

The Impact of Policy on the Performance of the ICT sector

Dr. Raúl L. Katz
Adjunct Professor, Division of Finance
and Economics

Director, Business Strategy Research
Columbia Institute of Tele-information

*Broadband as a Video Platform:
Strategies for Africa*

*Lusaka, Zambia
May 22, 2012*

This presentation examines how government policy may encourage or constrain the realization of ICT full potential

- What is the impact of the policy framework on ICT diffusion/adoption?
- How do models of regulation and public policy in the ICT sector condition specific sector performance?
- Which of those policies and frameworks are consistently associated with above par sector performance?
- Why are some countries more effective than others in implementing policy tools?
- What are the regulatory and policy issues influencing ICT outcomes in mature and emerging markets?
- What explains the trends in the evolution of policy?

Is there any link between policy and ICT sector performance?

Policy initiatives

- Competition policy
- Regulatory independence
- Demand side policies



Sector performance

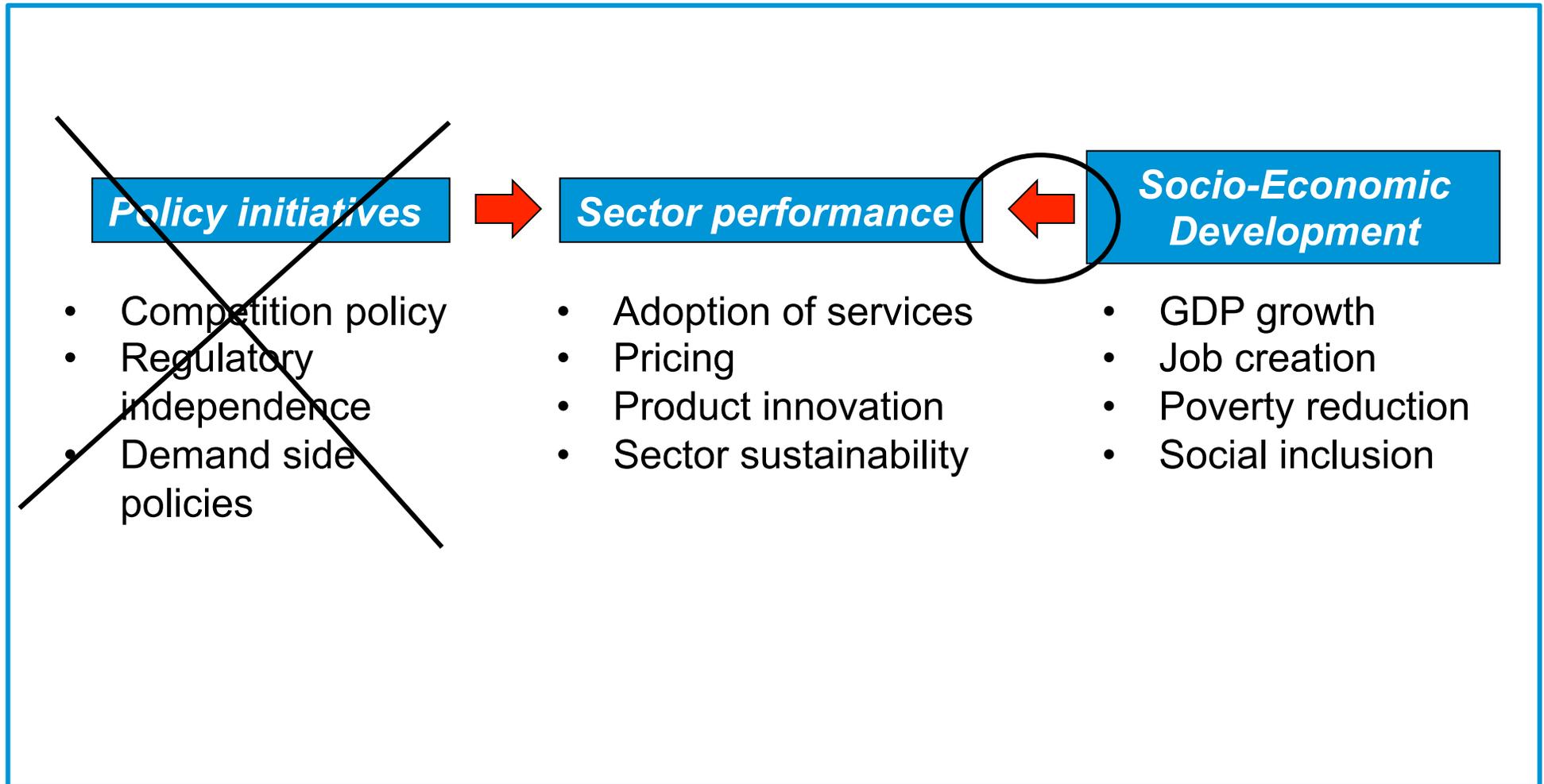
- Adoption of services
- Pricing
- Product innovation
- Sector sustainability



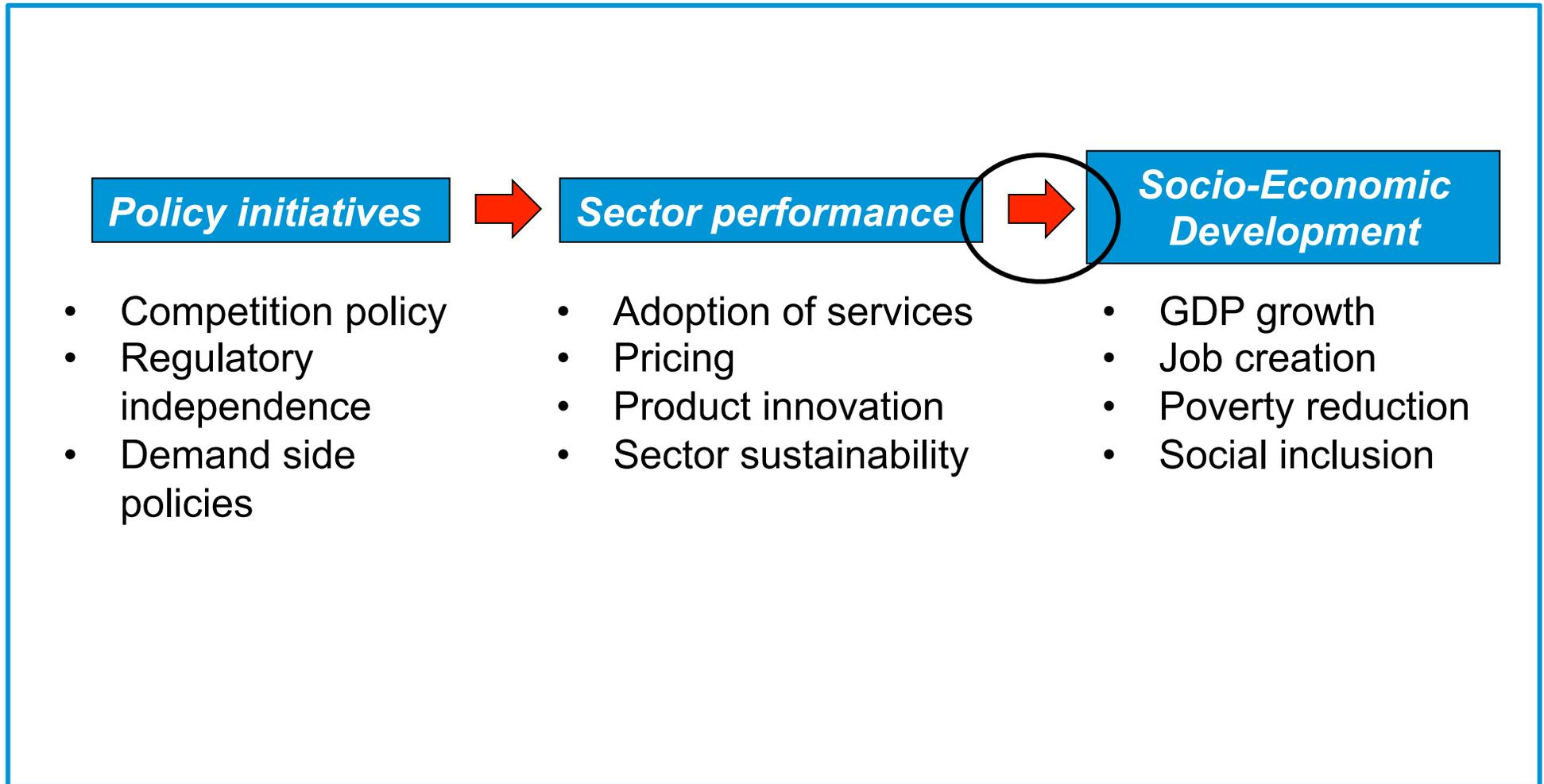
Socio-Economic Development

- GDP growth
- Job creation
- Poverty reduction
- Social inclusion

Or, alternatively, should we consider a reverse causality paradigm?

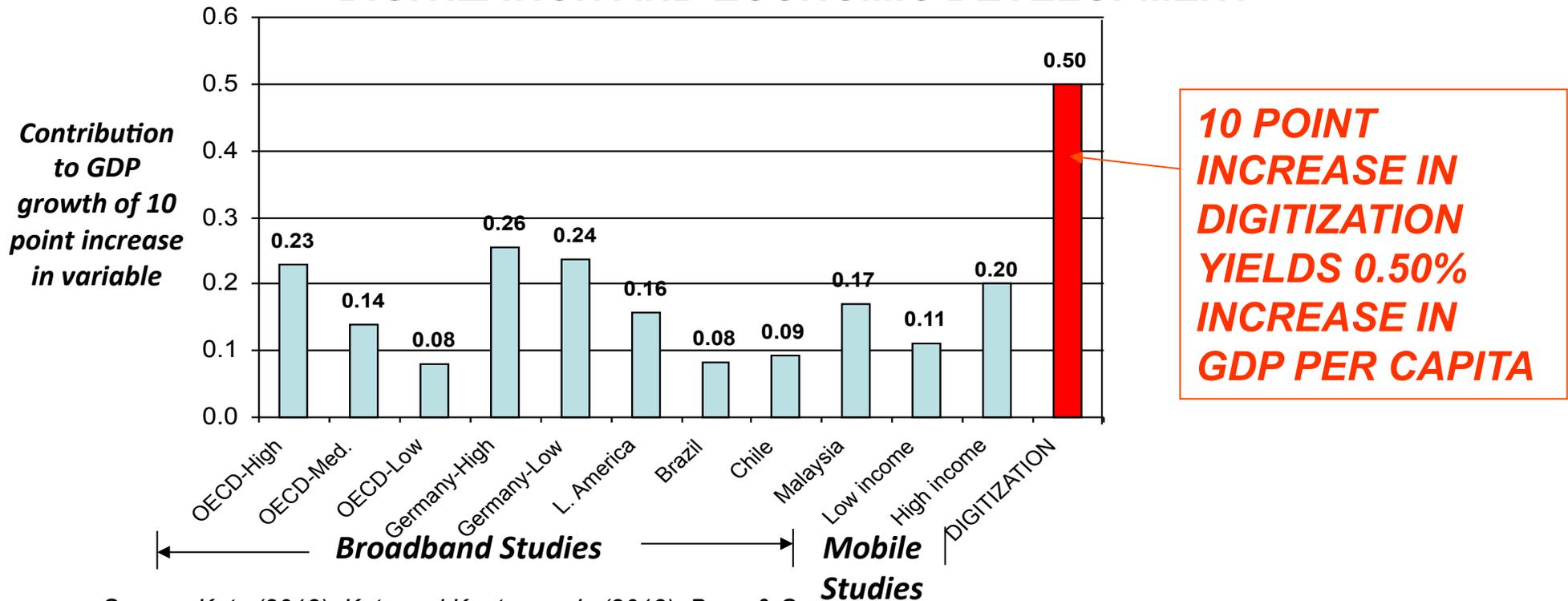


We have sufficient evidence to conclude that sector performance yields economic gains



Several studies point to the contribution of ICT to economic development

DIGITIZATION AND ECONOMIC DEVELOPMENT



10 POINT INCREASE IN DIGITIZATION YIELDS 0.50% INCREASE IN GDP PER CAPITA

- Digitization: full economic impact ICT is achieved through the cumulative adoption of all technologies, in addition to the assimilation and usage in the production and social fabric
- Broadband penetration is only one aspect of required policies; maximization of economic impact can only be achieved through a holistic set of policies ranging from telecoms to computing to adoption of internet and eCommerce

Sources: Katz (2012); The Impact of Broadband on the Economy: Research to date and Policy Issues. Geneva: International Telecommunication Union; Katz et al. (2012). Maximizing the Impact of Digitization, in Dutta, s. and Bilbao-Osorio, B. The Global Information Technology Report. World Economic Forum.

A recently completed study to assess the economic impact of wireless in Senegal confirms this finding

STRUCTURAL MODEL

Aggregate Production function:

$$GDP_{it} = a_1 K_{it} + a_2 L_{it} + a_3 Mob_Pen_{it} + \varepsilon_{1it} \quad (1)$$

Demand function:

$$Mob_Pen_{it} = b_1 MobPr_{it} + b_2 GDPC_{it} + b_3 HHI_{it} + \varepsilon_{2it} \quad (2)$$

Supply function:

$$Mob_Rev_{it} = c_1 MobPr_{it} + c_2 GDPC_{it} + c_3 HHI_{it} + \varepsilon_{3it} \quad (3)$$

Output function:

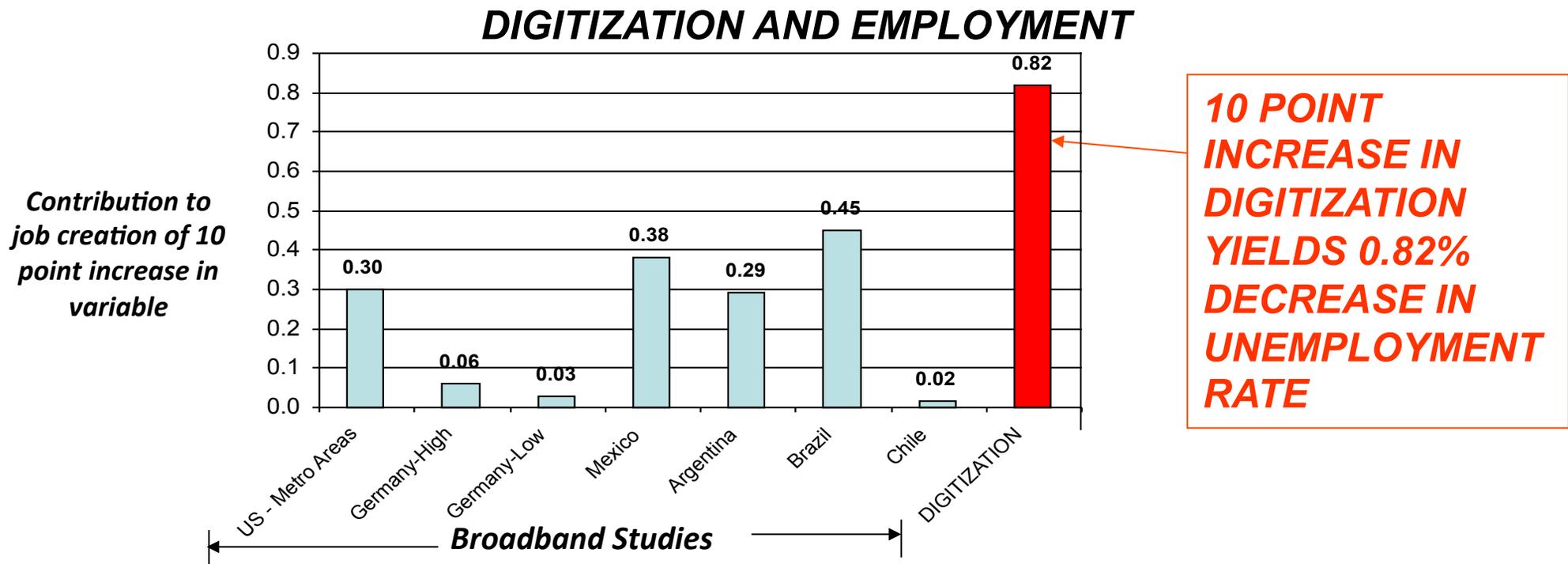
$$\Delta Mob_Pen_{it} = d_1 Mob_Rev_{it} + \varepsilon_{4it} \quad (4)$$

Source: Katz and Koutroumpis (2012)

| Variables | Mobile Model |
|--|--------------|
| Growth (GDP_{it}) | |
| Labour force (L _{it}) | 0.416*** |
| Fixed Capital Stock (K _{it}) | 0.615*** |
| Mob Penetration (Mob_Pen _{it}) | 0.044* |
| Constant | - |
| Demand (Mob_Pen_{it}) | |
| GDPC (GDPC _{it}) | 0.165 |
| Mob. Price (MobPr _{it}) | -5.238*** |
| Market Conc (HHI _{it}) | -3.590*** |
| Constant | 10.588*** |
| Supply (Mob_Rev_{it}) | |
| Mob Price (MobPr _{it}) | -3.122*** |
| GDPC (GDPC _{it}) | 0.929*** |
| Market Conc (HHI _{it}) | 0.123 |
| Constant | -3.360*** |
| Output (ΔMob_Pen_{it}) | |
| Mob Revenue (Mob_Rev _{it}) | 0.867*** |
| Constant | 7.150*** |
| Year Effects | YES |
| Quarter Effects | YES |
| R ² | (1) |
| Growth | 0.99 |
| Demand | 0.98 |
| Supply | 0.98 |
| Output | 0.30 |

Wireless has significantly affected the Senegalese economy between 2003 and 2010). The annualized average contribution to the Gross Domestic Product has been estimated to be equal to 0.044% growth of GDP for every 1% increase of Mobile penetration

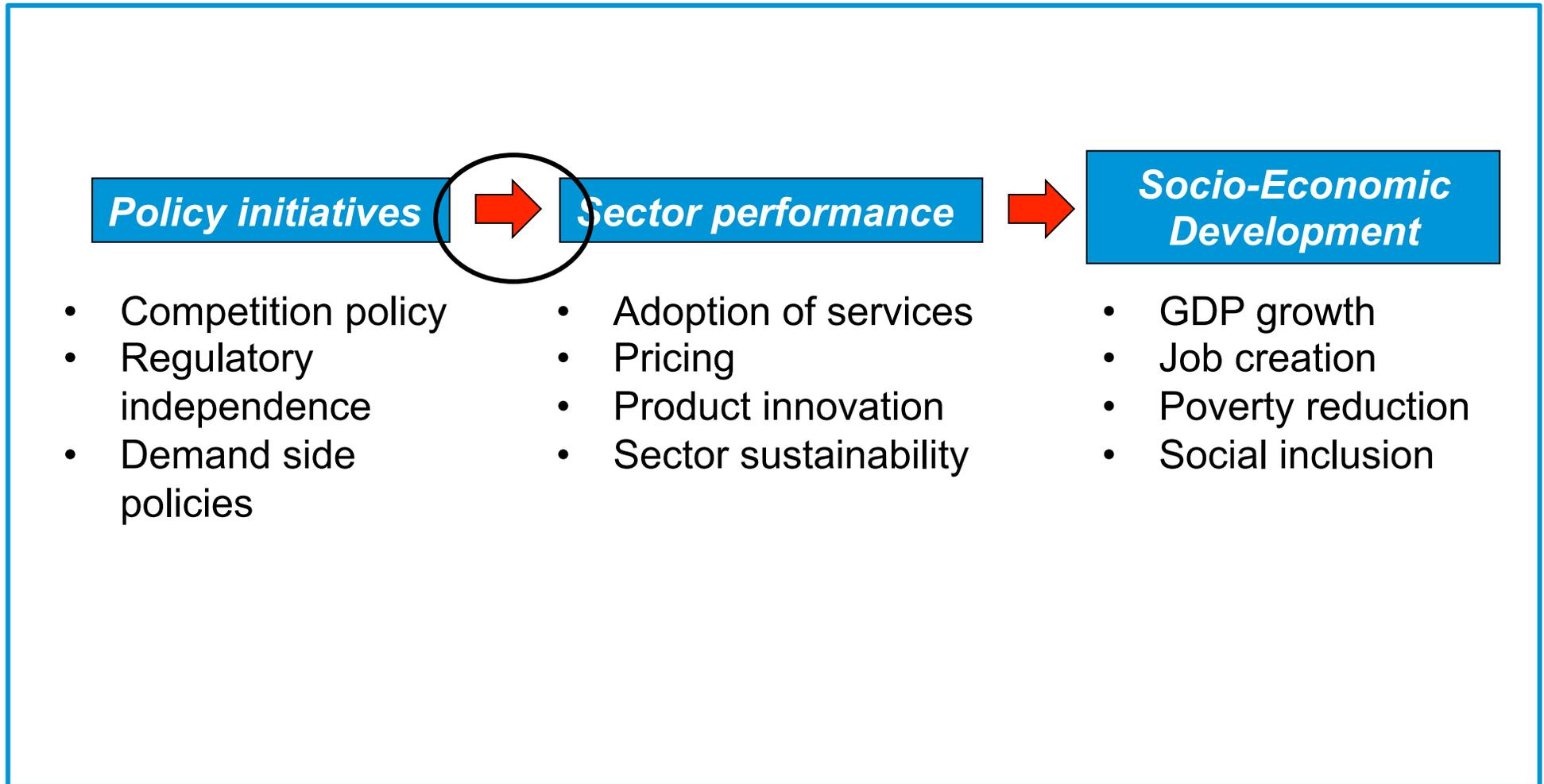
As in the case of GDP growth, Digitization has a higher impact on job creation than broadband



- Full deployment and assimilation of ICT has a much larger impact on employment because it contributes to more jobs in the ICT sector (software development, Business Process Outsourcing, equipment manufacturing and parts supplies)
- In addition, the impact of assimilation of ICT through enhanced usage has spill-over impact on other sectors of the economy (in particular, trade, financial services, health care)

Sources: Katz (2012); The Impact of Broadband on the Economy: Research to date and Policy Issues. Geneva: International Telecommunication Union; Sabbagh et al. (2012). Maximizing the Impact of Digitization, in Dutta, S. and Bilbao-Osorio, B. The Global Information Technology Report. World Economic Forum.

How about the policy impact on ICT sector performance?



ICT sector performance index was developed based on multiple indicators

EXAMPLES

Adoption

- Service adoption
- Prices

+

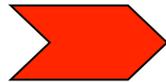
Innovation

- Product variety
- Feature functionality
- Service quality

+

Economic

- Output and profits
- Investment



- Broadband and wireless penetration
- Broadband prices (advertised and effective)
- Wireless prices (service revenue per minute)



- Percent of mobile ARPU derived from data services
- Quality of service metrics
 - Mobile: dropped calls, service coverage
 - Wireline: ASA in care calls, mean time to repair



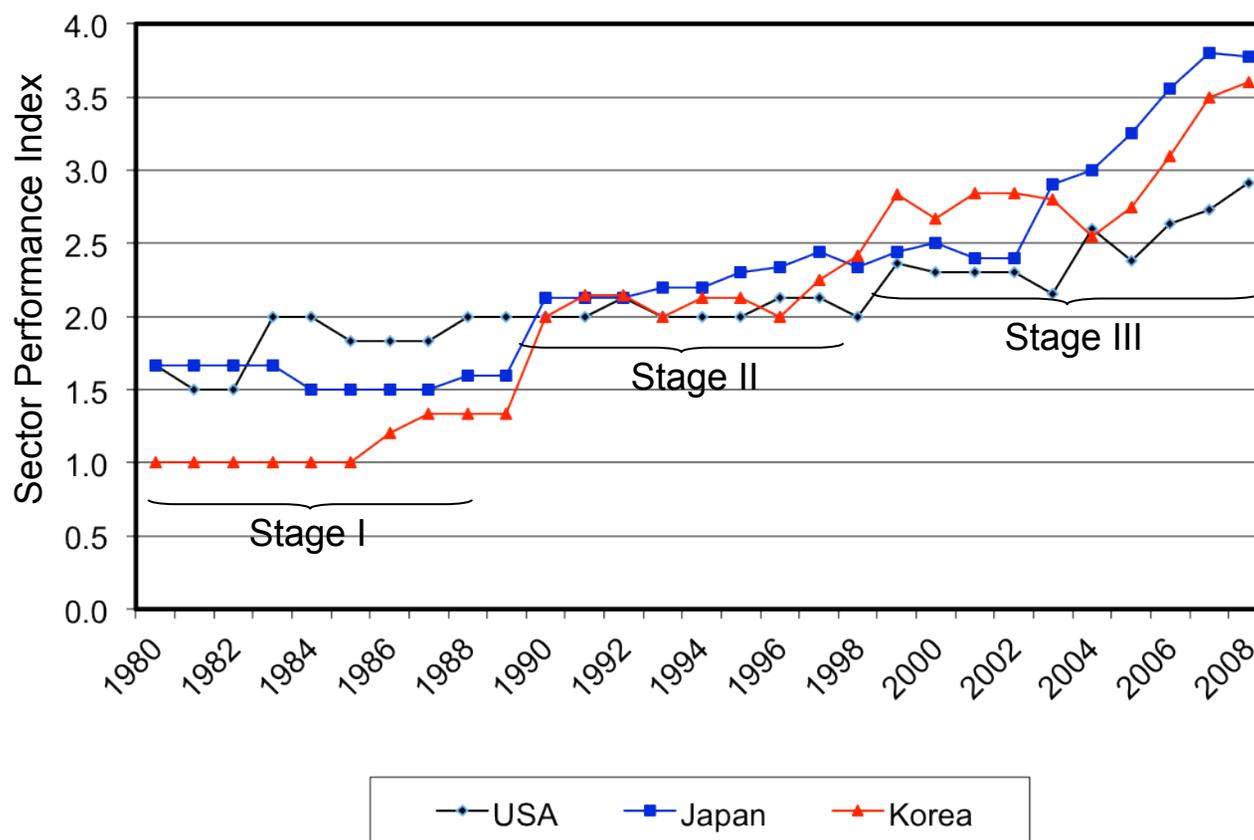
- Average Wireless Sector EBITDA
- Incumbent investment in broadband and NGNA
- Entrants' investment in broadband and NGNA
- Mobile carriers capital investment

We used the index to examine the sector performance of fifty-two countries in the past thirty years

- How have Korea and Japan performed relative to other industrialized countries? What policy and regulatory variables explain their different relative performance?
- Is there a consistent performance improvement trend among Western European countries? If not, what explains divergent paths among them?
- How has the telecom sector of selected Eastern European countries (Estonia, Slovak Republic) performed relative to Western Europe? What explains changes in sector performance?
- Are the “BRICs” behaving homogeneously? Is there a consistent or a divergent development path? Are policies affecting performance?
- What is the path toward enhanced sector performance of emerging countries like? Is there a consistent development path? What are the consistent patterns?

First observation: The ICT sectors of Japan and Korea have passed by the US after 1998

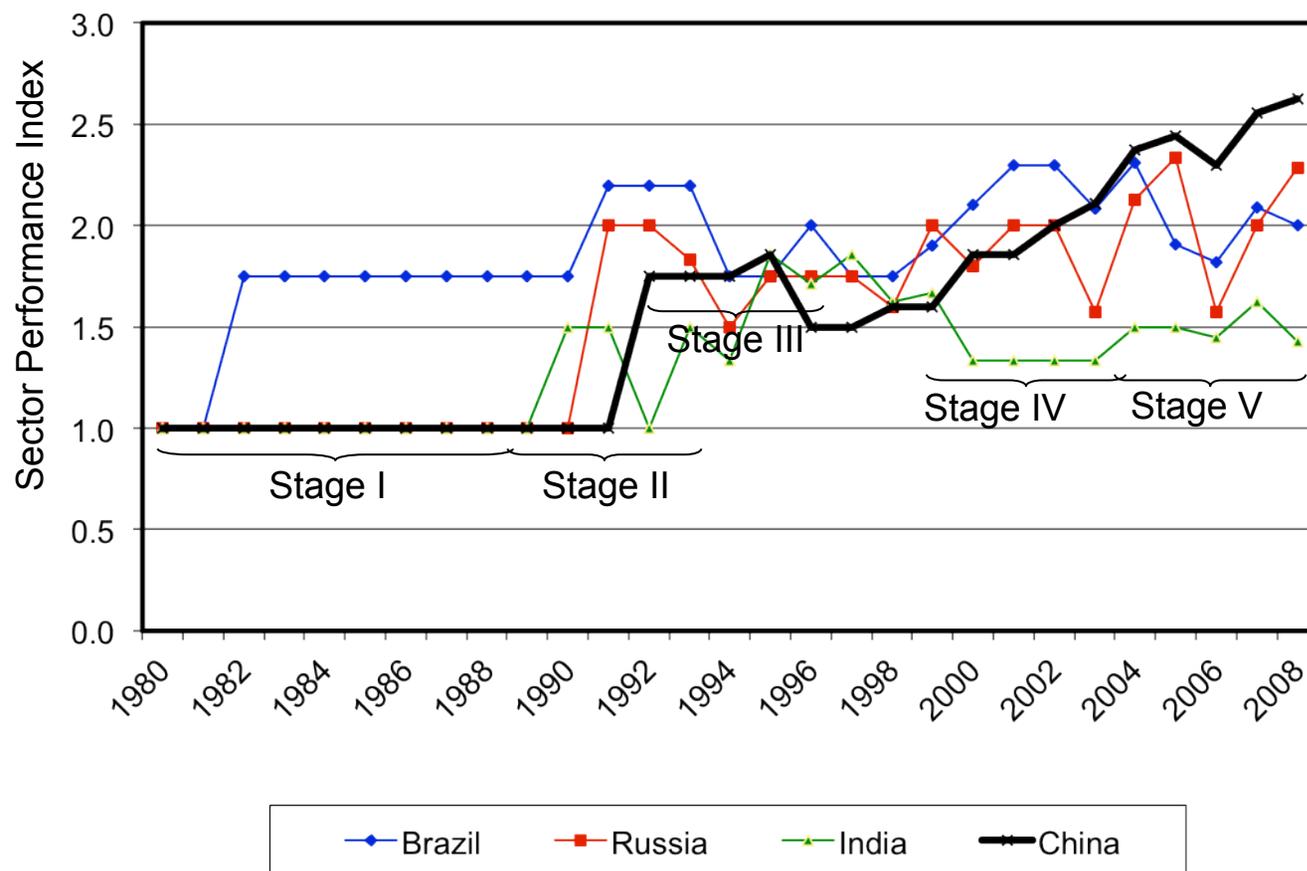
EVOLUTION OF SECTOR PERFORMANCE: US, JAPAN, KOREA (1980-2008)



Source: Katz (2011). *Policy and Development of ICT*, in Van Ark, B. *The Linked World: How ICT is transforming societies, economies and culture*. New York: The Conference Board

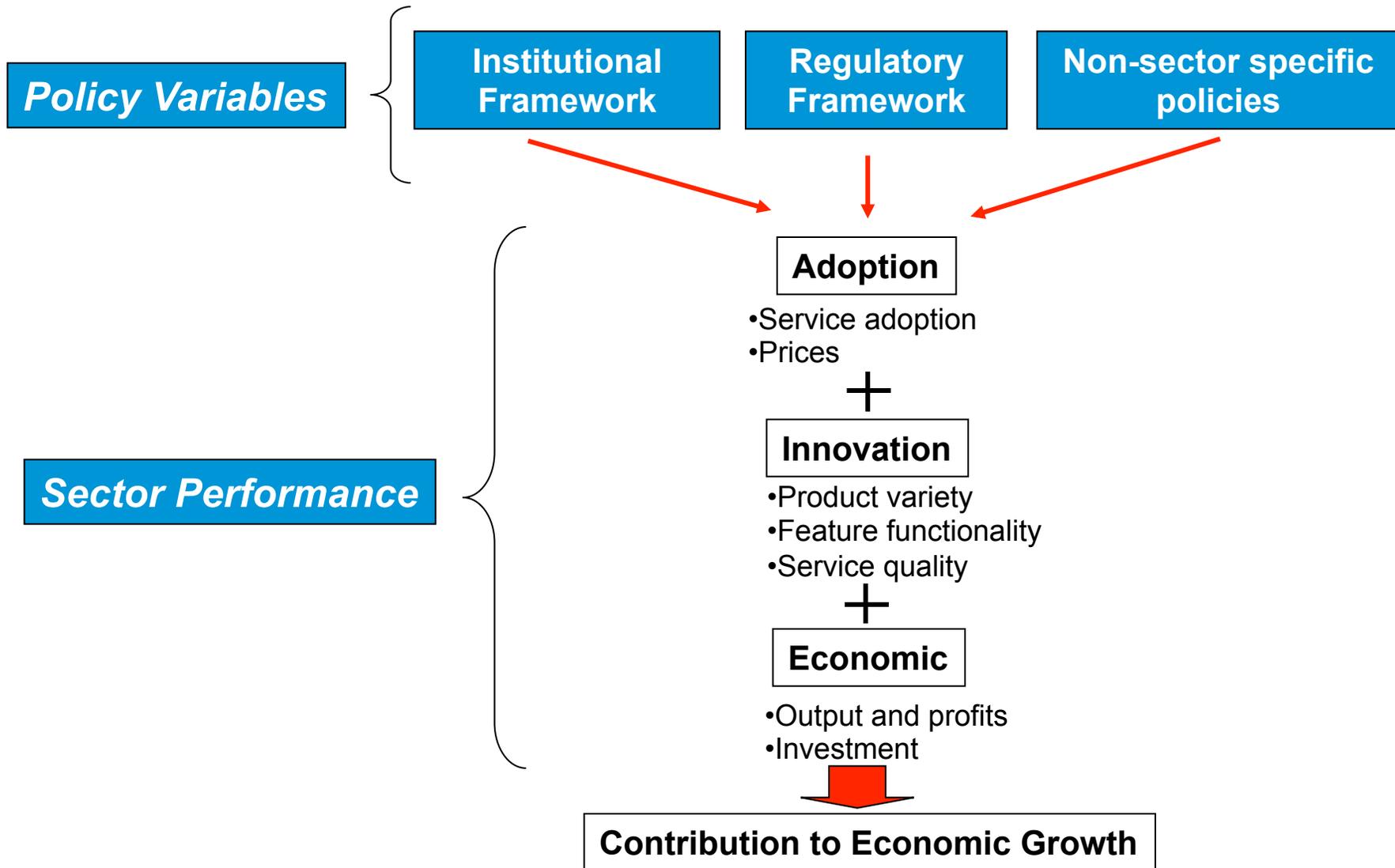
Second observation: China has bypassed the other “BRICs” around 2004

**EVOLUTION OF SECTOR PERFORMANCE: CHINA VS. BRICS
(1980-2008)**



Source: Katz (2011). *Policy and Development of ICT*, in Van Ark, B. *The Linked World: How ICT is transforming societies, economies and culture*. New York: The Conference Board

We then attempted to link these changes to three sets of policy variables



Each policy variable comprises multiple indicators

EXAMPLES

Institutional Framework

- Overall institutional environment (scope and scale of NRA, enforcement powers, dispute settlement, effectiveness of appeals)
- Separation between incumbent and regulatory activities
- Regulatory independence (autonomy, accountability, clarity of roles, transparency of process)
- Existence of an overarching law
- Privatization of incumbent

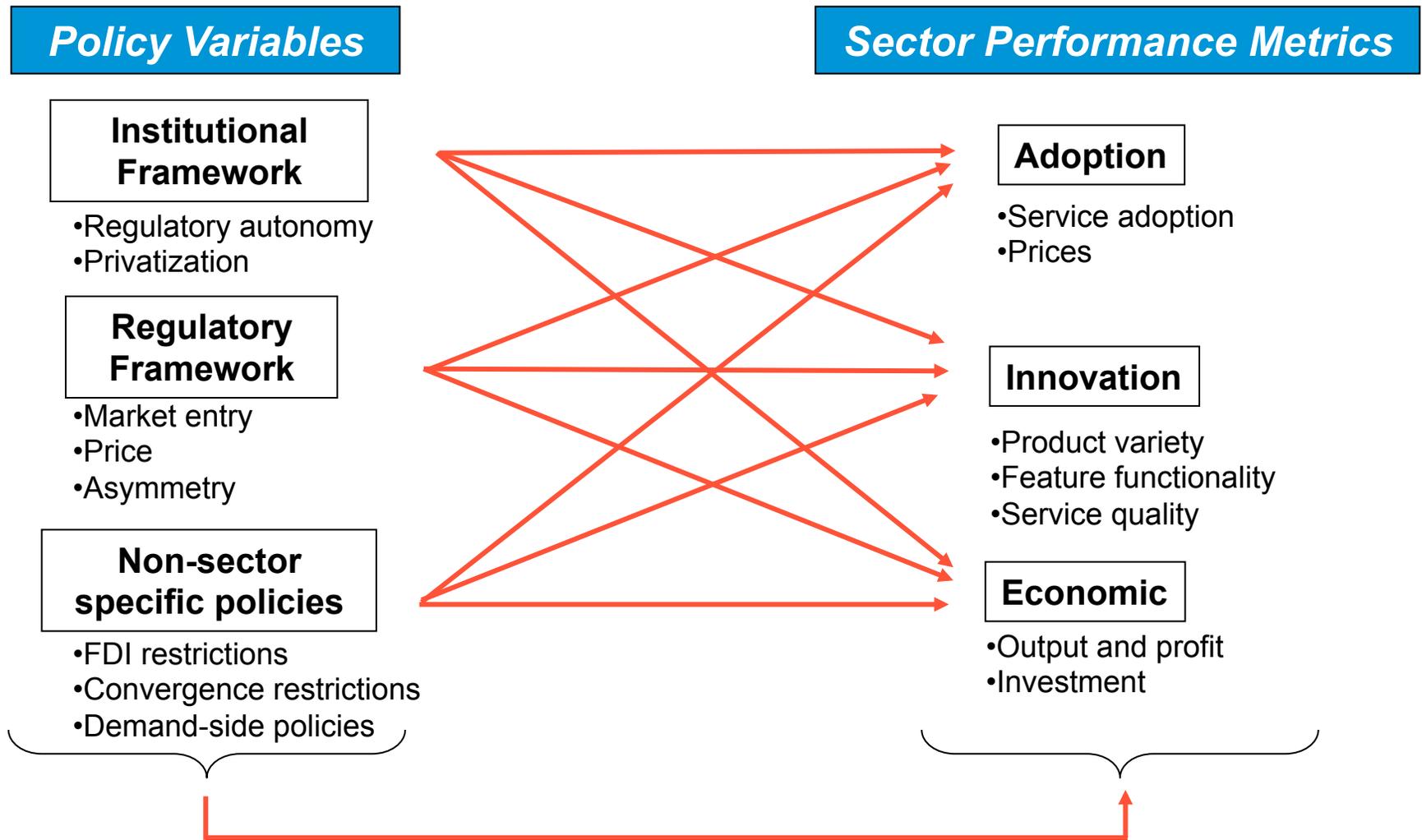
Regulatory Framework

- Market entry regulation (vertical separation, LLU, rights of way, numbering scheme, spectrum management)
- Price regulation (interconnection, mobile termination rates, WACC, retail pricing)
- Investment incentive regulation (asymmetry)
- The NRA's regulatory process (market analysis ex-ante)
- Application of regulation by the NRA (technological neutrality, operational conditions, compliance monitoring)

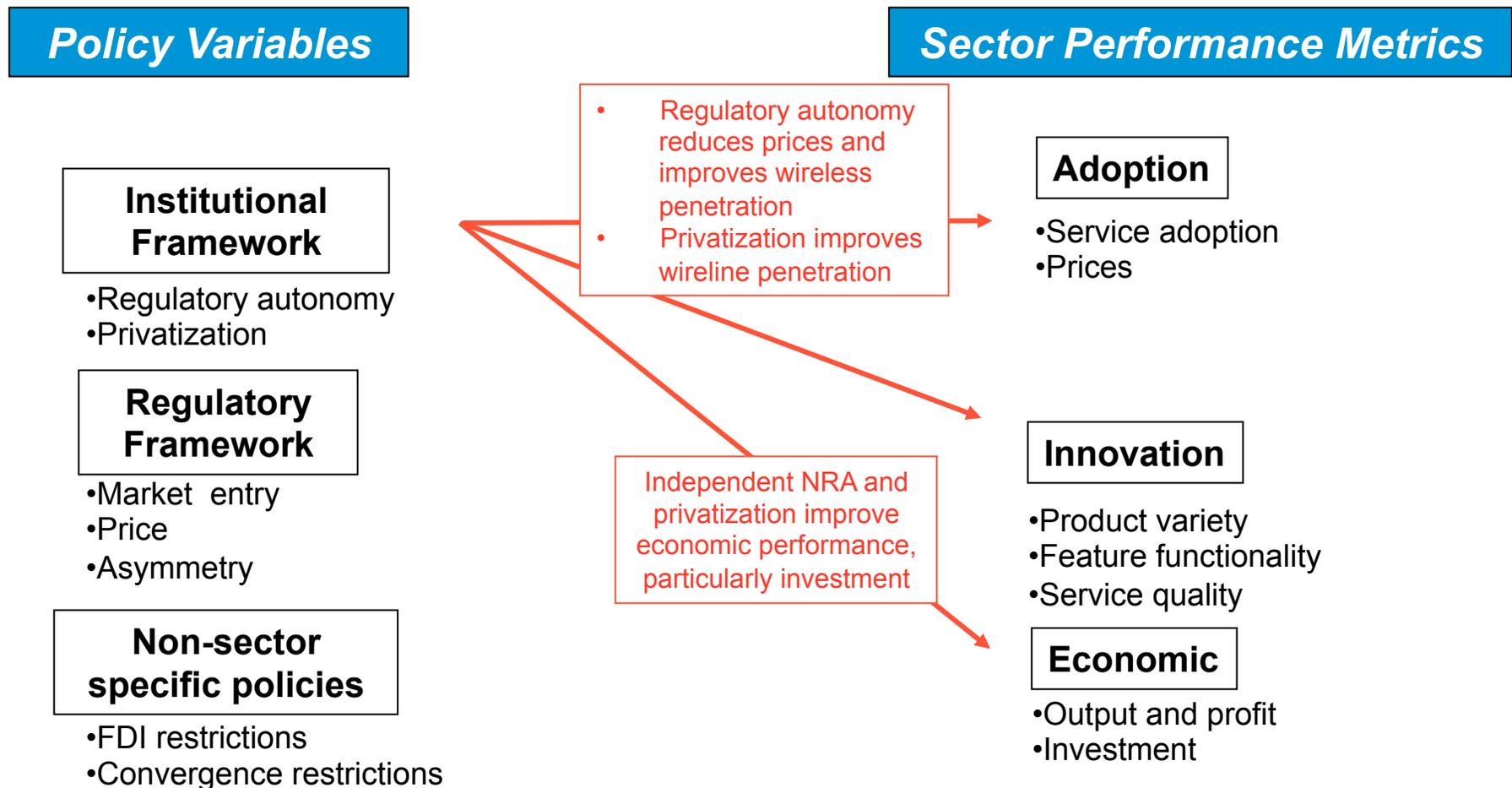
Non-sector specific policies

- Direct foreign investment restrictions affecting market entry and capital structure
- Other trade restrictions affecting services supply
- Regulation of audiovisual content affecting convergence

There is a whole range of causal links between policy variables and sector performance



Some of them have been studied before (I): the impact of the institutional framework on service adoption and economic performance



Some have been studied before (II): the impact of the regulatory framework on economic performance and service adoption

Policy Variables

Institutional Framework

- Regulatory autonomy
- Privatization

Regulatory Framework

- Market entry
- Price
- Asymmetry

Non-sector specific policies

- FDI restrictions
- Convergence restrictions

Sector Performance Metrics

Adoption

- Service adoption
- Prices

Innovation

- Product variety
- Feature functionality
- Service quality

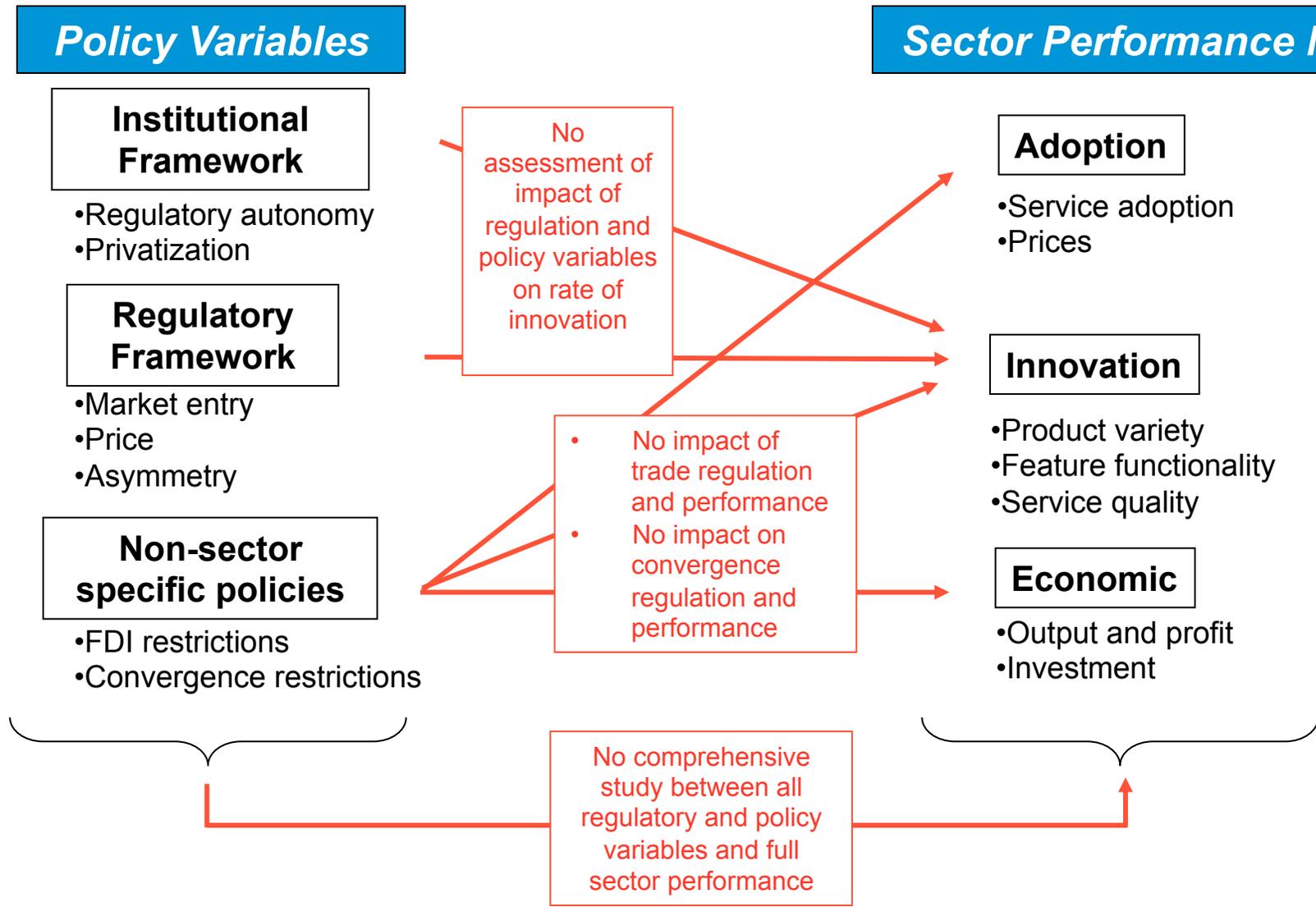
Economic

- Output and profit
- Investment

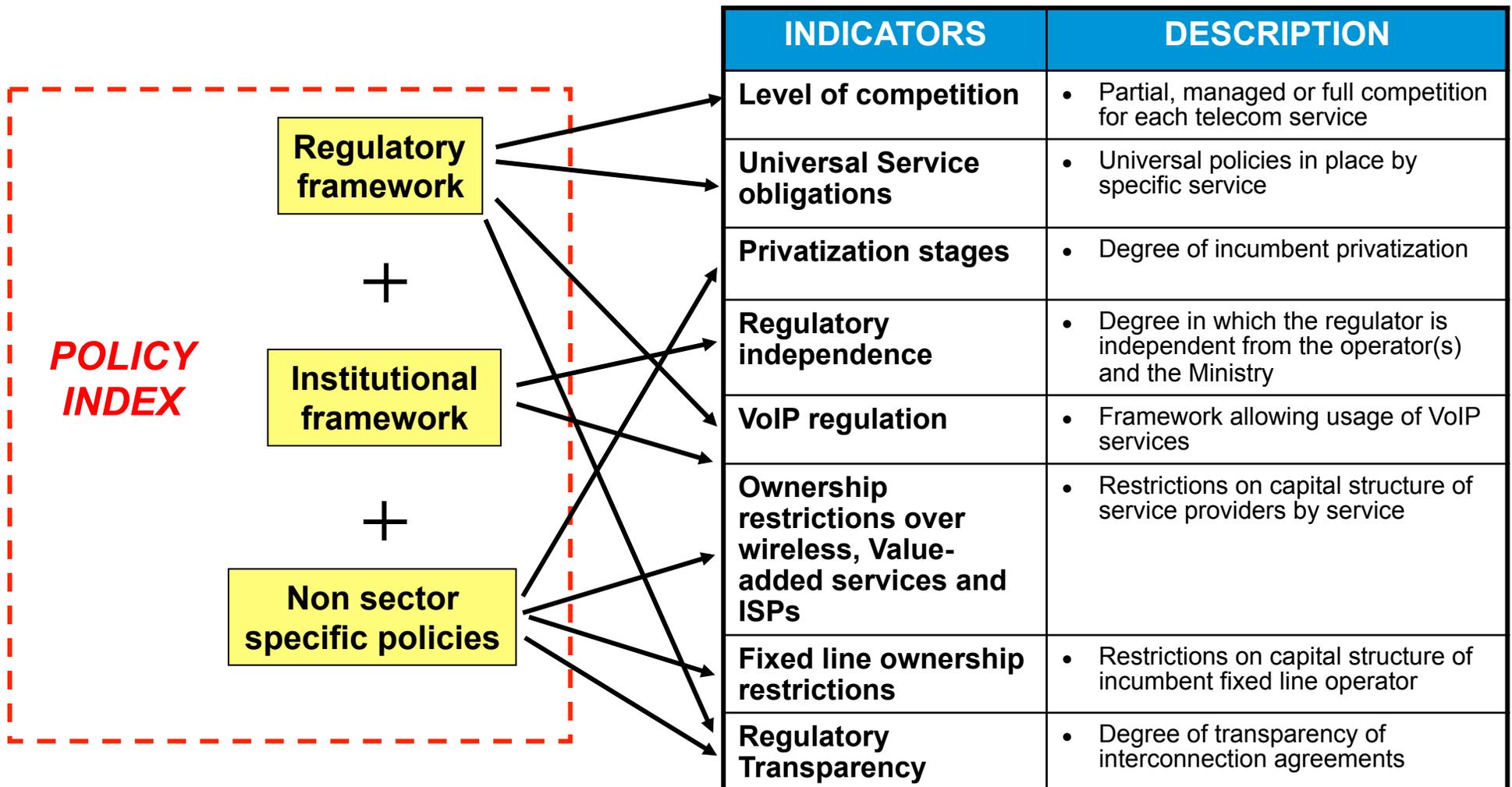
- Competition increases wireless penetration
- Number portability increases prices in wireless and wireline
- Platform competition drives broadband uptake

- Competition impacts wireline and wireless deployment
- Access regulation discourages investment

However, the impact of policy on innovation as well as the holistic impact of policy on sector performance has not been yet analyzed

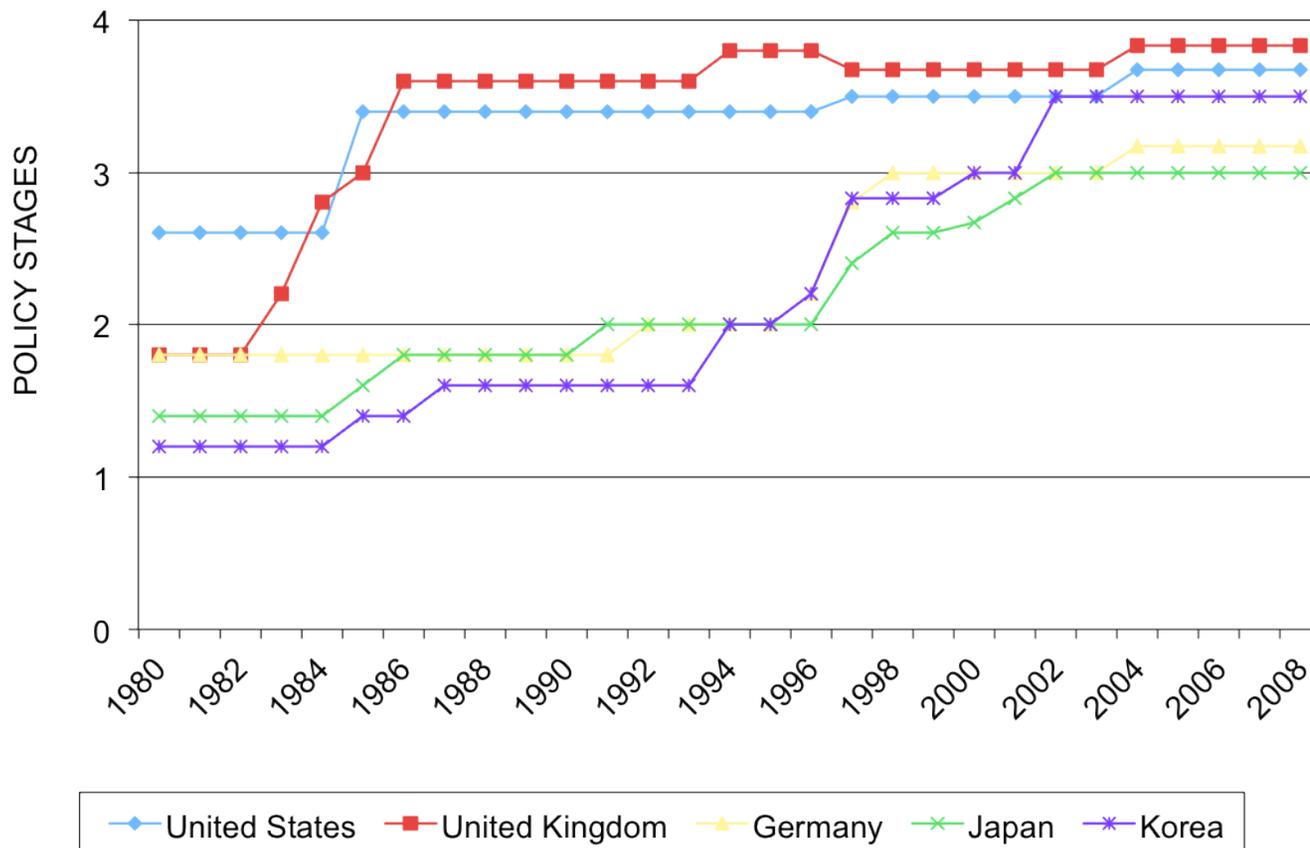


To assess the development of the policy environment, nine indicators were compiled to build a policy index



Observation 1: Policy evolution path followed by countries appear to be guided by distinct patterns

**POLICY EVOLUTION
(1980-2008)**

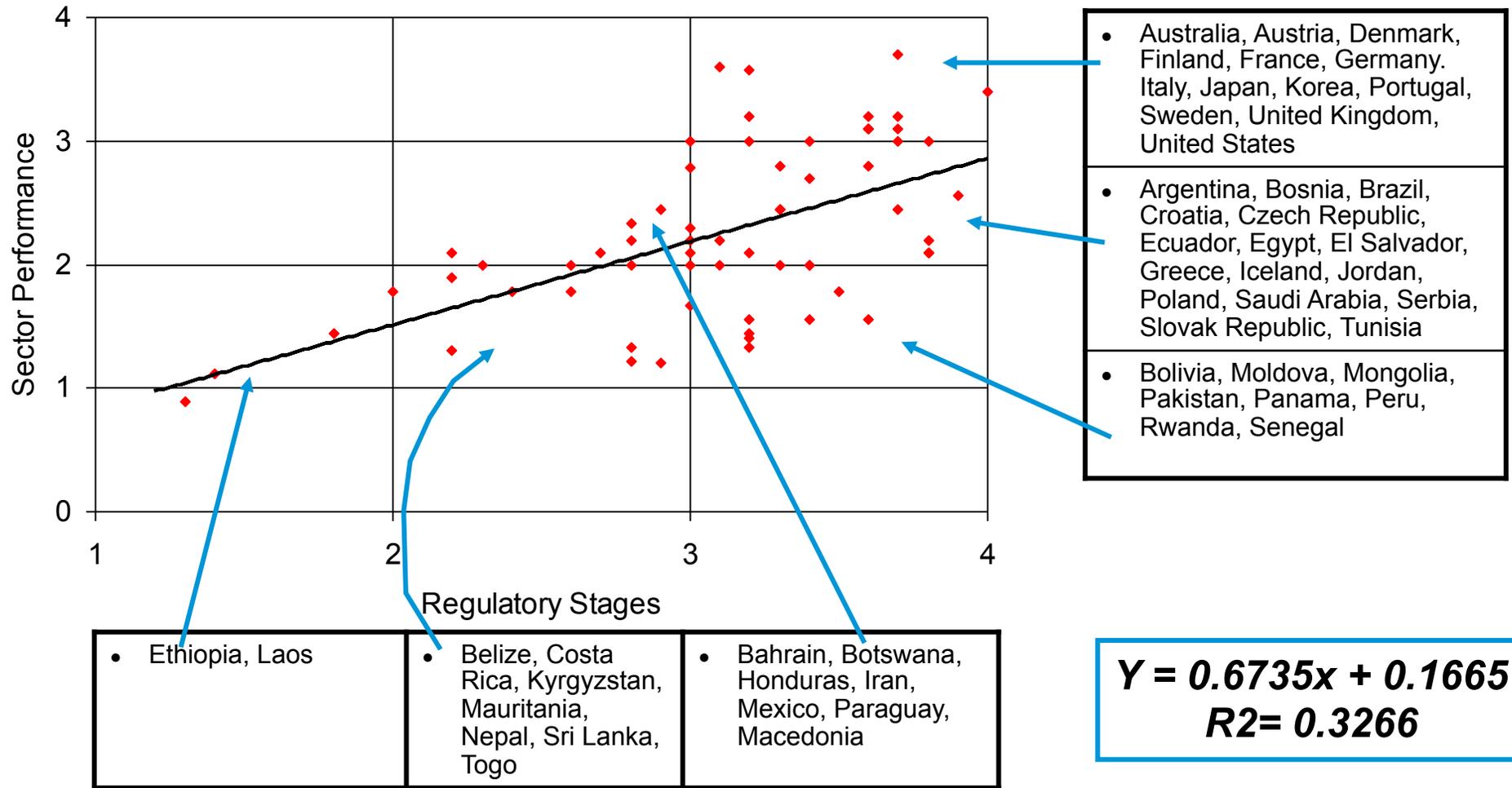


Policy Paths

- **The Anglo-Saxon path:** early liberalization and privatization
 - Privatize incumbent early
 - Open markets to competition early
 - Employ competitive safeguards
- **Gradual liberalization path:**
 - Policy mix of liberalization and protection of incumbent
 - Step-by-step adoption of deregulation
 - Gradual privatization

Observation 2: A direct relationship between policy stages and sector performance exists, when controlling for economic development

REGULATORY STAGES AND PERFORMANCE LEVELS (2008)



$$Y = 0.6735x + 0.1665$$

$$R^2 = 0.3266$$

Source: Katz (2011). Policy and Development of ICT, in Van Ark, B. The Linked World: How ICT is transforming societies, economies and culture. New York: The Conference Board

The statistical analysis was complemented with eight case studies to identify institutional variables and best practices

- **An emerging market “catch up” strategy:** how in 15 years, **China** advanced from a laggard among emerging countries to the top performer in its peer group (BRICs) and the emerging country universe
- **The impact of platform-based competition and industrial policy mix:** an assessment of **Korea**’s ICT development strategy
- **A demand-focused broadband strategy:** how **Estonia** has been able to catch-up with the rest of Western European countries by focus on demand promotion policies
- **Pursuing broadband universal service through government funding and platform-based competition:** how has **Sweden** been almost continuously ahead of the rest of Western Europe regarding performance of the telecom sector?
- **Is full liberalization yielding a step function improvement in sector performance?** The **Brazilian** case
- **The combined impact of foreign investment restrictions and low regulatory transparency/ independence:** the case of **Mexico**
- **Is a return to state-owned wireline monopoly combined with low regulatory transparency/ independence yielding negative effects?** The case of **Venezuela**
- **Comparative impact of policy framework in deployment of FTTH/B:** an assessment of broadband platform-based competition in the **United States**
- **Government policy as a factor in the stimulus of wireless broadband:** the case of **Japan**

Conclusion 1: Government policy has a significant influence in driving the performance of the ICT sector

- The performance of the ICT sector is statistically linked to 1) the adoption of pro-competitive policies, 2) guaranteed by regulatory independence and 3) guided by an overarching vision for the ICT sector
- Countries with the highest level of performance of ICT sector exhibit a **common set of policy features**:
 - Competition in all telecommunications industry segments
 - Broadband universal service, driven by a fair allocation of contribution across industry players
 - Privatized telecommunications incumbent
 - VoIP allowed with regulation in place
 - No restrictions to foreign ownership
 - Pro-active National Plan to promote ICT industries (software, services, applications)
- Not all telecommunications competition models are equally powerful in stimulating investment and innovation
 - There appears to be an **optimal level of competitive intensity** beyond which, the incentive to invest and deploy wireless broadband services diminishes
 - That optimal level for deployment of wireless broadband is driven by a **certain amount of market concentration** and a moderate level of competitive intensity

Conclusion 2: Competition policy and regulation needs to be complemented with active government sector involvement

- **Proactive government planning that articulates an overarching target vision** is also a critical driver of sector performance
 - Korea: Starting in 1995, the government began preparing five year plans with objectives ranging from broadband universalization, to becoming a global IT leader
 - Japan: e-Japan Strategy (2001)
 - Sweden: “Information Society for All” bill, establishing, Broadband Support Program (2001-7). National Broadband Plan
 - Estonia: Principles of Estonian Information Policy (1998); Estonian Information Society Strategy 2013, (2006)
- In addition to ICT national planning, a related best practice has to do with **discipline in follow-up**
 - Korea: each plan is assessed in terms of its results at the end of the planning horizon and the results of the assessment are fed back in the formulation of the next iteration
 - China: Institutional centralization was reinforced with government sponsored planning. Senior leadership performance reviews are tied tangibly to achieving detailed annual planning targets specifying network capacity expansion, coverage, and penetration – and quality standards
- In some cases, governments extend their sector intervention by **actively shaping the industry structure** (Brazil, Korea, Japan)

Conclusion 3: Leading information societies implement several demand-side policies aimed at promoting ICT adoption

- **Aggregating demand from all government entities requiring broadband services** (e.g. administration, public schools, hospitals, etc.) and assigning them the primary role of anchor tenants that ensure that investment in broadband networks can rapidly achieve a breakeven point (Korea, Netherlands)
- **Development of e-government services:** for example, electronic submission of tax returns, an e-procurement service for SMEs selling goods and services to the government, platforms for tele-commuting, the development of platforms that allow the interaction between the government and enterprises for e-business transactions (Korea, Estonia, Colombia)
- Implementation of **digital literacy programs comprising subsidies for acquiring PCs, and online education programs** targeted to the elderly and disabled (Korea)
- Introduce **tax incentives designed to stimulate investment** by companies in ICT assets and software (Sweden, Japan)
- Encourage **SMEs to voluntarily implement IT** to reform business management and improve productivity by providing training, collecting and disseminating best practices and supporting collaboration with local communities (Japan)

Conclusion 4: Executive branch leadership and articulation of regulatory and industrial policies

- The development of a telecom sector and the **creation of an export-oriented IT services and software industries** are linked through industrial policies
 - Korea: common approach to ICT sector development, whereby incubation of an export-oriented industry is linked to funding adoption of its products in the domestic market
 - Japan: the MIC set up in 2007 the ICT International Competitiveness Enhancement Program aimed at promoting Japanese products and developing world markets through a collaboration of industry, academia and government.
 - Estonia: in order to develop a domestic technology cluster, the government is sponsoring the Competence Centre in Electronics-, Info- and Communication Technologies (ELIKO) in 2004
 - China: By consolidating the Ministry of Electronic Industries (MEI) into the new Ministry of Information Industries (MII), Chinese policy makers aimed at cultivating state-owned champions in the telecom equipment space
- **Executive Branch leadership** in the promotion and oversight of ICT policy appears to be linked to high performance sectors (Korea "ICT Czar"; Brazil National Broadband Plan is being developed by the Secretariat of Strategic Affairs of the President of the Republic and directly approved by the President; China: Strong leadership from the top has been a key feature in China's ICT sector development)

To conclude, best practices are key to maximize the policy impact on sector performance and its consequent economic contribution

