Impact of Broadband on the Economy
Brainstorming Broadband: Developing a Roadmap for India

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Impact of Broadband (Internet)

▶ Direct impact from Broadband associated with network construction

▶ General Purpose Technology characteristics of Broadband (Internet) help deliver indirect impact through network effects – innovations triggered by greater diffusion of broadband in the economy

▶ Governments recognized the potential of digital transformation with broadband as its backbone and announced economic stimulus packages (in the aftermath of the 2008 financial crisis) with substantial components for investment in broadband infrastructure

▶ Over 10 percent of the total stimulus package in Australia was dedicated to development of broadband infrastructure. Corresponding number in Finland was 5%, and for Japan, United States, Canada and Spain – all below 2%

▶ At about 30% density (including both narrowband/broadband and fixed/ wireless) internet is already changing the way we live – shared economy, communication, internet of things, big data, etc.
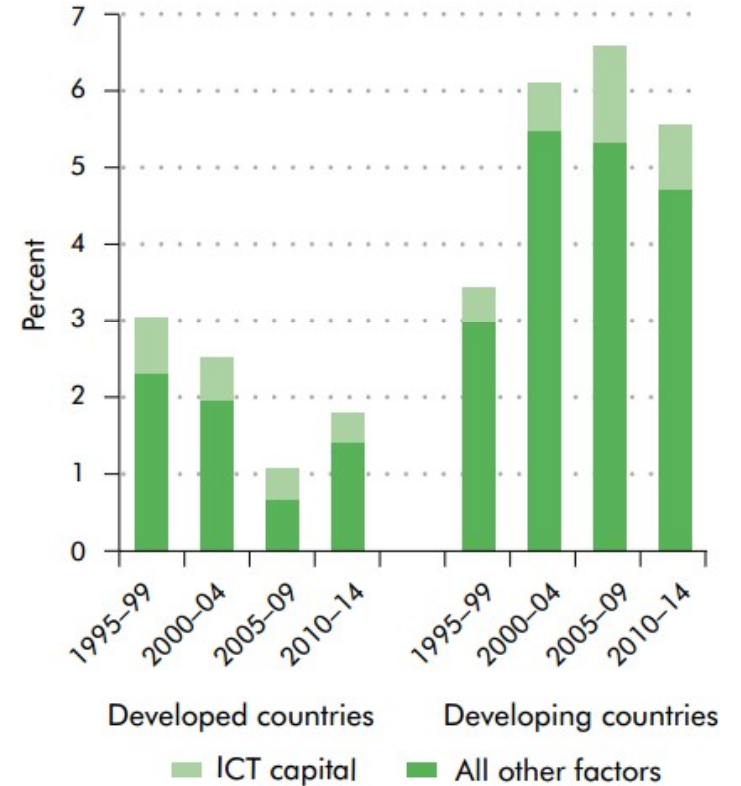
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ICT Contribution across economies

a. Share in GDP, OECD countries, 2011
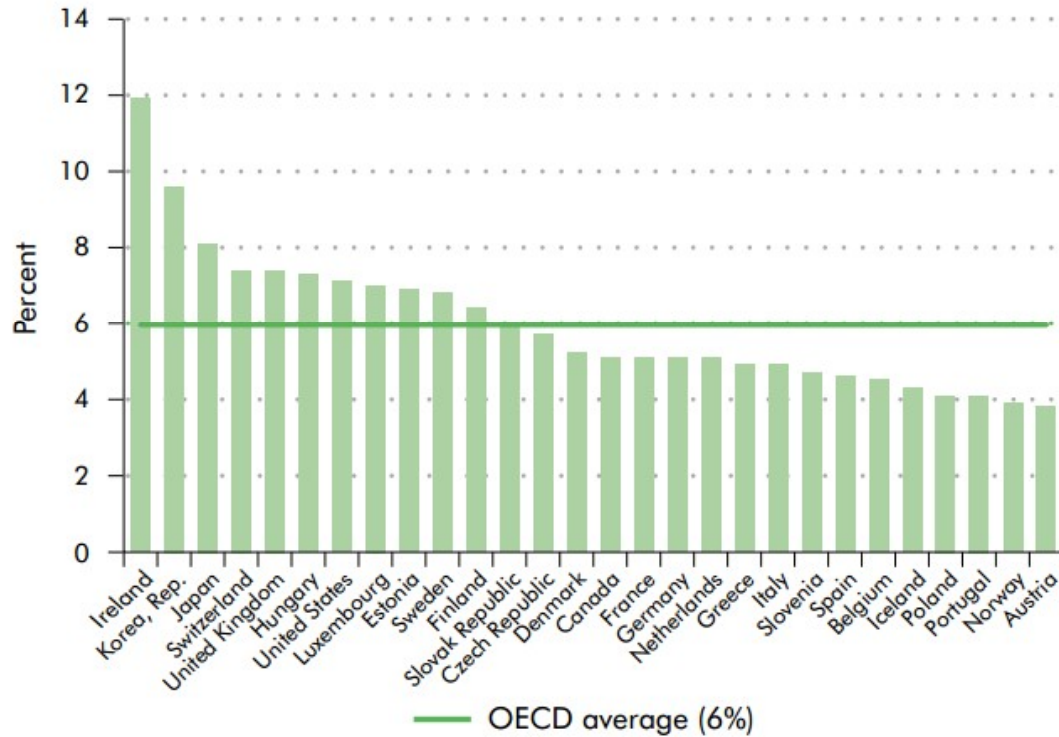
b. Contribution to GDP growth, 1995–2014

OECD average (6%)

Developed countries   Developing countries

ICT capital   All other factors

Measuring the Impact

▸ Economists have attempted to measure the benefits of all telecom services including fixed line, mobile, internet and broadband.

▸ Several estimates are available in the literature with methods of measurement evolving over time.

▸ Measurements provide estimates of impact on GDP growth and employment

▸ The value of communications technologies can be particularly high in developing countries because other forms of infrastructure such as roads are often poor. At the same time it is unlikely that increased internet or broadband penetration by itself will be able to alleviate other constraints such as poor governance, lack of capital, low skill levels, etc. faced by developing nations

	High Income	Low Income
Fixed	.43	.73
Mobile	.60	.81
Internet	.77	1.12
Broadband	1.21	1.38

Source: Qiang 2009

Sample Estimates for Impact on GDP

Research by	Country	Measure of Impact/Value
McKinsey & Company	Cross-country	• 10 % increase in broadband's household penetration delivers a boost to a country's GDP that ranges from 0.1 – 1.4%
Boston Consulting Group	India	$60 billion in 2013
Booz & Co	Cross-country	• 10 percent higher broadband penetration in a specific year is correlated to 1.5 percent greater labor productivity growth over the following five years. • Countries in the top tier of broadband penetration have also exhibited 2 percent higher GDP growth than countries in the bottom tier of broadband penetration
Gartner	India	$67.058 billion in 2014
Copenhagen Economics	India	• $41 billion – estimate for 2015(intermediaries excluding private investments)
McKinsey & Company	Argentina	• 2.2% of GDP in 2012
Boston Consulting Group	Hong Kong	• 5.9% of GDP in 2009
Boston Consulting Group	Sweden	• 7.7% of GDP in 2012

Sample Estimates for Impact on Employment

Author (Year)	Country	Variable	Type I Multiplier	Type II Multiplier
Katz *et al (2009)*	Germany	Employment	1.45	1.94
Katz *et al (2009)*	Germany	GDP	20.2 billion Euro investment will result in 170.9 billion Euro of additional GDP (.6% of annual GDP growth)	
Katz *et al (2008)*	Switzerland	Employment	1.38	(Study did not estimate induced employment)
Katz *et al (2009)*	United States	Employment	1.83	3.42
Libenau *et al (2009)*	United Kingdom	Employment	(Indirect and induced employment estimated together)	2.78
Crandall (2003)	United States	Employment	Indirect and induced employment estimated together)	2.17
Atkinson (2009)	United States	Employment	2.58	3.6
Australian Government	Australia	Employment	Direct, Indirect and Induced jobs would sum up to 200,000	
Strategic Analysis Group	Canada (Ontario)	Employment	2.03	3.42

$$\text{Type I} = \frac{direct + indirect}{direct}$$

$$\text{Type II} = \frac{direct + indirect + induced}{direct}$$

ICRIER worked on a subset of the Internet Ecosystem to measure the *Impact of the App Economy* on employment. The estimated Type I and Type II multipliers in a Business as Usual Scenario are 1.2 and 2.9 respectively

Estimates for India and Challenges of Measurement

- **ICRIER research has focused on measuring the economic impact of Internet using econometric frameworks as well case studies. The estimates and method of measurement are limited by the following challenges.**

- **Developing a non-monetary yardstick for measurement:** Traditional economic methods use price as the unit of measurement of economic value. Digital expansion has enabled the emergence of goods and services that are often invisible in price, making measurement of value especially complex.

- **Intangible inputs :** National Accounts Statistics only extend to purchases of software as far as digital capital inputs are concerned. The intangible inputs, such as investment in human resource systems, business organization etc do not get captured in this data.

- **Data inadequacy:** Currently, one of the biggest hurdles (particularly in India) in measuring the value of the Internet is the limited scope of existing surveys and inadequate services data. The nature of the digital transformation is such that it calls for microdata at the individual and firm level.

- **Statistical framework:** There is still no widely accepted method to measure the value of the Internet, or define the contours of the digital economy.

Estimate using the Expenditure Method

The total expenditure on the Internet in India is obtained using the standard National Income Accounting identity:

$Y= C+I+G+(X-M)$

- Y: Aggregate expenditure of the economy on the Internet

- C: Private final consumption expenditure on the Internet

- I: Gross fixed capital formation accruing to the Internet

- G: Government expenditure on the Internet

- X-M: Net exports of ICT goods and services (enabled by the internet)

Aggregate Expenditure on the Internet in 2011-12	Upper Bound(USD billion) *Internet+ Connectivity*	Lower Bound(USD billion) *Internet*
Private Final Consumption Expenditure	8.4	8.4
Gross Fixed Capital formation	16.09	16.09
Government Expenditure	5.98	5.98
Net Exports	56.6	10
Total expenditure on the Internet	**87.07**	**40.47**

The Multiplier

- We use a fixed effects instrumental variable regression (using a two period lead of the natural log of Internet Subscribers as an instrument) to estimate the impact of the Internet for India . This is a sub-national estimation using panel data regression. The data pertains to 19 states in India for the period 2001 to 2014

$$SGDP_{it} = \alpha_o + \alpha_1 K_{it} + \alpha_2 L_{it} + \alpha_3 ISub_{it} + \varepsilon_{it}$$

K_{it} is gross capital formation excluding investments in telecom in ith state in year t;

L_{it} is the total number of persons engaged in telecom in state i for year t;

$ISub_{it}$ is the number of internet subscribers in the $i$thstate in year t;

$SGDP_{it}$ is per capita GDP for ith state in year t;

e_{it} is the error term

- A 10% increase in rate of growth of Internet subscribers will result in a 2.4% increase in rate of growth of state *per capita* income.

- In terms of levels, the model implies that a 16% increase in the number of internet subscribers in 2011-12 led to an increase in the GDP in that year by $62.2 billion (3.8% of nominal GDP)

- Difference in results of the two methods measures the spillover benefits of the Internet

Sectoral/Micro-level impact assessments

▸ **Agriculture**

  ▸ Government sponsored projects: AGMARKNET, e-Seva, Janmithra

  ▸ Private sector projects: e-choupal by ITC, Mkrishi by TCS, etc.

  ▸ Recently farmers in Maharashtra have found an unusual ally in Facebook. They formed a group on social media and started inviting farmers from across the region to join the group to meet the supply-demand gap.

▸ **Finance & Banking**

  ▸ Mobile wallet transactions jumped from Rs 10 billion in 2012-13 to more than Rs 490 billion in the year 2015-16. (Source: RBI).

  ▸ Digital payments industry in India is projected to reach $500 billion, contributing 15% to India's GDP by 2020 (Source: Google and Boston Consulting Group (BCG) report on Digital Payments 2020)

  ▸ Number of mobile banking transactions has risen from 16.8 million in December 2014 to 39.5 million in December 2015 (Source: RBI)

▸ **E-Commerce**

  ▸ Constituting about 10% of its GDP, India's retail sector is emerging as one of the most dynamic and profitable sectors. The e-Commerce market is slowly replacing the traditional brick and mortar sellers in India

  ▸ Online grocery contributes less than 1% to the $500 billion retail industry (70% of which is food & grocery), but is expected to climb to 2-3% by 2018. 30% of orders on Grofers for fruits and veggies come from tier-2 towns; 24% of value of total sales are fresh produce

▸ **Education**

  ▸ A study reports that India has the second highest number of online enrolments in the world – 1,55,000 of the total 1.2 million world wide

  ▸ India is Coursera's second-largest market outside the US, after China, with almost 800,000 registered learners. Coursera has recently signed a partnership with the Indian School of Business, its first partnership in India

▸

Sectoral/Micro-level impact assessments

▶ Healthcare

  ▶ The introduction of hospital information system (HIS), picture archival and communications system (PACS), and electronic health record (EHR) has led to rapidly increasing volumes of data. According to analysts, Indian M2M healthcare device market is expected to reach $98.38 million by 2016, with a CAGR of 33.81% from 2011-2016.

▶ Jobs

  ▶ India is the second largest market for Linked in after US. 35 million users in India, nearly 10% of its total user base of around 400 million.

  ▶ The online jobs market is expected to double by 2020 with 63% consumers accessing jobs listed on digital classifieds.

  ▶ Impact Sourcing Service Providers (Rural BPOs) located in underserved areas to enable livelihood creation by utilizing local talent.

  ▶ India forms the largest chunk of the global impact sourcing market

  ▶ Example: As of December 2015 Samasource had provided employment to 6989 workers and impacted 28,585 people

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Conclusions

▸ There is enough evidence (domestic and global) to establish the growth benefits of Broadband, though measurement issues continue to exist

▸ Digital India, Smart City Mission and Bharat Net are direct government initiatives to improve digital infrastructure and adoption in the country. Not all programs are on track with regard to their stated objective and timelines.

▸ At 2.5 mbps, India has the lowest average connection speed among the leading Asia Pacific countries (March 2016). Policy intervention is necessary to fast track infrastructure deployment, especially in rural areas. Evaluate the potential for Public Private Partnerships in implementation of the National Optic Fibre Network

▸ Need to asses the overall regulatory infrastructure to enable digital service delivery and innovation in content creation

▸ Capacity building (both technical and institutional) to guard against potential loss from cyber attacks with increased proliferation of internet/broadband.

▸ Nurture the model of multistakeholderism for internet governance

Thank you!