

Estimating the economic impact of the broadband stimulus plan

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

Director, Business Strategy Research
Columbia Institute of Tele-information

*SPENDING THE BROADBAND STIMULUS:
Maximizing Benefits and Monitoring Performance*

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Let's first get some perspective on what we are talking about

HOW FAR BEHIND IS THE US IN TERMS OF BROADBAND DEPLOYMENT AND ADOPTION?

- The US is ranked 15th in terms of broadband penetration per population (25%), although this number underestimates wireless broadband access, and if we were to measure it by household, the position moves up to 11
- But, as of 12/07, according to the FCC, 82% of residences could have access to DSL and 96% could have access to cable modem
- Therefore, there are some people that could have broadband but either do not want to, do not need it, or cannot afford it
- Beyond this, it is true that there are some accessibility gaps (in 18 States 7% or more of premises do not have accessibility to broadband); in other words, we have a problem but is not as serious as we might think

HOW FAR BEHIND IS THE US IN TERMS OF BROADBAND TECHNOLOGY AND SPEED?

- The US ranks sixth among industrialized nations in terms of FTTx share of broadband access (6%)
- At current rate of fiber and DOCSIS 3.0 deployment, by 2010 the US will have approximately 40% of accesses delivering in excess of 100 Mbps
- Japan is at 45% and Korea at 34% today; Sweden, the most advanced European country is at 18%

HOW BIG IS THE BROADBAND STIMULUS IN TERMS OF TOTAL SPENDING IN THE TECHNOLOGY?

- The broadband provision of the Stimulus Bill amounts to \$7.2B in a variety of items and funding mechanisms
- In the past four years (2004-8), the telecommunications industry invested \$ 41B in broadband, while cable invested \$16B and Wimax carriers \$2.7B (Source: Skyline Marketing Group)
- In the next two years, the CAPEX projections for broadband are \$ 38B (Source: Skyline Marketing Group)
- Therefore, the broadband stimulus amounts to 7.4% of what the private sector would have invested between 2004-10

How many jobs will be generated as a result of the broadband stimulus plan?

WHAT WE KNOW	WHAT WE THINK WE KNOW BUT WE DON'T	WHAT WE KNOW WE DON'T KNOW
<ul style="list-style-type: none"> •The construction of broadband network has moderate direct and indirect employment effects •While total industrial output generated by the deployment of broadband is significant (\$11.7B), the proportion of imported goods is increasing, thereby reducing the amount of jobs being created •The induced effects of network construction magnify the total impact of network deployment 	<ul style="list-style-type: none"> •What are the network externalities like when broadband penetration has reached levels beyond 50% of households? •How many jobs can be lost as a result of productivity induced broadband? •How many jobs can be lost as a result of outsourcing facilitated by broadband? •Finally, a broadband investment program could create new jobs in the targeted region but result in job losses in another one, with limited incremental national impact: what is the impact? 	<ul style="list-style-type: none"> •What is the relationship between faster broadband speeds and employment?

We will first focus on the short-term employment effect of network construction

EFFECTS	KEY DRIVERS	ANALYSIS
<ul style="list-style-type: none">• Impact of network deployment in terms of short-term economic value-added and employment generation	<ul style="list-style-type: none">• Investment earmarked for broadband deployment	<ul style="list-style-type: none">• Input-output analyses
<ul style="list-style-type: none">• Impact of incremental broadband deployment on long-term productivity, innovation and business growth	<ul style="list-style-type: none">• Speed and pattern of penetration of broadband	<ul style="list-style-type: none">• Econometric modeling

The capital investment in the form of grants to deploy broadband will generate 128,000 jobs over four years (32,000 per year)

			BILL
Investment (all \$ numbers in millions)			\$ 6,390
Employment Creation	Direct effect	Jobs in equipment eq. mfr, construction and telecoms	37,300
	Indirect effect	Jobs in other sectors	31,000
	Induced effect	Household spending induced from direct/indirect effects	59,500
	Total effect	Jobs in all sectors	127,800
Multipliers	Type I Multiplier	$(\text{Direct} + \text{indirect})/\text{direct}$	1.83
	Type II Multiplier	$(\text{Direct} + \text{indirect} + \text{induced})/\text{direct}$	3.42

Sector	Effect
Electronic eq.	4,242
Construction	26,218
Communications	6,823
Total	37,283

Sector	Effect
Distribution	9,167
Transportation	1,536
Metal products	1,839
Electronic Eng.	959
Other services	8,841
Other	8,704
Total	31,046

If funds were to be invested in roads and bridges, the number of jobs would be higher

			BROADBAND	“ROADS AND BRIDGES”
Investment (all \$ numbers in millions)			\$ 6,390	\$ 6,390
Employment	Direct effect	Jobs in equipment mfr, construction and telecoms	37,200	48,500
	Indirect effect	Jobs in other sectors	31,000	33,900
	Induced effect	Jobs triggered by spending	59,600	69,600
	<i>Total effect</i>	<i>Jobs in all sectors</i>	127,800	152,000
Total Industry Output	Direct effect	Investment	\$ 6,390	\$ 6,390
	Indirect effect	Additional goods generated	\$ 5,291	\$ 5,386
	<i>Total effect</i>	<i>Total additional goods produced</i>	\$ 11,681	\$ 11,776
	Domestic		\$ 11,104	\$ 11,319
	Imported		\$ 577	\$ 457
	Multiplier	(Direct + Indirect)/Direct (\$1 of investment results in \$x of industrial output)	1.83	1.84

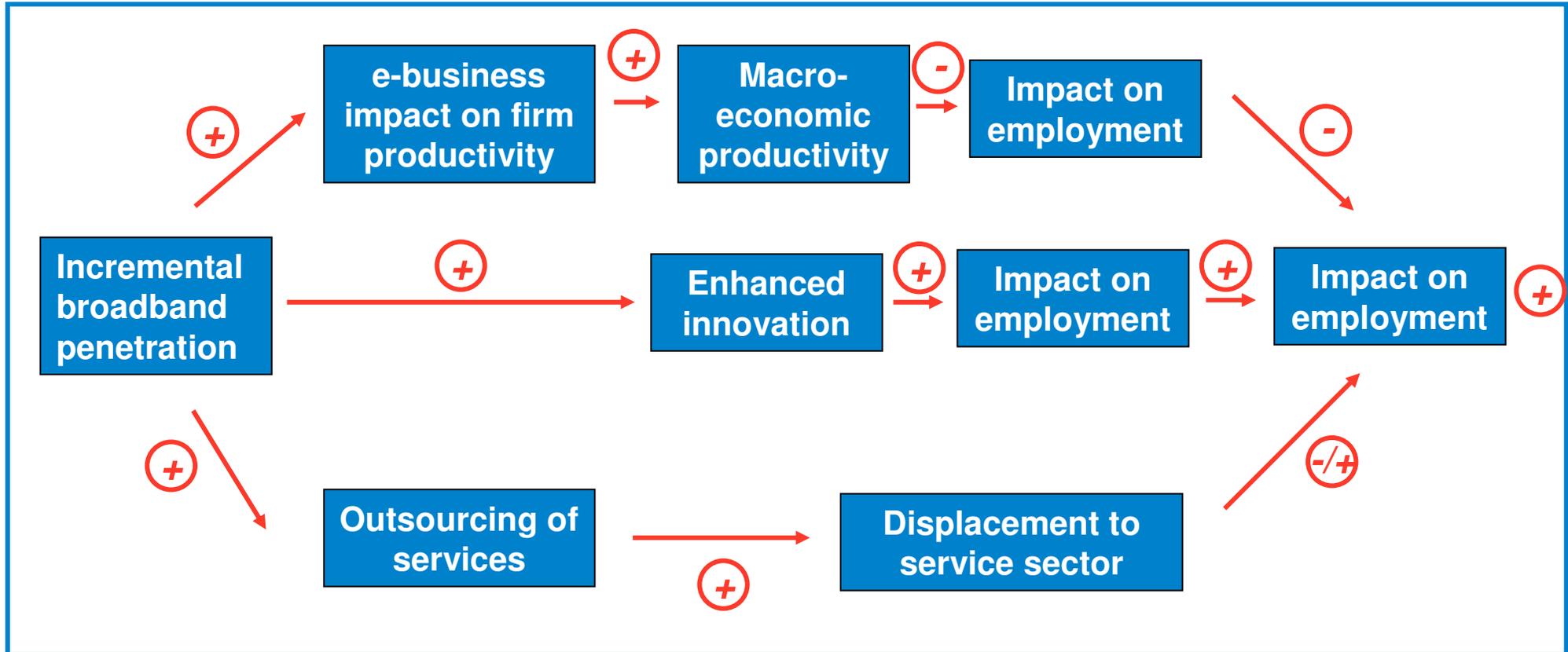
Roads and bridges generates more direct jobs because it is more construction intensive

Roads and bridges has less investment leaked overseas

How many jobs will be generated as a result of the so-called “network effects”?

EFFECTS	KEY DRIVERS	ANALYSIS
<ul style="list-style-type: none">• Impact of network deployment in terms of short-term economic value-added and employment generation	<ul style="list-style-type: none">• Investment earmarked for broadband deployment	<ul style="list-style-type: none">• Input-output analyses
<ul style="list-style-type: none">• Impact of incremental broadband deployment on long-term productivity, innovation and business growth	<ul style="list-style-type: none">• Speed and pattern of penetration of broadband	<ul style="list-style-type: none">• Econometric modeling

We have attempted to estimate the network effect on employment growth by deconstructing three simultaneous effects



Note: This causality chain was adapted from a model originally developed by Fornefeld et al., 2008 in a report for the European Commission

Given that the stimulus program is focused on “unserved & underserved” (*) areas, we limited our analysis to states with lowest penetration

State	Percent of Residential unserved <93%	Number of Lines	Households	Household Penetration	Population	Population Penetration
Alabama	92%	808,291	2,137,018	38 %	4,627,851	17 %
Arkansas	75%	532,171	1,287,429	41 %	2,834,797	19 %
Georgia	92%	2,296,983	3,961,474	58 %	9,544,750	24 %
Indiana	92%	1,206,274	2,778,394	43 %	6,345,289	19 %
Iowa	90%	581,263	1,329,596	44 %	2,988,046	19 %
Kansas	91%	680,270	1,219,439	56 %	2,775,997	25 %
Kentucky	91%	843,641	1,906,096	44 %	4,241,474	20 %
Maine	93%	288,491	696,611	41 %	1,317,207	22 %
Mississippi	91%	384,772	1,254,908	31 %	2,918,785	13 %
Montana	88%	185,251	435,533	43 %	957,861	19 %
Nebraska	93%	406,674	780,804	52 %	1,774,571	23 %
New Mexico	82%	343,568	862,067	40 %	1,969,915	17 %
North Dakota	88%	137,207	310,548	44 %	639,715	21 %
Oklahoma	91%	815,765	1,623,010	50 %	3,617,316	23 %
Pennsylvania	93%	2,852,177	5,477,864	52 %	12,432,792	23 %
South Carolina	92%	844,013	2,021,947	42 %	4,407,709	19 %
South Dakota	80%	160,821	357,240	45 %	796,214	20 %
West Virginia	84%	297,852	882,685	34 %	1,812,035	16 %
TOTAL		13,665,484	29,322,663	47 %	66,002,324	21 %

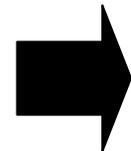
Source: FCC table 14 of HSPD1207; US Census Bureau

(*) Underserved area is a low income community designed under section 45 D which is defined as a population census tract located in either: 1) a poverty rate of at least 20 % or 2) median family income which does not exceed 80% of the greater metropolitan area median family income or statewide median family income.

We assumed that the stimulus program will bring these states to the national broadband penetration average

EIGHTEEN STATES CONSIDERED TO HOLD UNDERSERVED/UNSERVED AREAS

Economic data	Data	Sources
Employment, all economic sectors (10/08)	30,123,300	<i>US Census Bureau</i>
Employment, service sector (10/08)	24,791,300	<i>US Census Bureau</i>
Employment, NACE sector K (10/08)	3,860,100	<i>US Census Bureau</i>
Labor productivity, all economy average	75,291	BEA
Labor productivity, business services sector	144,298	BEA
GDP (current dollars) (millions) (2007)	2,574	Department of Commerce



Year	Households	Broadband lines	Penetration
2007	29,322,663	13,665,484	47 %
2008	29,648,145	14,348,758	48 %
2009	29,977,239	15,640,146	52 %
2010	30,309,986	16,891,358	56 %
2011	30,646,427	18,073,753	59 %
2012	30,986,603	19,158,178	62 %

Source: FCC table 14 of HSPD1207

We estimate that network externalities could result in 136,000 jobs, although there is a high level of uncertainty of ultimate impact

		2009	2010	2011	2012	Total
Productivity Effect	Jobs Lost in professional and information services	(19,000)	(17,000)	(15,000)	(13,000)	(64,000)
	Jobs lost in other sectors	(61,000)	(54,000)	(47,000)	(40,000)	(202,000)
	Subtotal	(80,000)	(71,000)	(62,000)	(53,000)	(266,000)
Innovation Effect	New business services	55,000	47,000	40,000	33,000	175,000
	New economic activity	64,000	55,000	46,000	38,000	203,000
	Subtotal	118,000	101,000	86,000	70,000	375,000
Outsourcing Effect	Pessimistic scenario	(33,000)	(29,000)	(26,000)	(22,000)	(110,000)
	Mid-course scenario	8,000	7,500	6,000	5,500	27,000
	Optimistic scenario	49,000	44,000	38,000	33,000	164,000
Total	Pessimistic scenario	5,000	1,000	(2,000)	(5,000)	(1,000)
	Mid-course scenario	46,000	37,500	30,000	22,500	136,000
	Optimistic scenario	87,000	74,000	62,000	50,000	273,000

Comparative employment effects and multipliers

				Our Study	Atkinso et al. (2009)	Crandall et al. (2003)
Investment (all \$ numbers in millions)				\$ 6,390	\$ 10,000	\$ 63,600
Network Construction	Employment	Direct effect	Jobs in equipment mfr, construction and telecoms	37,300	63,660	546,000
		Indirect effect	Jobs in other industries triggered by direct spending	31,000	165,815	665,000
		Induced effect	Jobs in all industries	59,500		
		Total Jobs	Type I and II	127,800	229,475	1,211,000
	Multipliers	Type I Multiplier	(Direct + indirect)/direct	1.83		
		Type II Multiplier	(Direct + indirect + induced) /direct	3.42	3.60	2.17
Externalities	Employment			136,000 (*)	268,480	
	Multipliers		Externalities/(Type I + Type II)	1.06	1.17	

(*) Mid-point estimate

Conclusions and policy implications

- Estimates for network construction jobs are fairly robust and consistent with prior research: 128,000 jobs (or 32,000 per year)
- Network effect multipliers exhibit higher level of uncertainty and therefore had to be ranged (0 to 270,000, with 136,000 as a mid-point) although anecdotal evidence and calibration with other research would point to the lower end of the distribution
- Job fulfillment is driven by success in implementing job creation and retention that could be enabled by broadband
- Policy implications:
 - Coordinate broadband deployment with job creation and retention programs
 - Refine criteria for selecting areas to deploy broadband based on the stimulus
 - Centralize program evaluation and grant allocation
 - Develop systematic tests based on social and economic criteria to evaluate the return on the investment
- Research agenda:
 - Broadband network effects
 - Economic impact of NGAN