Columbia Business School

Is the policy system able to keep up with accelerated change?

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The impact of the Internet on Employment and how to deal with the losers
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What is research telling us about employment effects of digitization (e.g. broadband internet deployment and digital innovation)?

- Job creation:
  - Broadband deployment programs create jobs with attractive multipliers on a short term basis
  - ICT deployment in emerging economies enable to attract jobs from advanced countries (especially low paid BPO)
  - Broadband has spillover effects in selected sectors (e.g. trade, health care, selected services)
  - Digital industries have some job creation effects

- Job destruction:
  - Low paid outsourced jobs from industrialized countries
  - Strong capital/labor substitution effects in labor intensive sectors across the board (e.g. Tourism)
  - Job losses in rural geographies (while productivity enhacement in advanced geographies can be compensated by innovation, business growth, etc., this is not the case in rural settings)

Three types of broadband network construction effects exist

Direct jobs and output	• Employment and economic production generated in the short term in the course of deployment of network facilities	• **Telecommunications technicians** • **Construction workers** • **Civil and RF engineers**
Indirect jobs and output	• Employment and production generated by indirect spending (or businesses buying and selling to each other in support of direct spending)	• **Metal products workers** • **Electrical equipment workers** • **Professional Services**
Induced jobs and output	• Employment and production generated by household spending based on the income earned from the direct and indirect effects	• **Consumer durables** • **Retail trade** • **Consumer services**

Network construction effects and multipliers are significant

NETWORK CONSTRUCTION EFFECTS OF BROADBAND

COUNTRY	STIMULUS INVESTMENT (USD billion)	NETWORK DEPLOYMENT JOBS ESTIMATE				MULTIPLIERS	
		DIRECT	INDIRECT	INDUCED	TOTAL	TYPE I (*)	TYPE II (**)
UNITED STATES	$ 6,390	37,000	31,000	60,000	128,000	1.83	3.42
SWITZERLAND	~$ 10,000	~80,000	~30,000	N.A.	~110,000	1.38	N.A.
GERMANY	$ 47,660	281,000	126,000	135,000	542,000	1.45	1.94
UNITED KINGDOM	$ 7,463	76,500	134,500		211,000		2.76
AUSTRALIA	$ 31,340				~200,000		

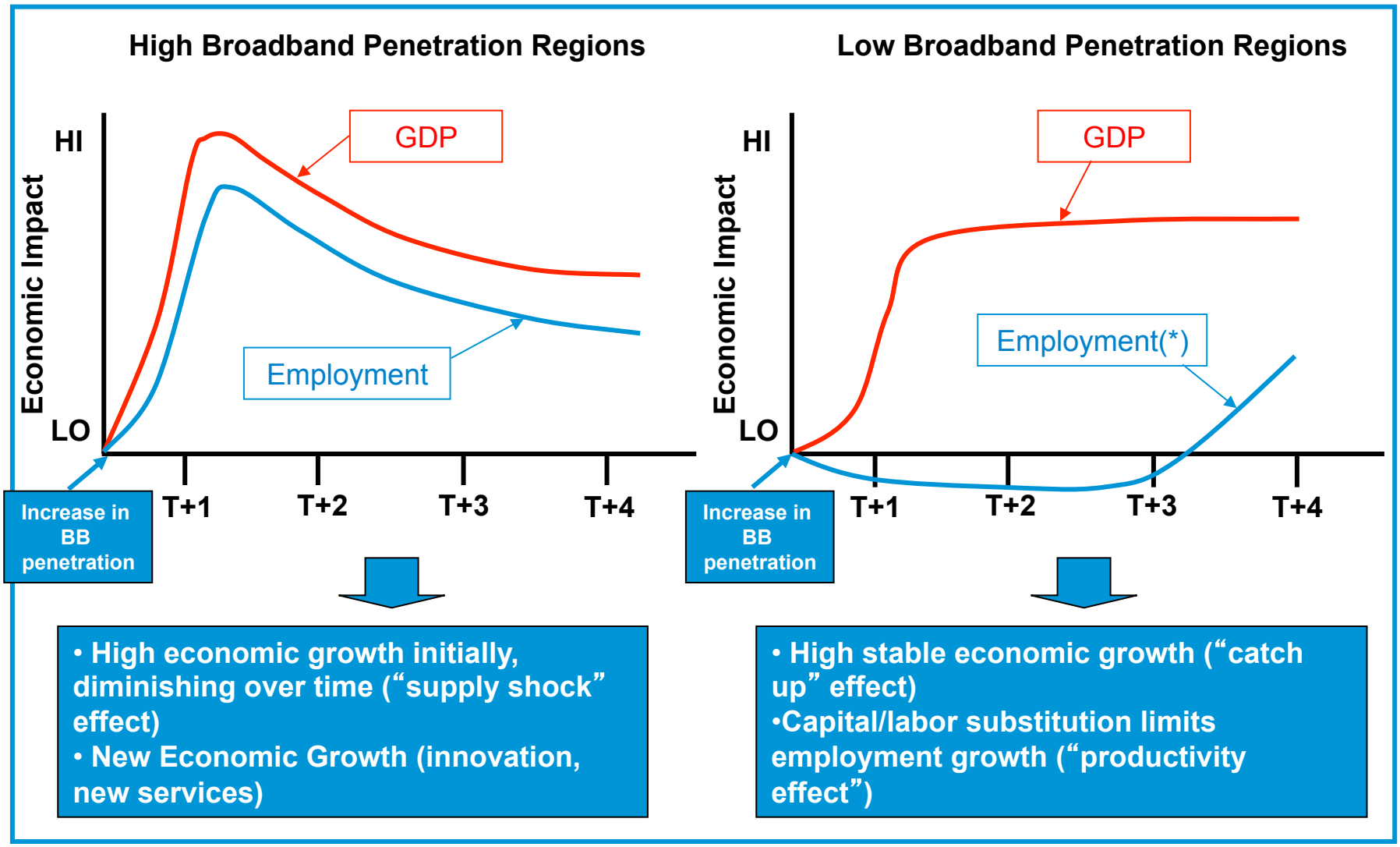
Sources: Katz, R. and Suter, S. (2009). *Estimating the economic impact of the US broadband stimulus plan, Columbia Institute for Tele-Information working paper;* Katz, R., P. Zenhäusern, S. Suter, P. Mahler and S. Vaterlaus (2008). *Economic Modeling of the Investment in FTTH* in Switzerland, unpublished report; *Libenau, J., Atkinson, R. (2009) The UK's digital road to recovery. LSE and ITIF; Australian government.* Katz, R., S. Vaterlaus, P. Zenhäusern, S. Suter and P. Mahler (2009). *The Impact of Broadband on Jobs and the German Economy*; Columbia Institute for tele-Information working paper

(*) (Direct + indirect)/direct
(**) (Direct + indirect + induced)/direct

Job creation on broadband spillovers are a bit more complex

Productivity	• Improvement of productivity as a result of the adoption of more efficient business processes enabled by broadband	**• Marketing of excess inventories** **• Optimization of supply chains**
Innovation	• Acceleration of innovation resulting from the introduction of new broadband-enabled applications and services	**• New applications and services (telemedicine, Internet search, e-commerce, online education, VOD and social networking)** **• New forms of commerce and financial intermediation**
Value chain recomposition	• Attract employment from other regions as a result of the ability to process information and provide services remotely	**• Outsourcing of services** **• Virtual call centers** **• Core economic development clusters**

In the aggregate, job creation through broadband and digital development varies by greography



(*) Results are at a low significance level

Broadband service availability has an impact on income in both metropolitan and rural counties in Kentucky, but employment effects differ

Kentucky: Impact of a 1 % point increase in Broadband Availability on Employment and Median Income (2004-9)

	Impact on Median Income	Impact on Employment
Metropolitan Counties	0.0968*	0.0303
Rural Counties Adjacent to Metro counties	0.0704*	-0.1953*
Rural Counties Isolated from Metro Counties	0.0800*	

Significant at the 1 % level

Source: Data compiled from Connect Kentucky databases, and ESRI Business Analyst Sourcebook for County demographics; analysis by the authors.

Job creation in rural counties due to broadband is limited to a few sectors

Kentucky: Impact of a 1% increase in Broadband Penetration on Industrial Sector Employment

Industry Sector	All Counties	Rural Counties
Financial Services and Insurance	0.678 (**)	0.517 (***)
Wholesale trade	0.846 (*)	0.836 (**)
Health Services	0.126 (*)	0.122 (**)

(*) Significant at 1% level
(**) Significant at 5% level
(***) Significant at 10% level

Source: Data compiled from US Census Bureau, Connect Kentucky databases, and ESRI Business Analyst Sourcebook for County demographics; analysis by the authors.

Digital Platform Innovation creates few direct jobs, but other value chain sectors do – and this does not count the spill over effects

EMPLOYMENT NUMBERS (2014)

	Firms	World	Latam
Global Digital Platforms	Google	47,756	367
	Facebook	9,199	156
	Skype	640	0
	Twitter	2,300	20
	LinkedIn	6,800	30
	Netflix	2,190	20
	Total	68,885	593
Latam Digital Platforms			9,006
Telecommunications carriers		589,356	153,000
Telecom equipment mfrs		975,715	32,262

Source: Annual reports; calculations by the author

Policy issues to promote positive effects and mitigate the negative ones

- Conventional rural development programs to mitigate “hollowing out” effects
- Reshaping of training programs emphasizing three-tiered digital training (digitization of production processes, digital applications and platform development, electrical engineering/computer science graduates)
- Overall, need to centralize policy development and implementation in the digital sector in emerging countries (address the institutional barrier)
  - Avoid redundant programs and frictional losses
  - Address coordination failures regarding access to labor, capital and technology
  - Create necessary conditions to facilitate venture capital investement
  - Failure rate and lack of scalability resources (26,000 start ups at Wayra-Telefonica incubator between 2010-13; 1.6% selected for incubation; 6% access to private capital)