution than fixed broadband
  - Developing countries benefit more from mobile broadband than industrialized countries
  - Developed countries with high penetration of fixed broadband enjoy larger benefit from the technology than developing nations
  - The economic contribution of digitization is higher in advanced economies than in developing countries
- The irruption of COVID-19 prompted the need to examine two questions:
  - Given the changes that have recently occurred in ICT deployment, adoption, and use, is their economic contribution remaining at the same level as measured before the occurrence of the pandemic?
  - Can ICT infrastructure have an impact on the economic resilience of countries facing the pandemic?

**COVID-19 HAS DRIVEN SEVERAL CHANGES IN THE ICT SECTOR: ACCELERATION OF INVESTMENT IN DEVELOPED COUNTRIES AND A CONTRACTION IN THE DEVELOPING WORLD**

**TELECOMMUNICATIONS INVESTMENT PER CÁPITA (USD)**

|                                    | 2019      | 2020      | Delta  |
|------------------------------------|-----------|-----------|--------|
| WORLD                              | \$ 50.86  | \$50.77   | -0.2 % |
| Africa                             | \$ 9.81   | \$ 9.12   | -7.0 % |
| Latin America and the Caribbean    | \$ 45.16  | \$41.99   | -7.0 % |
| Asia and Pacific                   | \$ 30.08  | \$ 29.22  | -2.9 % |
| Arab States                        | \$ 42.54  | \$ 41.09  | -3.4 % |
| Commonwealth of Independent States | \$ 31.93  | \$ 33.04  | 3.5 %  |
| Europe                             | \$ 99.92  | \$ 101.77 | 1.9 %  |
| North America                      | \$ 291.50 | \$ 305.28 | 4.7 %  |

Source: Katz, R. and Jung, J. (2021). *The Economic Impact of Broadband and Digitization through the Covid-19 pandemic - Econometric Modelling*. ITU



**COVID-19 HAS DRIVEN SEVERAL CHANGES IN THE ICT SECTOR: DESPITE THE CAPEX CONTRACTION IN THE DEVELOPING WORLD, BROADBAND PENETRATION HAS CONTINUED TO GROW GLOBALLY**

**FIXED BROADBAND PENETRATION  
(percent of households)**

|   | <b>2019</b>    | <b>2020</b>    | <b>Delta</b> |
|---|----------------|----------------|--------------|
| WORLD                                     | 54.22 %        | 56.80 %        | 4.8 %        |
| Africa                                    | 4.34 %         | 5.96 %         | 37.4 %       |
| Latin America and the Caribbean           | 53.32 %        | 58.54 %        | 9.8 %        |
| Asia and Pacific                          | 53.15 %        | 55.24 %        | 3.9 %        |
| Arab States                               | 62.39 %        | 67.04 %        | 7.4 %        |
| <b>Commonwealth of Independent States</b> | <b>66.70 %</b> | <b>72.11 %</b> | <b>8.1 %</b> |
| Europe                                    | 84.39 %        | 87.57 %        | 3.8 %        |
| North America                             | 92.01 %        | 95.46 %        | 3.8 %        |

Source: Katz, R. and Jung, J. (2021). *The Economic Impact of Broadband and Digitization through the Covid-19 pandemic - Econometric Modelling*. ITU



**COVID-19 HAS DRIVEN SEVERAL CHANGES IN THE ICT SECTOR: THE INCREASE IN BROADBAND PENETRATION HAS BEEN PARTLY FUELED BY A DECLINE IN SERVICE PRICING**

**INCREASE IN BROADBAND AFFORDABILITY  
(Service pricing as per cent of GNI per capita)**

|                                    | Fixed Broadband |         |         | Mobile Broadband |        |         |
|------------------------------------|-----------------|---------|---------|------------------|--------|---------|
|                                    | 2019            | 2020    | Delta   | 2019             | 2020   | Delta   |
| WORLD                              | 7.39 %          | 7.14 %  | -3.3 %  | 1.60 %           | 1.51 % | -5.1 %  |
| Africa                             | 51.61 %         | 46.08 % | -10.7 % | 7.03 %           | 5.68 % | -19.2 % |
| Latin America and the Caribbean    | 3.18 %          | 3.62 %  | 13.9 %  | 1.97 %           | 1.78 % | -10.0 % |
| Asia and Pacific                   | 2.83 %          | 3.12 %  | 10.3 %  | 0.95 %           | 1.08 % | 13.0 %  |
| Arab States                        | 3.20 %          | 3.55 %  | 10.9 %  | 1.27 %           | 1.05 % | -17.0 % |
| Commonwealth of Independent States | 0.88 %          | 0.77 %  | -12.5 % | 0.99 %           | 0.86%  | -12.6 % |
| Europe                             | 1.32 %          | 1.27 %  | -3.7 %  | 0.60 %           | 0.61 % | 1.6 %   |
| North America                      | 0.86 %          | 1.00 %  | 16.3 %  | 0.44 %           | 0.43 % | -4.5 %  |

Source: Katz, R. and Jung, J. (2021). *The Economic Impact of Broadband and Digitization through the Covid-19 pandemic - Econometric Modelling*. ITU



## A STRUCTURAL MODEL WAS USED IN BOTH ECONOMETRIC STUDIES TO ESTIMATE THE ECONOMIC CONTRIBUTION OF BROADBAND

### STRUCTURAL MODEL USED TO ESTIMATE THE GDP GROWTH IMPACT OF AN INCREASE IN 10 PER CENT OF BROADBAND PENETRATION

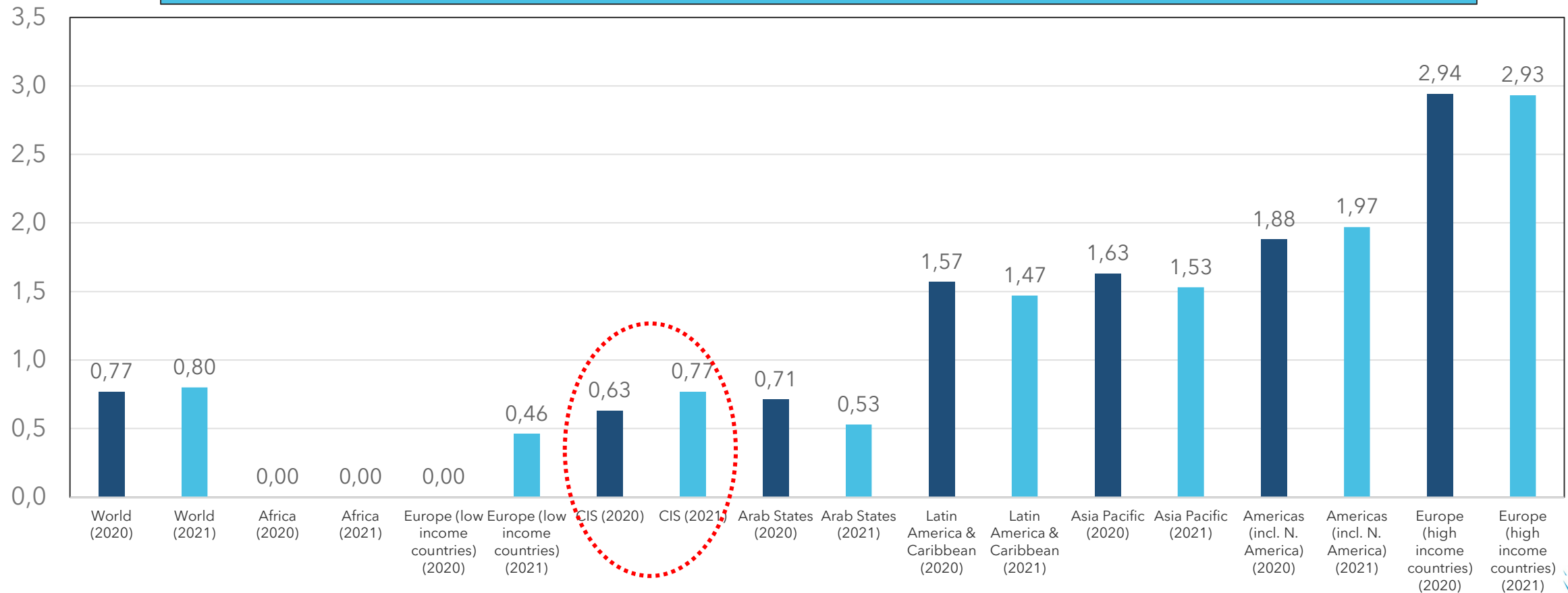
|                               |  |
|-------------------------------|--|
| Aggregate production function | $\text{GDP per capita}_{it} = a_1(\text{Capital}_{it}) + a_2(\text{Education}_{it}) + a_3(\text{Broadband Penetration}_{it}) + e_{it} \quad (1)$                                       |
| Demand function               | $\text{Broadband Penetration}_{it} = b_1(\text{Rural population}_{it}) + b_2(\text{Broadband Price}_{it}) + b_3(\text{GDP per capita}_{it}) + b_4(\text{HHI}_{it}) + e_{it} \quad (2)$ |
| Supply function               | $\text{Broadband Revenue}_{it} = c_1(\text{Broadband Price}_{it}) + c_2(\text{GDP per capita}_{it}) + c_3(\text{HHI Fixed broadband}_{it}) + e_{it} \quad (3)$                         |
| Output function               | $\Delta \text{Broadband Penetration}_{it} = d_1(\text{Fixed Broadband Revenue}_{it}) + \varepsilon_{4it} \quad (4)$  |

Source: Katz, R. and Callorda, F. (2020). *The Global Economic Impact of Broadband, Digitization and ICT regulation*. ITU



## THE ECONOMIC CONTRIBUTION OF FIXED BROADBAND IN CIS COUNTRIES HAS INCREASED SINCE THE LAST ECONOMETRIC STUDY

### GDP GROWTH IMPACT OF AN INCREASE IN 10 PER CENT OF FIXED BROADBAND PENETRATION (in per cent)

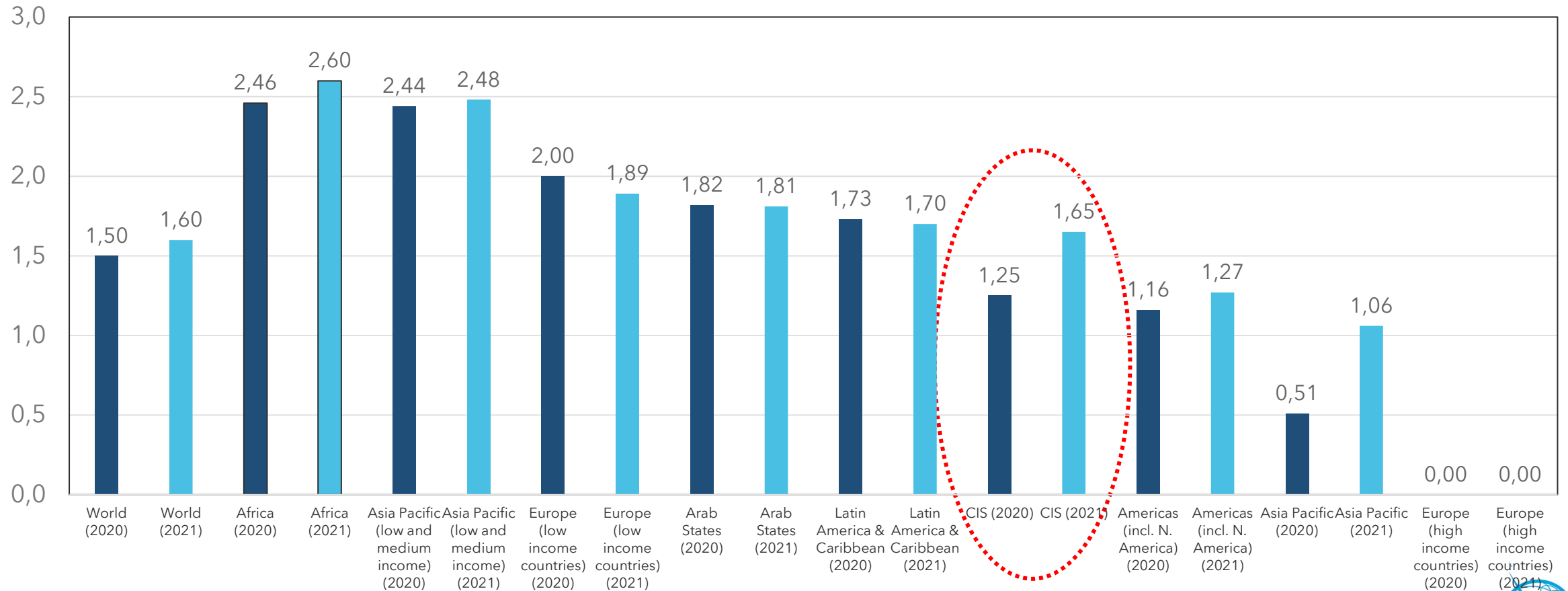


Source: Katz, R. and Jung, J. (2021). *The Economic Impact of Broadband and Digitization through the Covid-19 pandemic - Econometric Modelling*. ITU



**SIMILARLY, THE ECONOMIC CONTRIBUTION OF MOBILE BROADBAND IN CIS COUNTRIES HAS INCREASED SINCE THE LAST ECONOMETRIC STUDY**

**GDP GROWTH IMPACT OF AN INCREASE IN 10 PER CENT OF MOBILE BROADBAND PENETRATION (in per cent)**



Source: Katz, R. and Jung, J. (2021). *The Economic Impact of Broadband and Digitization through the Covid-19 pandemic - Econometric Modelling*. ITU

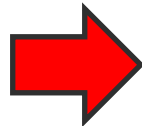




## THE STUDY ALSO RELIED ON ECONOMETRICS TO VALIDATE THE ANECDOTAL EVIDENCE THAT DIGITIZATION ALSO HELPS MITIGATING COVID-19 DISRUPTION

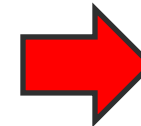
### PANDEMIC

- Lockdowns/shelter in place
- Closing of offices and other places of work
- Disruption of supply chains
- Closing of places of entertainment
- Closing of borders/only essential travel



### ECONOMIC LOSSES

- Global recession: -3.3 % in 2020 (deepest since Great Depression)
- Advanced economies hardest hit (-5.8%)
- 90% drop in global airline passenger travel and 30% in cargo traffic
- Unemployment 7.5% in advanced economies and 12% in emerging markets



### CONTRIBUTION OF DIGITAL TECHNOLOGIES

- Telecommuting
- Videoconferencing/cloud computing
- Virtualization of supply chains
- Distance learning
- Shift to remote entertainment
- E-commerce
- Telemedicine

## WE TESTED WHETHER ALL COUNTRIES ARE EQUALLY ABLE TO MITIGATE THE ECONOMIC DISRUPTION TRIGGERED BY THE PANDEMIC

### MODIFIED FIRST STEP OF STRUCTURAL MODEL

$$\text{Log}(GDPpc)_i = \mu_i + \theta \text{Log}(GFKF)_{it} + \sigma \text{Log}(HK)_{it} + \beta \text{Log}(BB \text{ PEN})_{it} + \delta \text{COVID}_{it} + \gamma (BB * \text{COVID}^2)_{it} + \rho_{i,2020} + \zeta_t + \varepsilon_{it}$$

Impact of COVID:  
deaths per 100  
population

Interaction between  
broadband and  
COVID

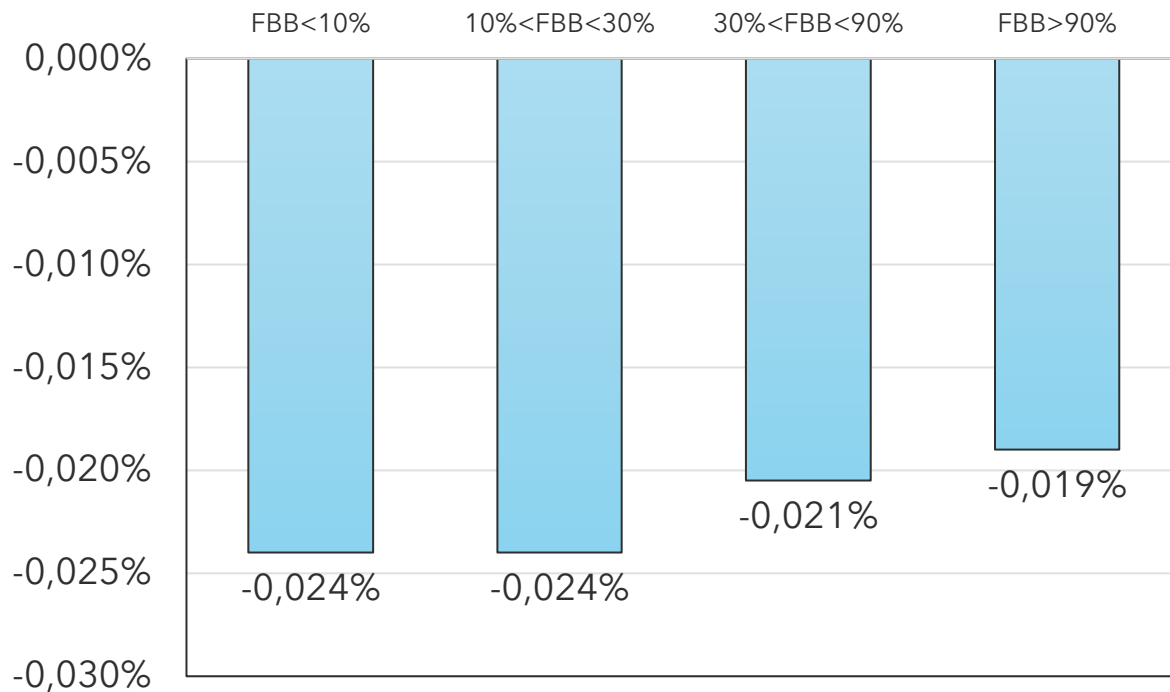
| Broadband HH penetration | Examples                                |
|--------------------------|---|
| <10%                     | Tajikistan, Turkmenistan                |
| 10%-30%                  | Kyrgyzstan                              |
| 30%-90%                  | Armenia, Kazakhstan, Russia, Uzbekistan |
| >90%                     | Azerbaijan, Belarus                     |

Source: Katz, R. and Jung, J. (2021). *The Economic Impact of Broadband and Digitization through the Covid-19 pandemic - Econometric Modelling*. ITU

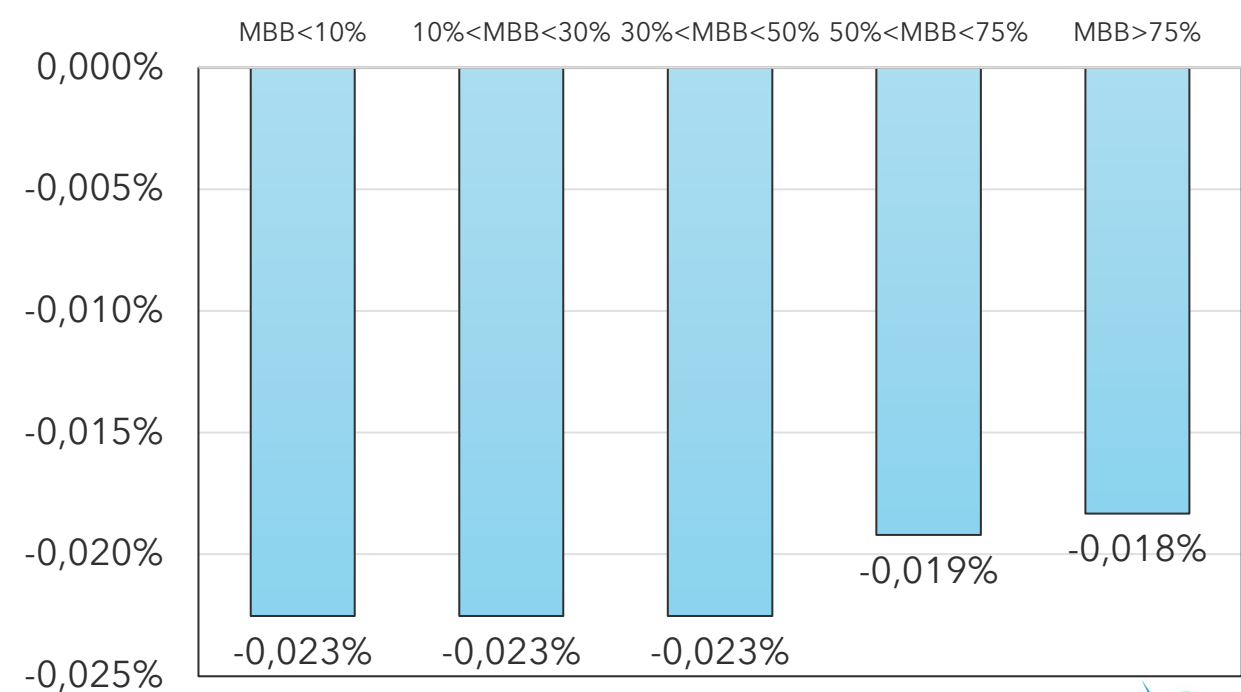
THE ECONOMETRIC MODEL RESULTS INDICATE THAT THE MITIGATION OF ECONOMIC DISRUPTION CAUSED BY THE PANDEMIC CAN ONLY BE ACHIEVED AT HIGH LEVELS OF DIGITIZATION

PERCENTAGE VARIATION IN QUARTERLY GDP PER CAPITA AFTER AN INCREASE OF 1% IN COVID DEATHS PER 100 POPULATION

By level of fixed broadband penetration



By level of mobile broadband penetration



Source: Katz, R. and Jung, J. (2021). *The Economic Impact of Broadband and Digitization through the Covid-19 pandemic - Econometric Modelling*



## IMPLICATIONS OF FINDINGS FOR THE COMMONWEALTH OF INDEPENDENT STATES

- Broadband and digitization appear to be increasing their economic contribution, becoming a critical lever of economic growth in the Commonwealth of Independent States
- Governments and regulators in the Commonwealth of Independent States need to evaluate initiatives that should accelerate capital spending and lead to stimulation of telecommunications investment to ensure continuous roll-out of networks
- The importance of ICT in mitigating part of the economic damage of pandemics raises the need for governments to reduce demand side barriers (affordability, digital literacy, local content development) and stimulate adoption of mobile broadband
- The high value of fixed broadband as a mitigant of pandemic-induced economic disruption raises the urgency of CIS countries with underdeveloped fixed connectivity to explore approaches to foster the roll-out of networks

# Thank you

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