

**ITUWebinars**

# Towards strengthened impact of ICTs on economic development in Europe

15 June 2020, 14.00-15.30

Follow us on twitter: @ITU\_EUR  
[www.itu.int/go/EUR\\_ICTs\\_Impact\\_20](http://www.itu.int/go/EUR_ICTs_Impact_20)

ITU Regional Initiative for Europe on Broadband infrastructure, broadcasting and spectrum management

ECONOMIC  
GROWTH

BROADBAND  
DEVELOPMENT

INFRASTRUCTURE  
MAPPING

STRATEGIC  
PROJECTS

POLICIES AND  
STRATEGIES



Organized by:



# ECONOMETRIC ANALYSIS OF THE CONTRIBUTION OF BROADBAND, DIGITIZATION AND ICT POLICY IN THE EUROPE REGION

Raul L. Katz

**International Telecommunication Union (ITU)**  
**Telecommunication Development Bureau**

## WHY IS THIS STUDY IMPORTANT?

---

- The study of the Economic Contribution of Broadband, Digitization and ICT Regulation helps Governments make decisions with regards to investment in infrastructure;
- The study provides an understanding of the comparative impact of fixed vs. mobile broadband is important for countries that have to prioritize public investments in telecommunications or policy focus
- The global and regional analyses present a perspective on how policy decisions might differ according to a country and region level of development
- The study demonstrates the different economic impact between a general purpose technology (e.g. broadband) and the digital ecosystem
- Study provides an understanding of why a developed institutional and regulatory framework can have a positive impact on the growth of the digital economy

# METHODOLOGY: THREE ECONOMETRIC MODELS IMPLEMENTED GLOBALLY AND BY REGION OF THE WORLD

Economic impact of fixed and mobile broadband



Structural model composed of four equations



Aggregate Production function: (1)

$$GDP_{it} = a_1 K_{it} + a_2 L_{it} + a_3 Mob\_Pen_{it} + e_{it}$$

Demand function: (2)

$$Mob\_Pen_{it} = b_1 Rural_{it} + b_2 Mob\_Price_{it} + b_3 GDPC_{it} + b_4 HHI_{it} + e_{it}$$

Supply function: (3)

$$Mob\_Rev_{it} = c_1 MobPr_{it} + c_2 GDPC_{it} + c_3 HHI_{it} + e_{it}$$

Output function: (4)

$$\Delta Mob\_Pen_{it} = d_1 Mob\_Rev_{it} + \epsilon_{4it}$$

Economic impact of digitization



Endogenous growth model



$$Y = A(t)K^{1-b}L^b$$

where

$A(t)$  represents the level of technology progress (in our case the digitization index),  $K$  corresponds to the fixed capital formation, and  $L$  to the labour force.

By converting all terms to logarithms, the coefficients can be estimated through an econometric model.

$$\log(GDP_{it}) = a_1 \log(k_{it}) + a_2 \log(L_{it}) + a_3 \log(D_{it}) + \epsilon_{it}$$

Impact of policy on digitization



Multi-variate regression model with fixed effects



$$Dig. Index_{it} = \beta_1 Reg. Index_{it} + Year F. E. + Country F. E. + e_{it}$$

Beyond measuring the correlation between both variables, a model with lagged variables was developed. In this case, the specified model is as follows:

$$Dig. Index_{it} = \beta_1 Reg. Index_{it} + \beta_2 Reg. Index_{it-1} + Year F. E. + Country F. E. + e_{it}$$

Finally, the variables were converted to logarithms to test causality of change in values of both indices:

$$\ln(Dig. Index_{it}) = \beta_1 \ln(Dig. Index_{it-1}) + \beta_2 \ln(Reg. Index_{it-1}) + Year F. E. + Country F. E. + e_{it}$$

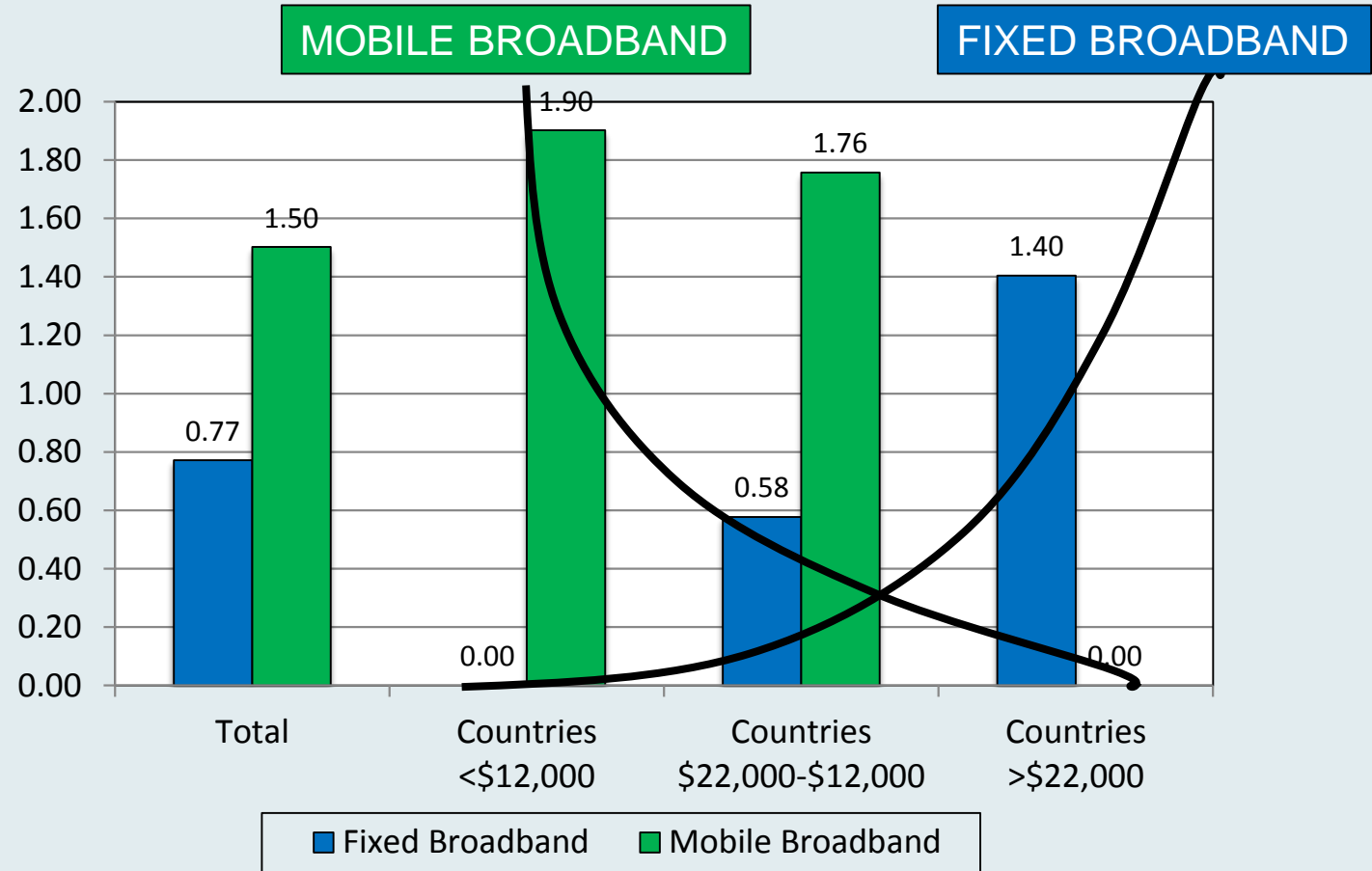
# GLOBAL STUDY RESULTS: IMPACT OF BROADBAND

Mobile broadband generates higher economic contribution than fixed broadband

The impact of fixed broadband increases with economic development

Developing countries benefit more from mobile broadband than industrialized countries

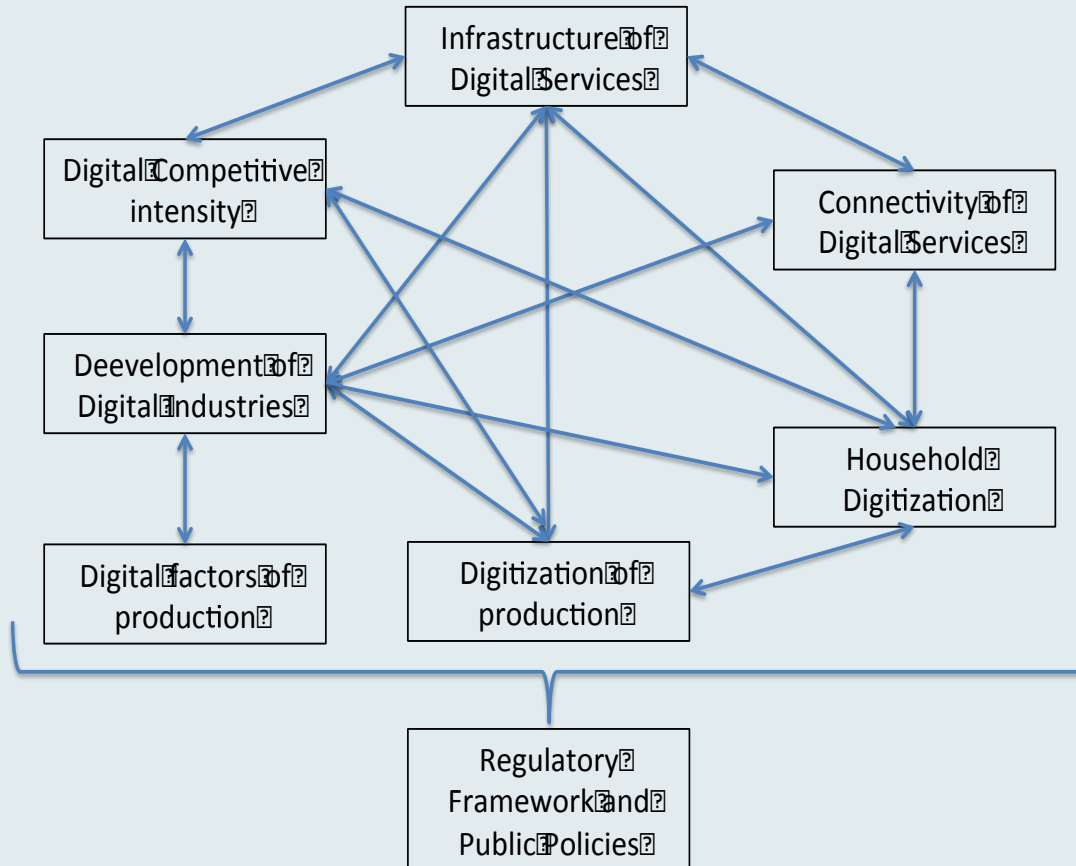
### GDP Growth Impact of an increase in 10% of broadband penetration



Source: ITU

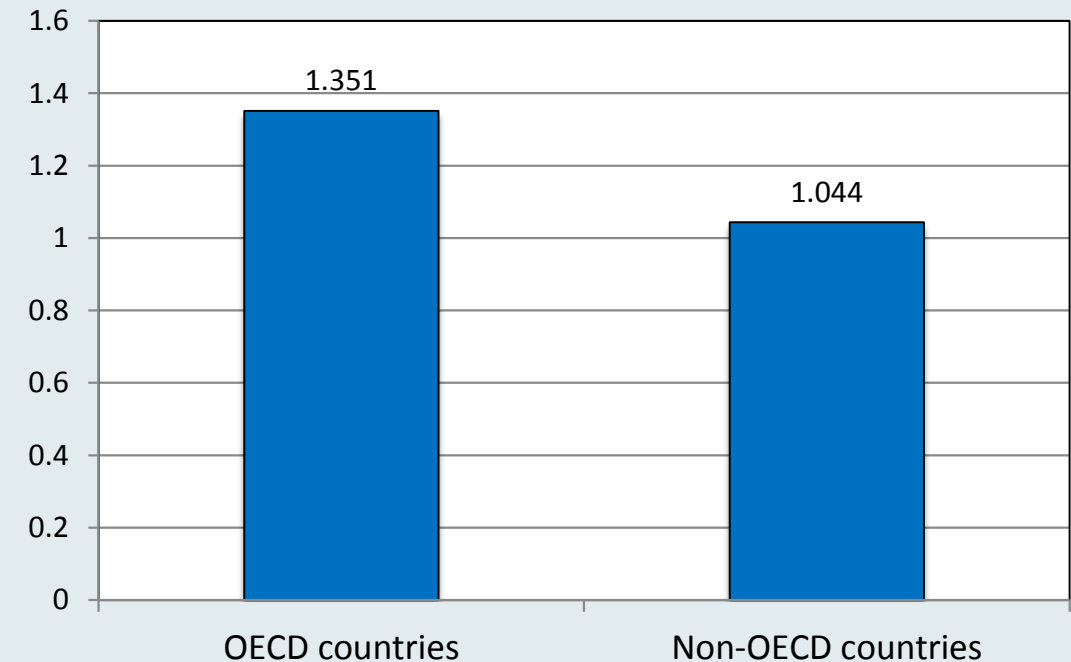
# GLOBAL STUDY RESULTS: THE ECONOMIC CONTRIBUTION OF DIGITIZATION IS HIGHER IN ADVANCED ECONOMIES THAN IN EMERGING ONES

## What is Digitization?



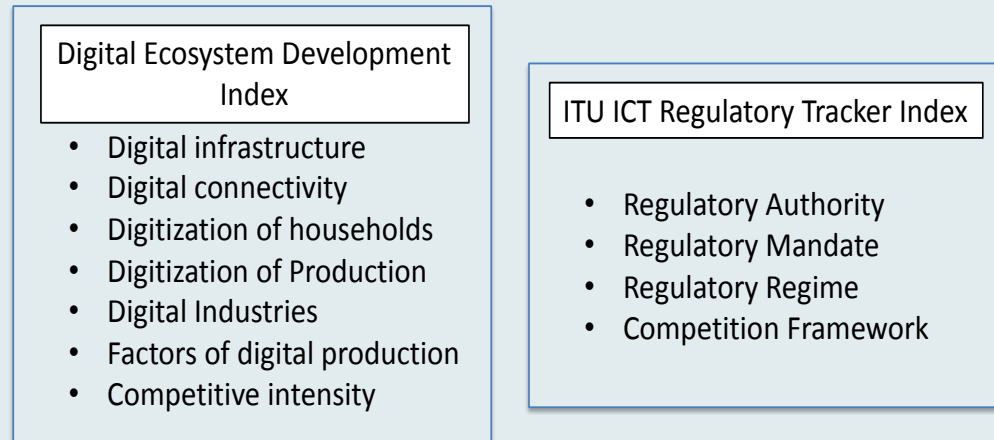
Source: Katz and Callorda (2018)

## Impact on GDP of 10% increase in digitization



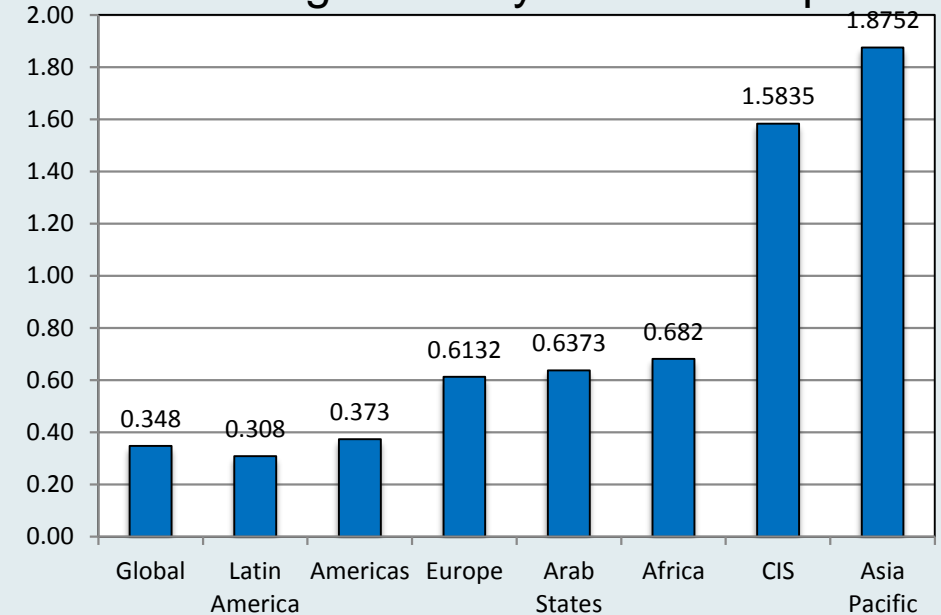
Source: ITU, 2014-2015

# GLOBAL STUDY RESULTS: THE DEVELOPMENT OF DIGITIZATION IS PARTLY DRIVEN BY INSTITUTIONAL AND REGULATORY FACTORS



$$\text{Log (Digital Index}_{it}) = B_1 \text{Log (Digital Index}_{it-1}) + B_2 \text{Log (Regulatory Index}_{it-1}) + \text{Year} + \text{Country FE} + \epsilon_{it}$$

Impact of the 10% of the Lagged ITU ICT Regulatory Tracker on the Digital Ecosystem Development Index



Source: ITU

## Why does regulation and policy impact digitization development?

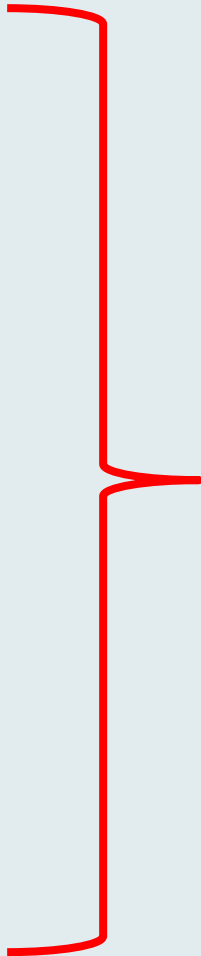
- Changes of a policy and/or institutional nature yield an acceleration in public ICT investment
- Institutional changes (centralization of decision making, policy coordination) yield a higher efficiency in the development of public policy initiatives
- The institutional change implies the “signalling” sent by the public sector to the private sector that ICT and digital development represent a cornerstone in the development of the country

# EUROPE STUDY RESULTS: IMPACT OF BROADBAND

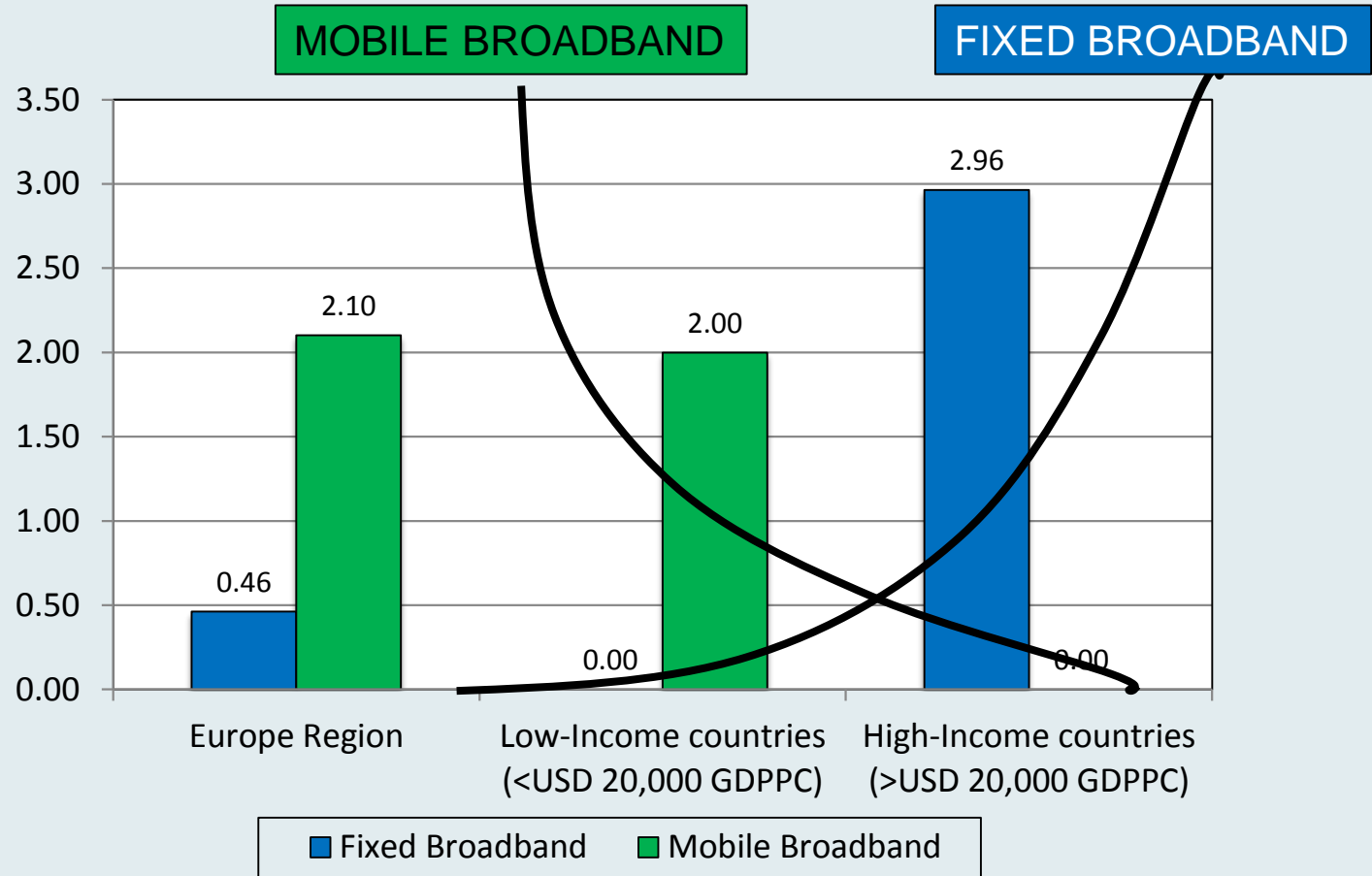
Mobile broadband generates higher economic contribution than fixed broadband

The impact of fixed broadband increases with economic development

Developing countries benefit more from mobile broadband than industrialized countries



GDP Growth Impact of an increase in 10% of broadband penetration

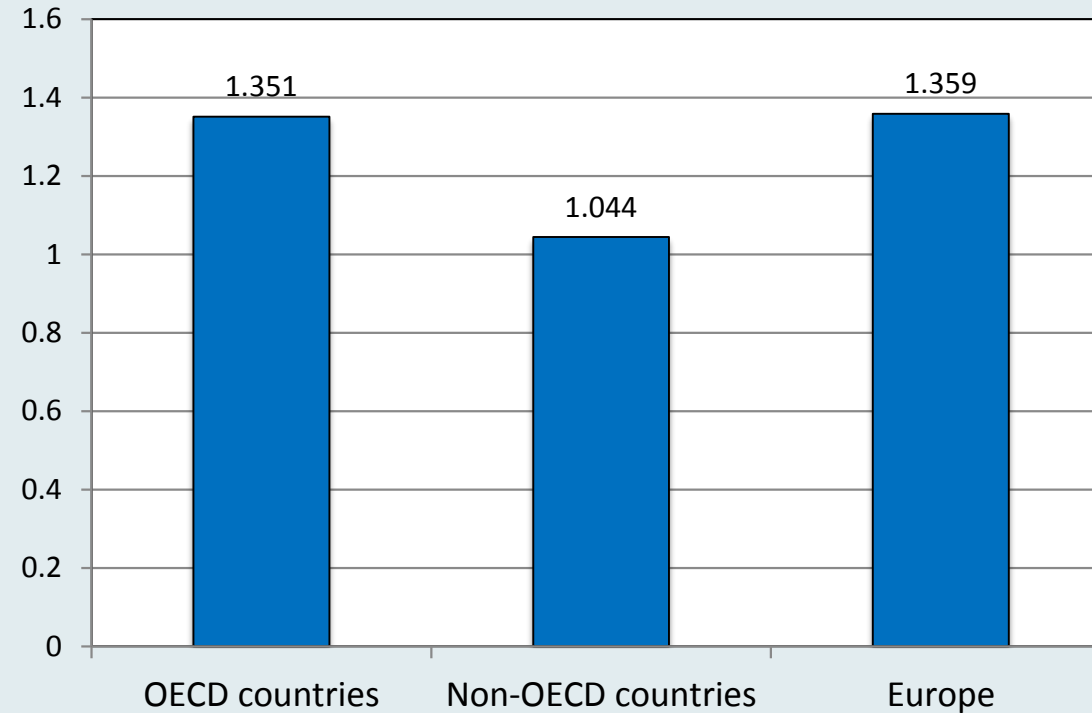


Source: ITU



# EUROPE STUDY RESULTS: THE ECONOMIC CONTRIBUTION OF DIGITIZATION IN EUROPE REGION IS SIMILAR TO THE ONE AT OECD COUNTRIES

## Impact on GDP of 10% increase in digitization



*Source: ITU, 2014-2015*

## EUROPE STUDY RESULTS CONFIRM EVIDENCE FROM GLOBAL STUDY

### Econometric modelling Results: Global vs. Europe Region

Hyptheses	Coefficient of 10% increase impact in penetration on GDP per capita growth					
	Aggregate Europe region	High-income Europe region	Low-income Europe region	ITU global study	ITU global study – High income countries	ITU global study – Low-income countries
Economic impact of fixed broadband in high-income countries in the ITU Europe region is higher than the impact estimated for low-income countries (return-to-scale effect)	0.4	2.9	0.07 (not significant)	0.8	1.4	0.5 (not significant)
Economic impact of mobile broadband in low-income countries in the ITU Europe region is higher than high income countries (saturation effect)	2.1	-0.2 (not significant)	2.0	1.5	-0.2 (not significant)	2.0
Economic impact of digitization in the ITU Europe region is as <del>Slightly higher than</del> <b>slightly higher than</b> that of OECD high-income countries (return-to-scale effect)	1.36			1.33	1.35 (OECD countries)	1.0 (non-OECD countries)

## POLICY AND REGULATORY IMPLICATIONS

**Developing countries should accelerate the development of mobile broadband**

**Industrialized nations should focus on the deployment of ICT to accelerate digitization of production**

**Countries should develop ICT policy making processes that integrate economic analysis and simplified institutional architecture**

- Encourage policies to facilitate infrastructure deployment in rural and isolated areas (infrastructure sharing, interconnectivity, and effective use of spectrum)
- Promote use of emerging technologies (e.g. Wi-Fi) for addressing the need of affordable digital infrastructure and services
- Implement incentives that are attractive to operators and stimulate collaboration between private sector firms within the digital ecosystem
- Implement public sector-sponsored initiatives to reduce the economic adoption barrier of vulnerable population
- Promote the development of local Internet content and languages
- Build digital skills of non-adopters in order to address the digital illiteracy barrier

## POLICY AND REGULATORY IMPLICATIONS

**Developing countries should accelerate the development of mobile broadband**

**Industrialized nations should focus on the deployment of ICT to accelerate digitization of production**

**Countries should develop ICT policy making processes that integrate economic analysis and simplified institutional architecture**

- Promote the development of commercial and investment cases that combine the benefits of telecommunication/ICT infrastructure with other enabling technologies (e.g. AI, AR/VR)
- Put in place regulatory sandboxes for enterprises wishing to test emerging technologies and use cases
- Stimulate the launch of 5G pilot projects to obtain feedback and support design of future spectrum allocations, while stimulating the adoption of new services
- Combine digital transformation of production with the assessment of digital skills requirements and the implementation of retraining efforts
- Keep flexibility on regulatory rules and procedures to allow innovation, so that new uses and technologies can be conceived, designed, tested and deployed
- Ensure predictability and regulatory certainty from long term policies to underline multi-year infrastructure deployment
- Migrate to competition models that, while protecting consumers, recognize that certain levels of industry concentration are required to ensure adequate returns

## POLICY AND REGULATORY IMPLICATIONS

**Developing countries should accelerate the development of mobile broadband**

**Industrialized nations should focus on the deployment of ICT to accelerate digitization of production**

**Countries should develop ICT policy making processes that integrate economic analysis and simplified institutional architecture**

- Policy makers and regulatory agencies should integrate economic impact analysis through close collaboration and partnership with academia and research institutions to generate evidence in support of the development of policies to accelerate the development of digitization
- Forward-looking ICT infrastructure development has to be supported by close collaboration between policy makers, regulators and private operators
- Policy making and regulatory processes should be based on principles of administrative simplification and speed
- Allow for intense public participation and consultation with civil society in the regulatory process, providing stakeholders with the most transparent

# THE ECONOMIC CONTRIBUTION OF BROADBAND, DIGITIZATION AND ICT REGULATION

**ITU** Committed to connecting the world  
 العربية 中文 Español Français Русский

What would you like to search for?

Home ITU General Secretariat Radiocommunication Standardization **Development** ITU Telecom Members' Zone Join ITU

About ITU-D Partners Projects TDAG WTDC Study Groups Regional Presence Join ITU-D

## The Economic Contribution of Broadband, Digitization and ICT Regulation

YOU ARE HERE HOME > ITU-D > ITU-D POLICY AND REGULATION > THE ECONOMIC CONTRIBUTION OF BROADBAND, DIGITIZATION AND ICT REGULATION

SHARE

**Useful ITU resources**

- The ICT Regulatory Tracker
- ITU ICTEye database
- Digital Economy and Markets
- Publications on Economics & Finance
- ITU-D Study Groups

Today's digital transformation is changing economies at warp speed and scale. The ITU series on "The economic contribution of broadband, digitization and ICT regulation" examines this revolution from a data and evidence-based perspective. It quantifies the positive impact of broadband, digital transformation, and the interplay of ICT regulation on national economies by applying econometric modelling techniques.

Importantly, this series developed in the framework of BDT Cluster 1 Policy and Regulation builds on several years of robust and reliable data resources to measure the impact of institutional and regulatory variables on the development of the digital ecosystem using top-tier data metrics on the digital ecosystem and the maturity of ICT regulatory frameworks, namely the Digital ecosystem development index and the ITU ICT regulatory tracker.

**The Global study and methodology**

The global study presents the methodology applied and the findings related to the evidence that broadband technologies and effective ICT regulation can have a positive impact on the growth of national economies and prosperity. The findings also provide a more refined picture of the effects of broadband on countries at a different stage of development. It further provides evidence of the importance of the regulatory and institutional variables in driving digital growth. [More.](#)

### ECONOMETRIC MODELLING FOR AFRICA



An increase of 10% in mobile broadband penetration in Africa would yield an increase in 2.5% in GDP per capita. An increase of 10% in the ITU ICT Regulatory Tracker yields a positive increase in the CAF Digital Ecosystem Development Index of 0.682%. [More.](#)

### ECONOMETRIC MODELLING FOR ARAB STATES



In terms of policy and regulatory framework an increase of 10% of digitization, in the CAF Digital Ecosystem Development Index, results in 2.49% growth in GDP per capita in the Arab States. [More.](#)

### ECONOMETRIC MODELLING FOR THE AMERICAS



The analysis suggests that an increase of 10% in fixed broadband penetration in the Americas would yield an increase in 1.9% in GDP per capita. An increase of 10% in the CAF Digital Ecosystem Development Index results in a 1.9% growth in GDP per capita. [More.](#)

### ECONOMETRIC MODELLING FOR ASIA AND PACIFIC



The impact of policy and regulatory frameworks was noted, an increase of 10% in the ITU ICT Regulatory Tracker yields a positive increase in the CAF Digital Ecosystem Development Index of 1.875% in the Asia-Pacific countries. [More.](#)

### ECONOMETRIC MODELLING FOR CIS



In the CIS region, an increase of 10% in the ITU ICT Regulatory Tracker yields a positive increase in the CAF Digital Ecosystem Development Index of 1.58%. An increase of 10% in fixed broadband penetration would yield an increase in 0.63% in GDP per capita. [More.](#)

### ECONOMETRIC MODELLING FOR EUROPE



The impact of policy and regulatory frameworks on the development of digitization in Europe is positive, an increase of 10% in digitization (CAF digital Ecosystem Development Index) results in 1.4% growth in GDP per capita. [More.](#)



For further information please contact:

ITU Regulatory and Market Environment Division  
[treg@itu.int](mailto:treg@itu.int)

Raul Katz, Telecom Advisory Services LLC  
[raul.katz@teleadv.com](mailto:raul.katz@teleadv.com)