

The economic crisis: telecommunications sector impact and stimulus programs

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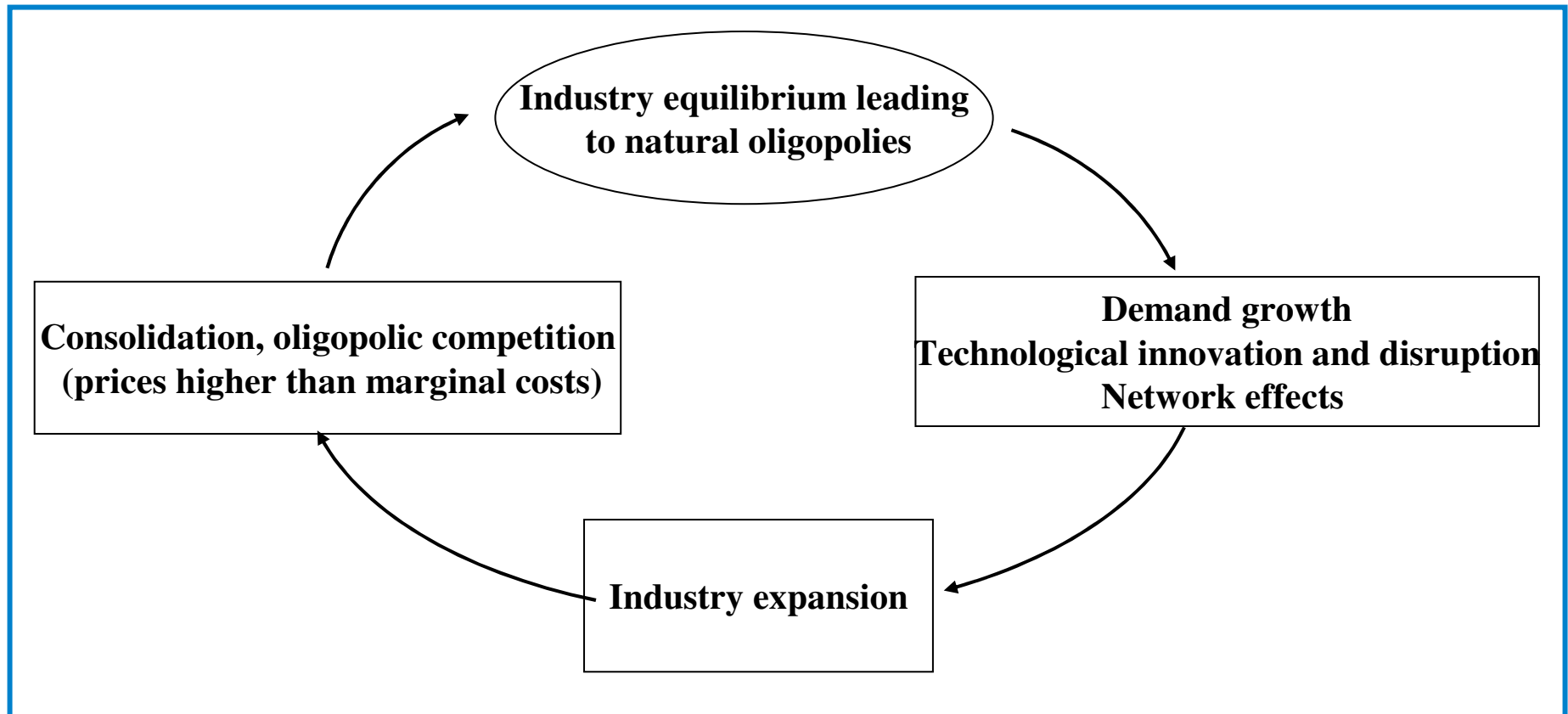
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Agenda

- The impact of the economic crisis on the telecommunications sector
- Assessing the impact of telecommunications stimulus plans
- Regulatory and policy implications

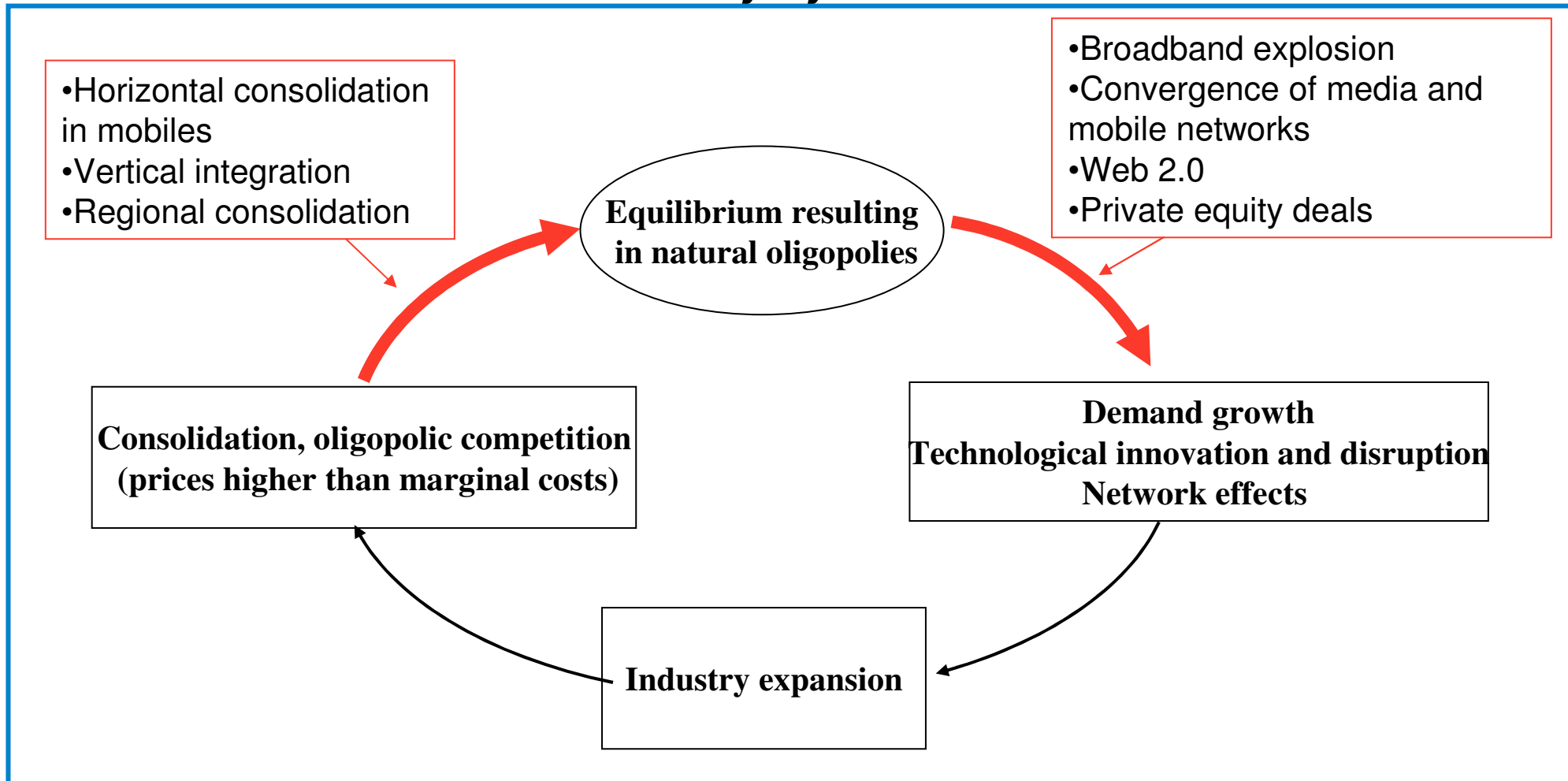
The 2001 crisis heralded the beginning of a new stage of industry development, characterized by expansions and consolidations

Industry Cycles



In parallel with consolidation and return to scale, the industry entered in a stage of asset overvaluation, characteristic of investment bubbles

Industry Cycles



The sector exhibited positive and negative aspects at the time of the beginning of the crisis

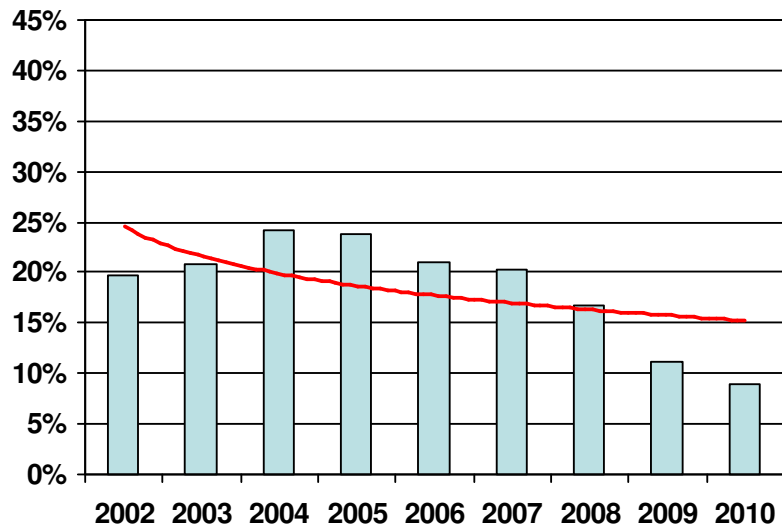
- Consolidation helped solving some of the structural factors such as diseconomies of scale
- In some countries, facilities-based competition emerged, allowing the sector more operational and investment flexibility and consequently, sustainability
- However, cable TV competition stimulated an increase in capital investment that, combined with the funding of mergers, has started to put pressure on the carriers' balance sheets
- On the other hand, the reduction in fixed telephony revenues was only partially compensated with mobile telephony and broadband, both reaching saturation levels and a high price compression
- Secondly, fixed telephony had not been able to reduce its costs in proportion to the reduction in revenues (in the US, the reduction in opex between 2001 and 2007 (\$2.100 millions) did not compensate the drop in revenues (\$ 15.000 mil million))

What type of effect is the crisis expecting to have on telecommunications consumption?

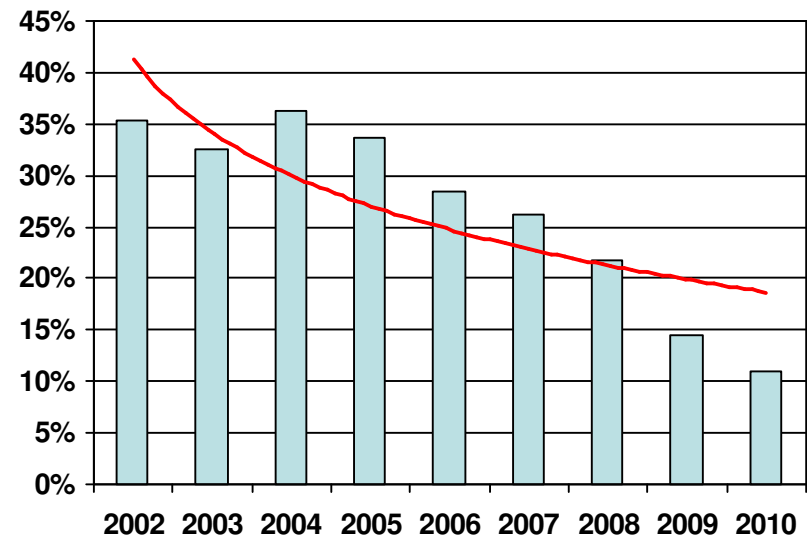
- The consumption of telecommunications goods and services is determined by two factors: income elasticity and penetration rate
 - Income elasticity determines the amount of reduction or increase in consumer spending as a result of changes household revenues: the higher the elasticity, the higher sensitivity of telecom consumption to income changes
 - Elasticity is a function service penetration: when service adoption is low, it is considered a superfluous consumption by a large portion of adopters and therefore the elasticity to deterioration of income will be high; conversely, if penetration is high, the service is perceived as a necessary good (a utility) and therefore inelastic to household income
- What does this mean for future consumption of telecommunications services worldwide?
 - Wireless telephony has reached high penetration levels and, therefore, is perceived as a necessary service, which would mean that it would remain isolated from consumption effects; furthermore, the high proportion of pre-paid subscribers allows users to control spending by reducing usage rather than disconnecting or postponing purchases
 - Wireline would be affected insofar that, with the acceleration of fixed-mobile substitution, disconnection rates of fixed lines could increase
 - Broadband could be affected by the consumption trends, although the situation of unmet demand could still neutralize a negative trend (more below)

First wireless effect: the reduction in wireless subscriber growth rate is linked to a secular trend –saturation- rather than the crisis

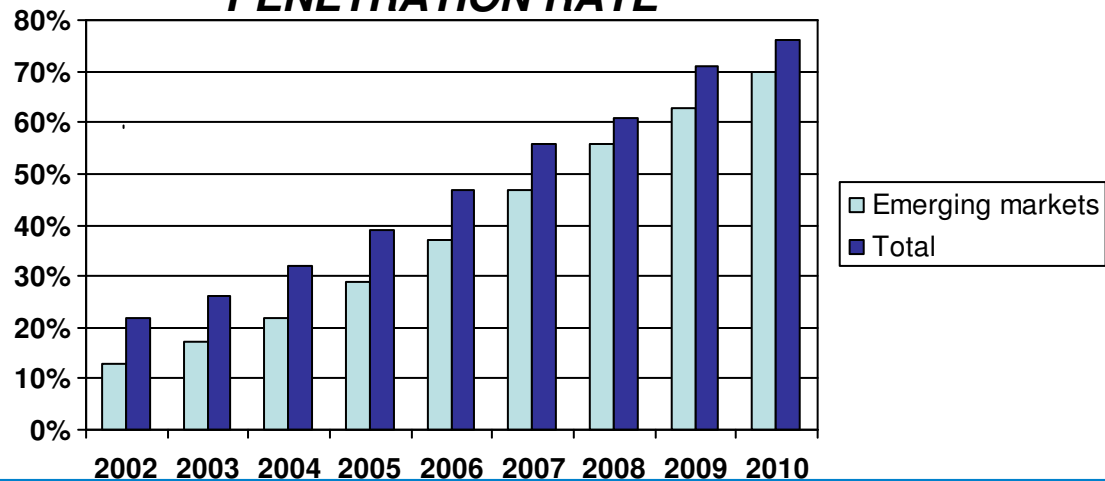
GLOBAL SUBSCRIBER GROWTH RATE



EMERGING MARKET SUBSCRIBER GROWTH RATE



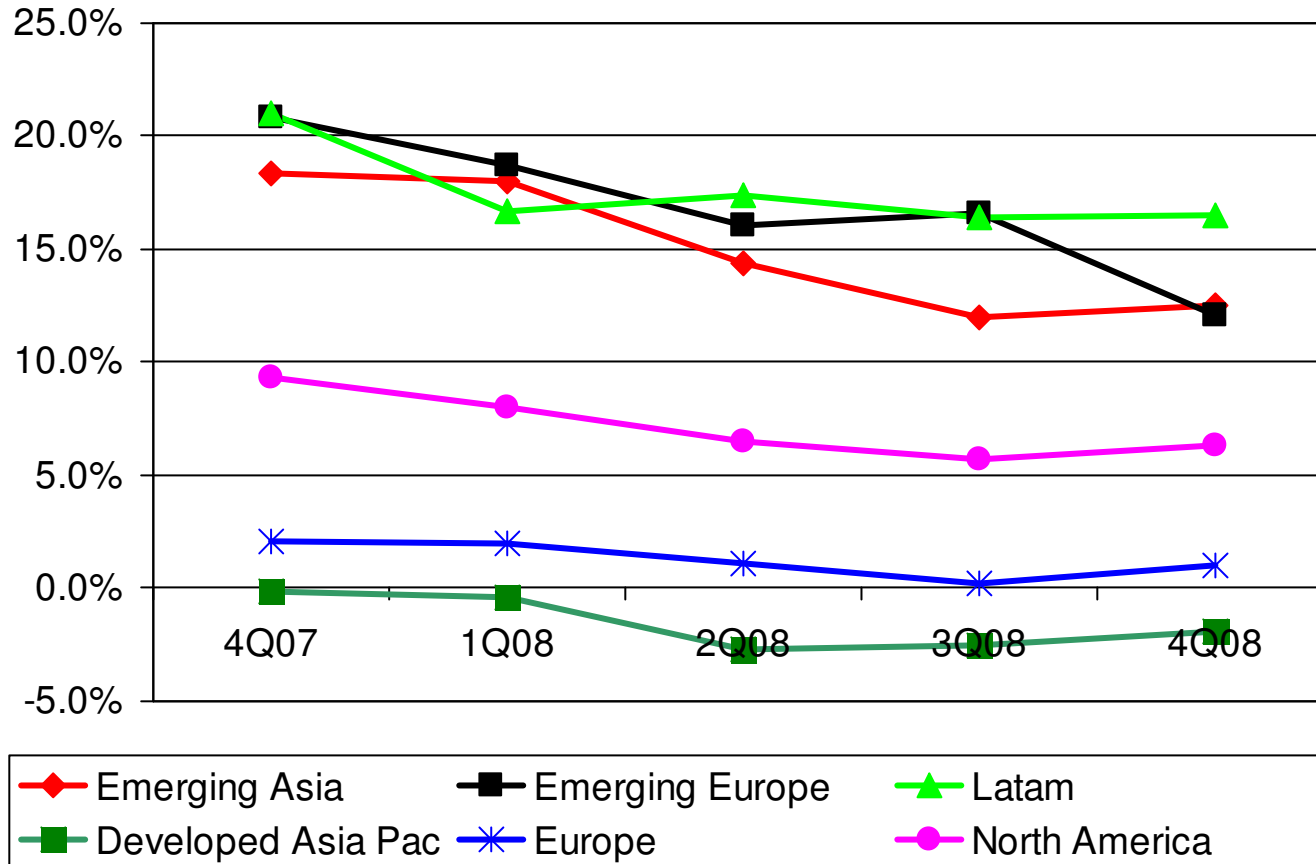
PENETRATION RATE



Source: Merrill Lynch

Second wireless effect: however, service revenue growth has been consistently declining worldwide

WIRELESS SERVICE REVENUE YoY GROWTH BY REGION



Source: Merrill Lynch

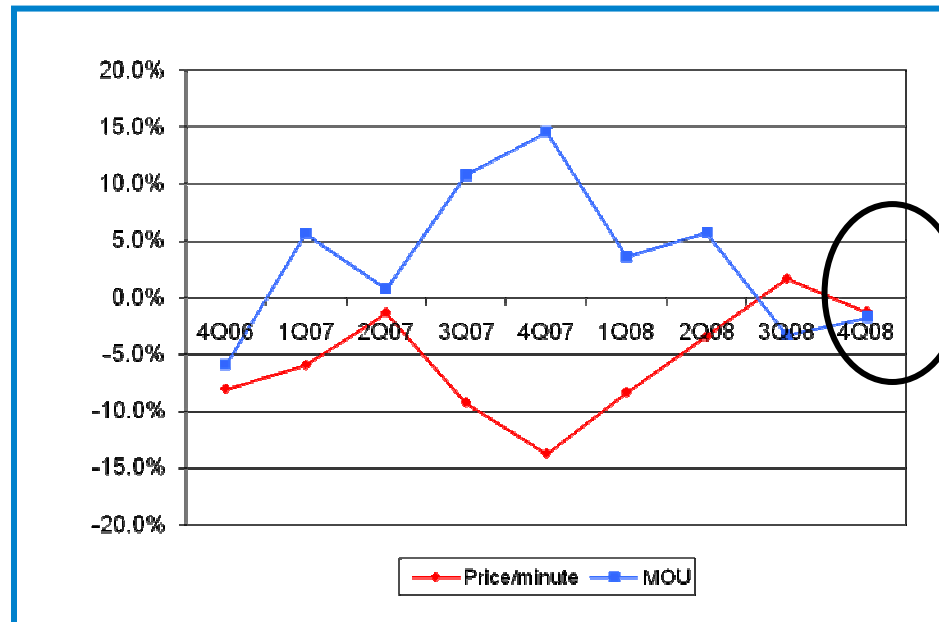
Second wireless effect: the reduction of wireless usage in the industrialized world can be driven by several macroeconomic trends

- **A reduction of consumer confidence:** a New Millennium Research Council survey suggests that US consumers have already cut wireless spending as a belt-tightening measure and will continue to do so.
 - 17% of respondents with postpaid service have already cut back due to job/recession-related concerns
 - 40% are very or somewhat likely to cut back on service "if the economy gets worse in the next six months"
- **Unemployment:** a rise in unemployment rates result in sharp reduction of wireless spending: Ireland and Spain, exhibit quite sharp deceleration in revenue growth
- **Service substitution:** in those countries where mobile tariffs are variable and those of fixed telephony flats, substitution could happen in reverse, whereby consumers would not cancel service but would reduce the use of mobile while increasing that of wireline
 - ATT has already experienced a reduction in MOUs in the second quarter of 2% while Verizon's was of 1%, triggering a drop in ARPU from \$52.04 to \$51.77
 - Postpaid subscriber growth 26% down for Verizon
 - T-Mobile has registered an increase in MOUs of 2% in the last quarter, which the lowest growth rate in its history
 - Rural wireless operators have indicated a reduction in roaming revenues, which would indicate that Americans are traveling less

Second wireless effect: in emerging regions, preliminary indications show an impact on wireless usage driven by a decrease in price elasticity

- In emerging markets we have seen impressive demand resilience, despite the lack of discretionary income. We attribute this to the compelling value wireless provides (i.e. basic communications) when there is no wireline alternative.
- However, there are some initial signs that economic weakness to have a visible impact in the coming quarters: for example, in Mexico price elasticity has suddenly dropped since the end of 2008

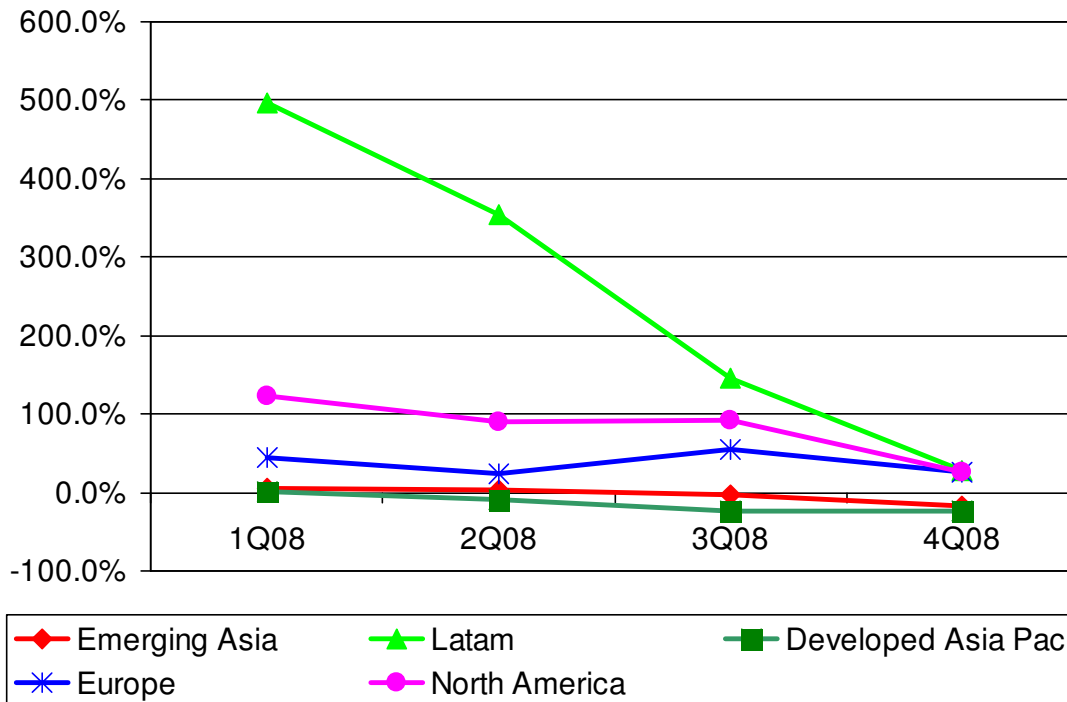
America Móvil in México: Q-t-Q change rate in pricing and MOU



Source: Deutsche Bank Securities

Third wireless effect: an extension of device replacement cycles can also be detected

CONVERGED DEVICES SALES YoY GROWTH BY REGION

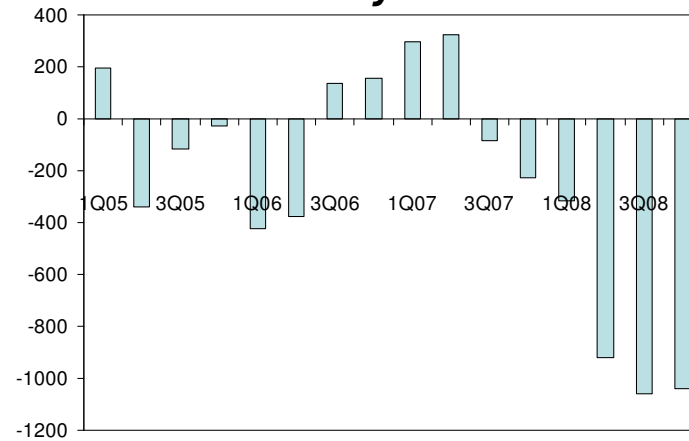


- Historically, device replacement cycles have ranged from 1.5 to 2 years (consistent with worldwide data)
- However, in parallel with the economic deterioration, replacement cycles have been extended, reaching 1.5 to 2 years (still faster than PCs which is 3.5 years)
- This trend has resulted in significant slowdown of handset sales in 4Q08

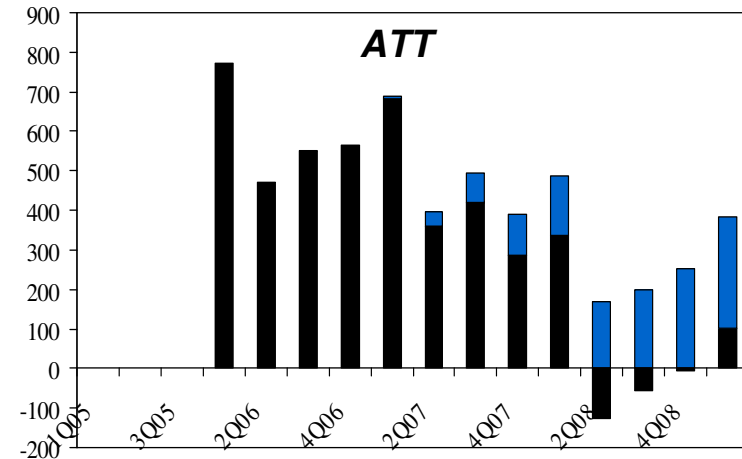
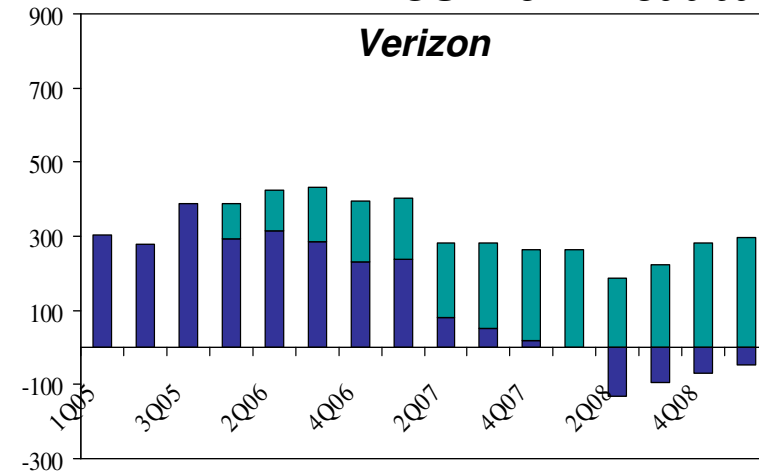
Source: Merrill Lynch

First broadband effect: there is a reduction in the growth of broadband subscribers, but gradual stabilization at a lower growth rate

US: Reduction in Primary Residential Lines by Quarter



US: New Broadband Accesses by Quarter



Sources: Operators

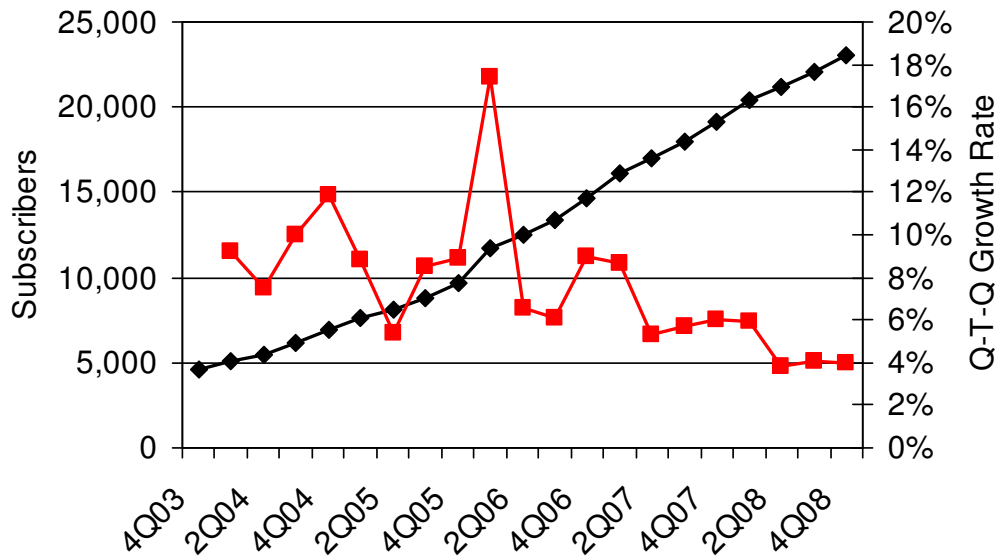
■ ADSL ■ Fiber

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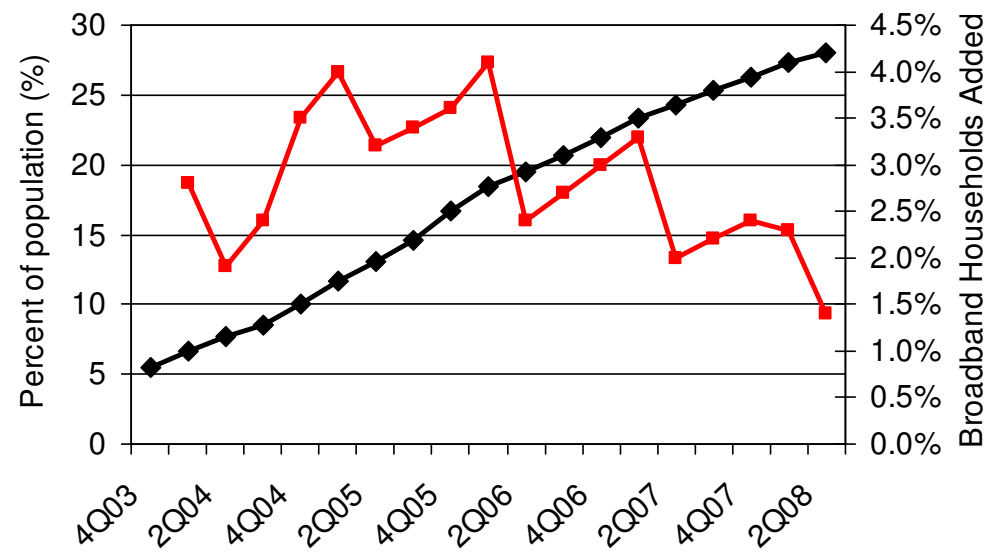
First broadband effect: this decrease can also be observed in other industrialized countries

Decrease in broadband growth

Germany: Broadband market



United Kingdom: Broadband Market



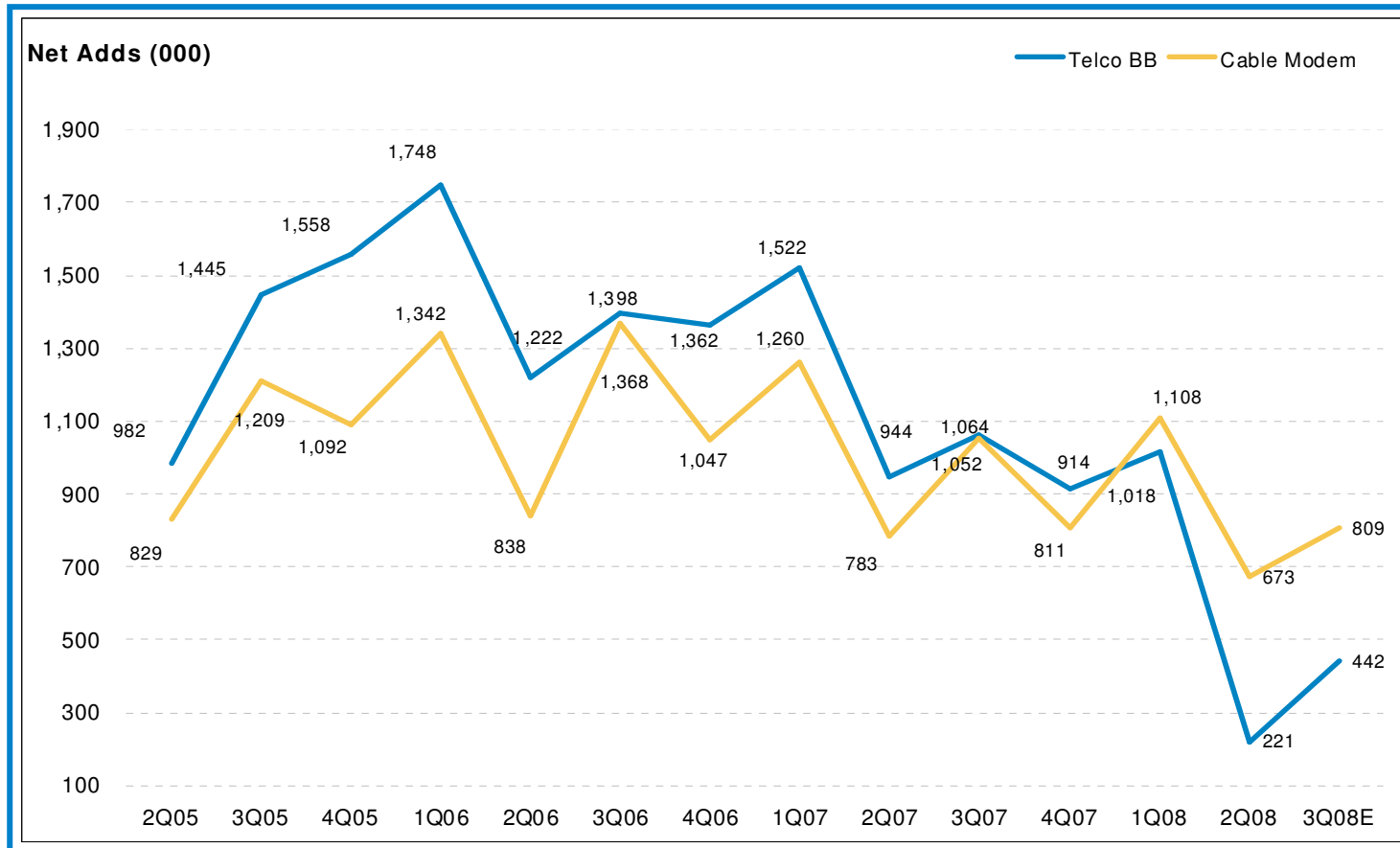
Sources: Merrill Lynch; analysis by the author

First broadband effect: In the industrialized world, the reduction in broadband growth is due to several simultaneous factors

- **Construction slowdown:** the reduction in the rate of residential construction has resulted in a net decline of new accesses
- **Household consolidation:** people moving back in with their parents, young adults living with roommates rather than independently is reducing the rate of household formation and driving down new subscriber growth
- **Substitution of fixed broadband for mobile broadband:** in certain European markets, the mobile internet via 3G is replacing fixed broadband
 - Certain market segments (such as students) which are impacted more by the economic situation tend to cancel its home fixed broadband access and consolidate its Internet access through mobile devices, complemented with fixed access at work or at the university
- **Decrease in confidence:** consumers tend to postpone the purchasing of products and services: ATT and Verizon have announced that the number of new subscribers to their broadband services have declined over 80%
- **End of promotions:** Certain market segments which have purchased broadband access through promotional discounts, have started to disconnect when the period of introductory discounts ends

Second Broadband effect: the reduction of telco broadband is, in some cases, also partly due to successful cable competition

US: New Broadband Accesses

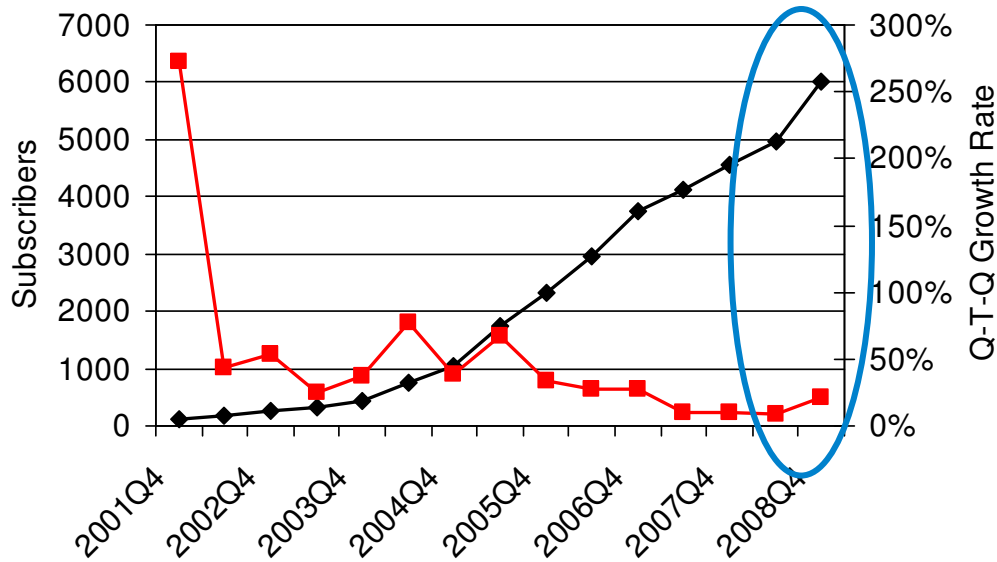


Sources: Company data, Morgan Stanley Research

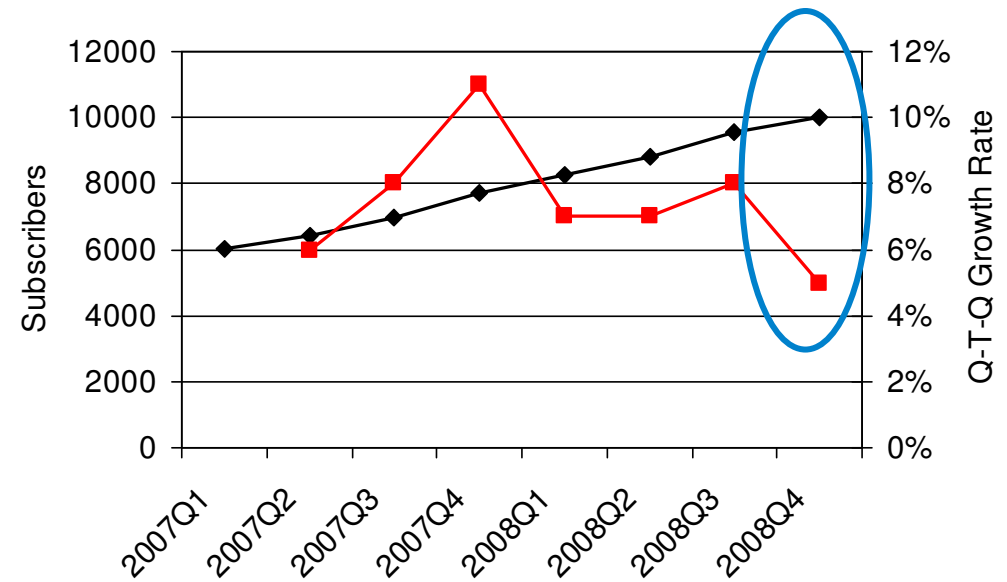
Third broadband effect: in emerging markets, the trend is not consistent because under situation of unmet demand, there could be still room for growth under economic crisis

Decrease in broadband growth

Mexico: Broadband market



Brazil: Broadband market

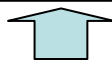


Sources: Merrill Lynch; analysis by the author

First CAPEX effect: The macroeconomic climate is affecting the levels of capital investment

Variables that impact the capex rate

Key Variables	<ul style="list-style-type: none"> • Expected return rate • Risk associated with the rate of return 		
Secondary Variables	Macro-economy	ICT industry	Firm level
	<ul style="list-style-type: none"> ○ Acceleration effect (Roller y Waverman, 2001) ○ Demographic and geographic characteristics ○ Economic cycle (Katz, 2003) ○ Generic regulatory framework 	<ul style="list-style-type: none"> ○ Industry regulation ○ Competitive intensity ○ Technological progress ○ Evolution of demand 	<ul style="list-style-type: none"> ○ Cost of capital ○ Debt leverage ○ Firm profitability



A reduction of the GDP growth rate of 1% leads to a decline of 0.7% in the investment rate

- The cost of capital for telcos is increasing in parallel with the other sectors of the economy
- Sprint is paying LIBOR + 2.5-3.0%
- Verizon is paying 200 “basis points” more than what they paid historically (8.95% on notes issued in 10/30)
- There is a net increase in WACC to 8.5%

First CAPEX effect: Data indicates so far a capital investment negative trend

CAPITAL INVESTMENT IN LATIN AMERICAN TELECOMMUNICATIONS

COMPANY	INVESTMENT 1996-2006 (in \$ billions)	INVESTMENT 2007-8 (in \$ billions)	2009 ANNOUNCEMENTS (in \$ billions)
Telefonica	24.785	10.547	•Telefónica expects total capex this year to be below 7.5 bn euros compared to 8.40bn euros last year
Telecom Italia	12.189	3.176	1.411
America Movil	10.282	9.283	3.224
Telmex International	7.925	2.914	•Reduced 2009 capex from 1,630 million to 1,100 million
Portugal Telecom	6.650	2.511	1.235

Sources: Unctad; Dow Jones; Deutsche Bank

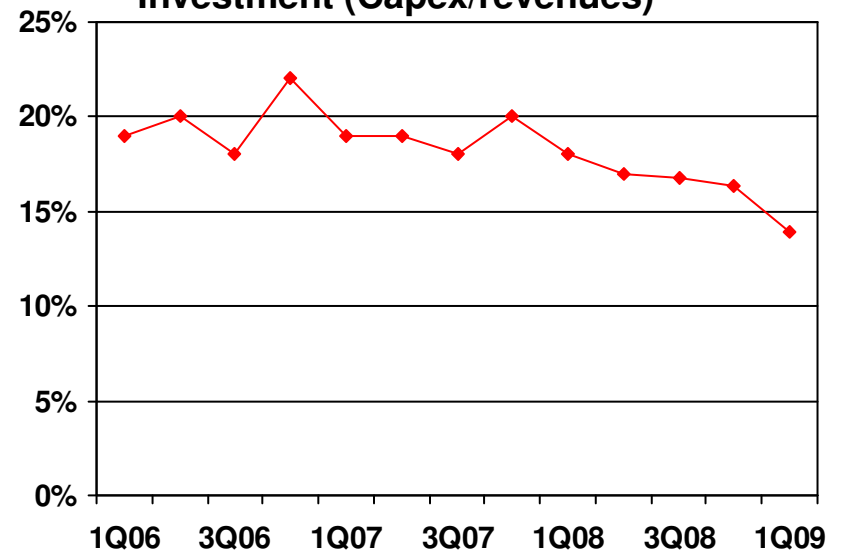
Second CAPEX effect: reallocation to high growth businesses

Verizon: Evolution of Capital Expenditures

Investment (in billion USD)

Sector	1H06	2H06	1H07	2H07	1H08	2H08	1Q09
Fixed	5.010	5.249	5.210	5.839	4.835	5.316	2.156
Mobile	3.178	3.440	3.388	3.115	3.250	2.923	1.551
Total	8.188	8.689	8.598	8.954	8.085	8.239	3.707

Investment (Capex/revenues)



Source: Operator

Third CAPEX effect: At the same time, we are witnessing a marked decline in IT spending

- Operators are reducing their IT investments in terms of postponing the launch of big systems projects and displaying considerable prudence in the conversion of pilot trials to big projects
- For example, Sprint has decided to postpone all modifications to its billing system, and any future migration in its systems architecture
- Simultaneously, having generated enough synergies as a result of its BellSouth acquisition, ATT has reduced its IT budget at the same time that it has outsourced a large portion of systems maintenance to an offshore Indian provider
- Finally, the migration costs of a new billing system at Comcast has obliged this cable TV operator to postpone its acquisition at least temporarily
- This tendency is confirmed by the fact that IBM Global Services and Infosys have had their revenues grow only 2% this quarter

Theoretically, the telecommunications sector should be less affected by the financial crisis

- The telecommunications sector should be less affected impacted by the financial crisis for two reasons:
 - The industry has had some experience on how to survive contraction cycles (see 2001)
 - The telecommunications business comprises a continuous flow of revenues, which is not the case with other more cyclical industries
- In moments of high volatility, industries with stable monthly revenues and constant demand become the most attractive investment targets since public infrastructure services represent a less risky option for institutional investors
- Debt, especially for large telco players, appears to be at manageable levels
 - Moderate to low leverage
 - Generally good/long debt maturity profiles, which results in lower refinancing risk in the short term
 - Low exposure to foreign exchange volatility due to hedges acquired in 2008
- Lack of access to capital markets could be compensated by access to vendor financing
- However, currency devaluation since mid- 2008 will result in higher capital expenditures relative to revenue generation
 - Most revenues are generated in local currency
 - 30% to 60% of capex is linked to the dollar

The information available until now indicates that the sector is cautiously moving through capex and furthering consolidation

- The degree with which the decline in consumption and capex is not as sharp as in the 2001-2 crisis is a function of both service penetration and the experience gathered by the sector in the prior cycle
- Platform-based competition provides operators with greater financial and operational flexibility to adapt to the new circumstances
- This cycle could accelerate the pace of consolidation
 - US: Embarq by Citizens in the US, Alltel by Verizon, ATT of Centennial
 - Brasil: Intelig by TIM, merger of Brasil Telecom and Oi in Brazil
 - Upcoming: in Europe (for example, broadband in Germany and other fixed telephony operators) and Latin America (CLECs in Mexico, ILECs in Colombia, cable in Argentina)
- Operational flexibility to adapt to new market conditions, product innovation and the possibility of managing the fixed and mobile product portfolio are probably the best options to face the challenge of the new cycle

Agenda

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- Assessing the impact of telecommunications stimulus plans
- Regulatory and policy implications

In response to the economic crisis, governments have begun to deploy incremental public infrastructure programs with some ICT focus

TELECOM INFRASTRUCTURE STIMULUS PROGRAMS

COUNTRY	ICT FOCUS (in US\$ billion)
United States	<ul style="list-style-type: none"> Launched a Broadband Stimulus program focused on providing service to unserved and underserved areas for \$7.2 billion
Australia	<ul style="list-style-type: none"> Government is planning to spend A\$ 4.7 billion of total A\$ 43 billion required for construction of the National Broadband Network
Singapore	<ul style="list-style-type: none"> Government will provide a grant of S\$ 750 million of S\$ 2.2 billion to support the roll-out of the fiber network
Sweden	<ul style="list-style-type: none"> Broadband government promotion comprised financial incentives to municipalities to fund 2/3 of total NGN investment (Euros 864 million)
Colombia	<ul style="list-style-type: none"> \$ 0.29 b (\$0.16 b in universal telephony, \$0.05 b in ICT education, \$0.03 b in Broadcasting, \$0.03 b in computing education and \$0.02 b in e-government)
Portugal	<ul style="list-style-type: none"> Government announced an 800-million-euro credit line for the roll-out of NGAN. The credit line is part of an agreement between the government and the operators, and is the first step in a 2.18-billion-euro plan to boost the country's economy.
Ireland	<ul style="list-style-type: none"> The government will invest 322 million in a National Broadband Scheme aimed at completing country coverage
Canada	<ul style="list-style-type: none"> Has relied on four programs to promote broadband development resulting in an overall investment of C\$ 300 million

Sources: Government announcements

How big are the broadband stimulus programs in terms of total spending in the technology?

UNITED STATES	<ul style="list-style-type: none">• 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
AUSTRALIA	<ul style="list-style-type: none">• The total program cost has been estimated at A\$43 Billion, It is expect to take 7-8 years to build the network which will deliver a minimum of 100Mbps to 90% of the population and 12Mbps to the remaining 10%• The investment program tackles an “investment failure” (e.g. no wireline NGAN investment, only 29% of broadband subscribers get speeds in excess of 8Mbps through ADSL2+; this slow rate of broadband development is affecting traffic, rare case of cable TV player purchasing ULL)

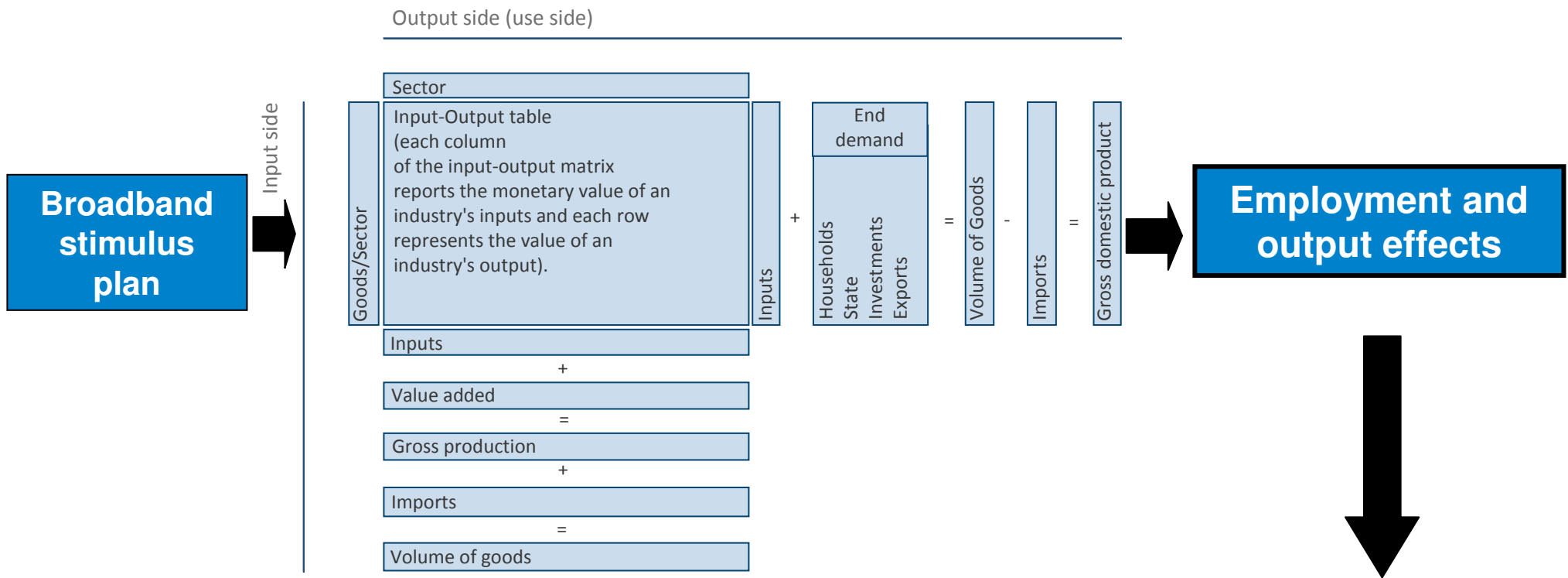
How many jobs will be generated as a result of the broadband stimulus plan?

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">• Regression based forecasting• Chain ratios

Three types of network construction effects exist

EFFECT	DESCRIPTION	EMPLOYMENT EXAMPLES
Direct jobs and output	<ul style="list-style-type: none"> • Employment and economic production generated in the short term in the course of deployment of network facilities 	<ul style="list-style-type: none"> • Telecommunications technicians • Construction workers • Civil and RF engineers
Indirect jobs and output	<ul style="list-style-type: none"> • Employment and production generated by indirect spending (or businesses buying and selling to each other in support of direct spending) 	<ul style="list-style-type: none"> • Metal products workers • Electrical equipment workers • Professional Services
Induced jobs and output	<ul style="list-style-type: none"> • Employment and production generated by household spending based on the income earned from the direct and indirect effects 	<ul style="list-style-type: none"> • Consumer durables • Retail trade • Consumer services

We use input-output tables to calculate the impact of broadband construction on employment and production



The interrelationship of these three effects can be measured through multipliers, which measure total employment change throughout the economy from one unit change on the input side. **Type I multipliers** measure the direct and indirect effects (direct plus indirect divided by the direct effect), while **Type II multipliers** measure Type I plus induced effects (direct plus indirect plus induced divided by the direct effect)

In the US, we estimate that the broadband stimulus plan will generate 128,000 jobs in network deployment over four years

			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	(Direct + indirect)/direct	1.83
	Type II Multiplier	(Direct + indirect + induced)/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

The US estimates are at the lower end of other country projections

COUNTRY	STIMULUS INVESTMENT (billion)	NETWORK DEPLOYMENT JOBS ESTIMATE	INVESTMENT PER JOB	SOURCE
UNITED STATES	\$ 6,390	127,800	\$ 50,000	Katz et al. (2009)
AUSTRALIA	\$ 31,340	200,000	\$ 156,700	Australian government
SWITZERLAND	\$ 11,630	114,000 (*)	\$ 102,000	Katz et al. (2009)
UNITED KINGDOM	\$ 7,463	211,000	\$ 35,369	Libenau et al. (2009)

(*) Only direct and indirect jobs

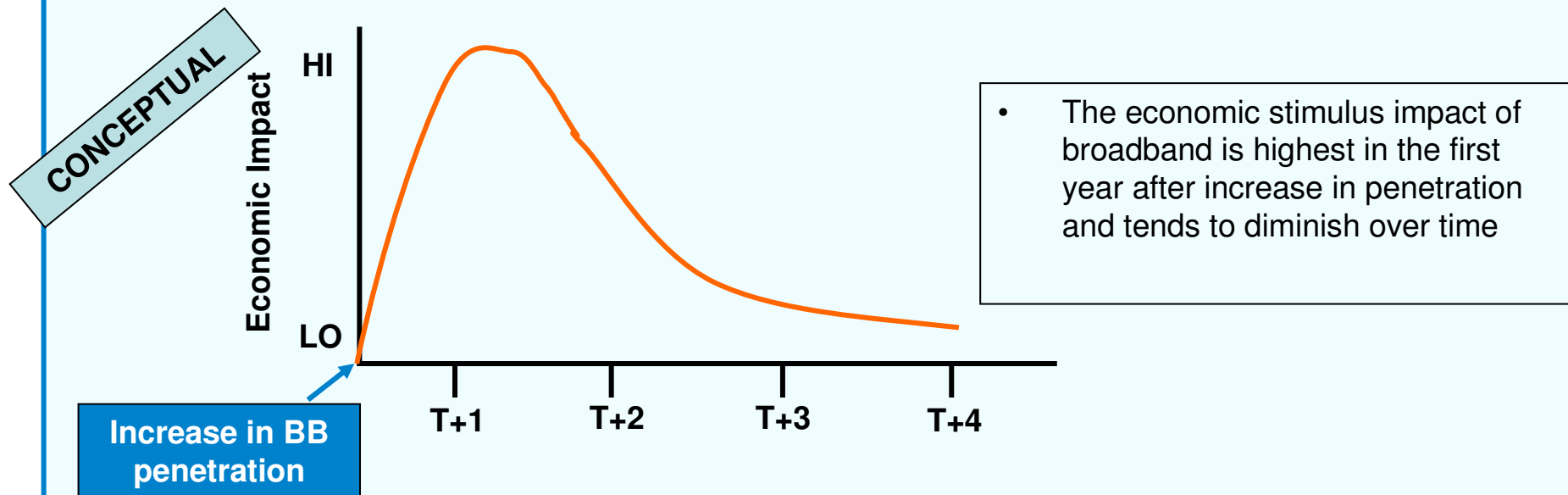
Once deployed, broadband infrastructure yields three network effects

Three types of network construction effects exist

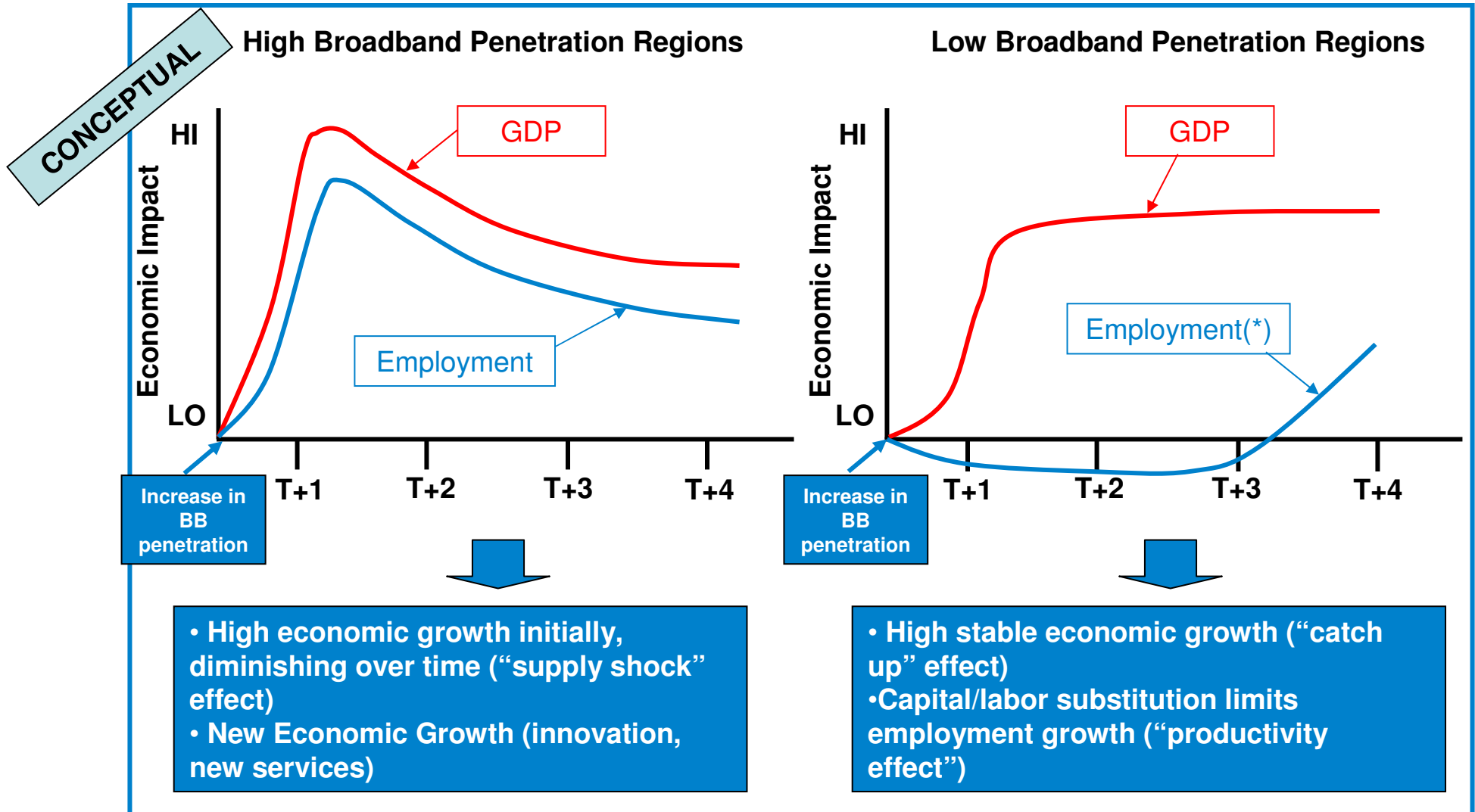
EFFECT	DESCRIPTION	EMPLOYMENT EXAMPLES
Productivity	<ul style="list-style-type: none"> Improvement of productivity as a result of the adoption of more efficient business processes enabled by broadband 	<ul style="list-style-type: none"> Marketing of excess inventories Optimization of supply chains
Innovation	<ul style="list-style-type: none"> Acceleration of innovation resulting from the introduction of new broadband-enabled applications and services 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Attract employment from other regions as a result of the ability to process information and provide services remotely 	<ul style="list-style-type: none"> Outsourcing of services Virtual call centers Core economic development clusters

Approach 1: Economic impact of broadband in terms of network externalities have been found to be significant

- Our analysis estimates the impact of increase in broadband penetration on rate of economic growth and job creation
 - Due to the effect of high broadband penetration growth in 2001, time intervals were calculated for three stages: 2000-1, 2001-2, 2002-3
 - In addition, GDP and employment data was adjusted through an Hodrick-Prescott filter to time series in order to normalize for trends and business cycle effects
- Aggregate results for the whole territory indicate that broadband penetration has a significant short-term effect on economic growth



Approach 1: Different economic impact profiles result from different levels of broadband penetration

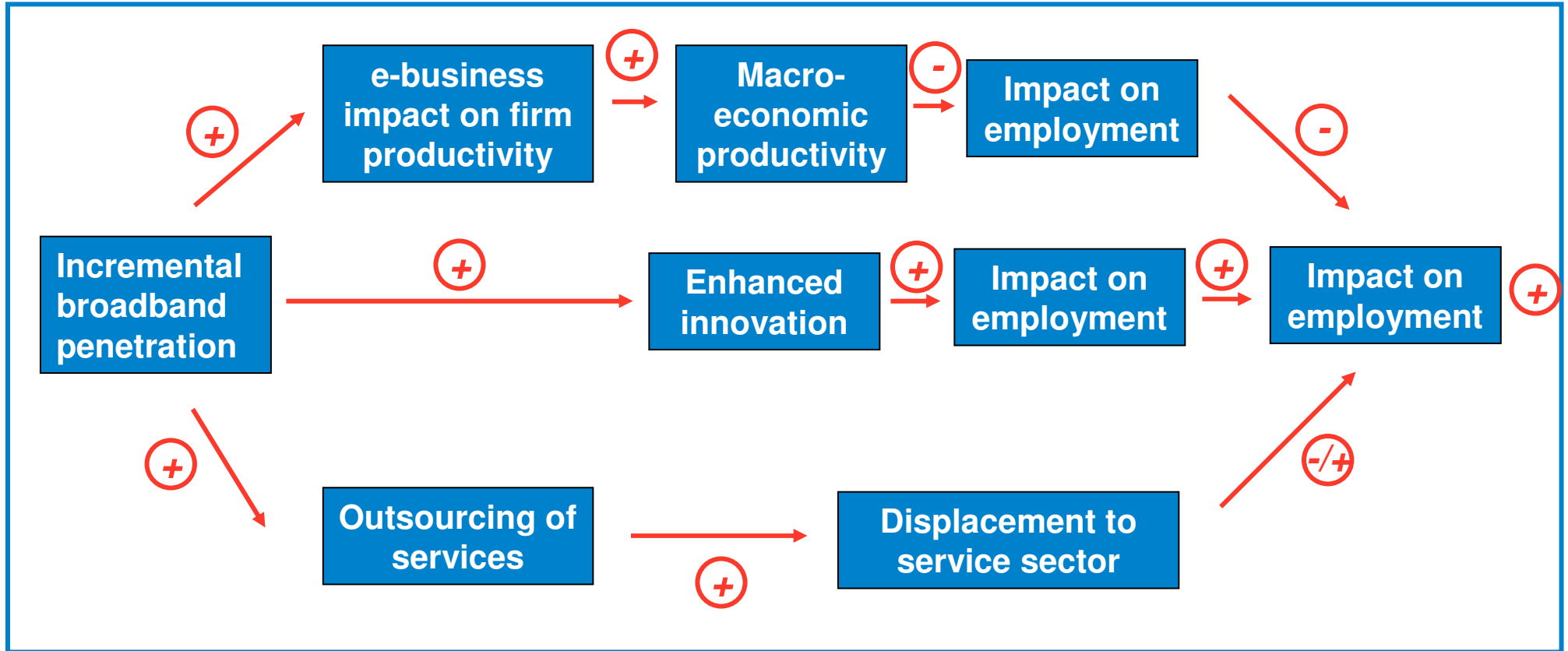


(*) Results are at a low significance level

Approach 1: An increase in broadband penetration of 5-7% results in 0.025 percentage points increase in output and over 160,000 jobs

- Most employment impact is concentrated in highest broadband penetration areas
- Employment impact is over three years, although we can extend effect over ten year period
- While we hypothesize the presence of a saturation effect, our models have not yielded yet significant results

Approach 2: Estimate network effects on employment by deconstructing three simultaneous effects and applying ratios

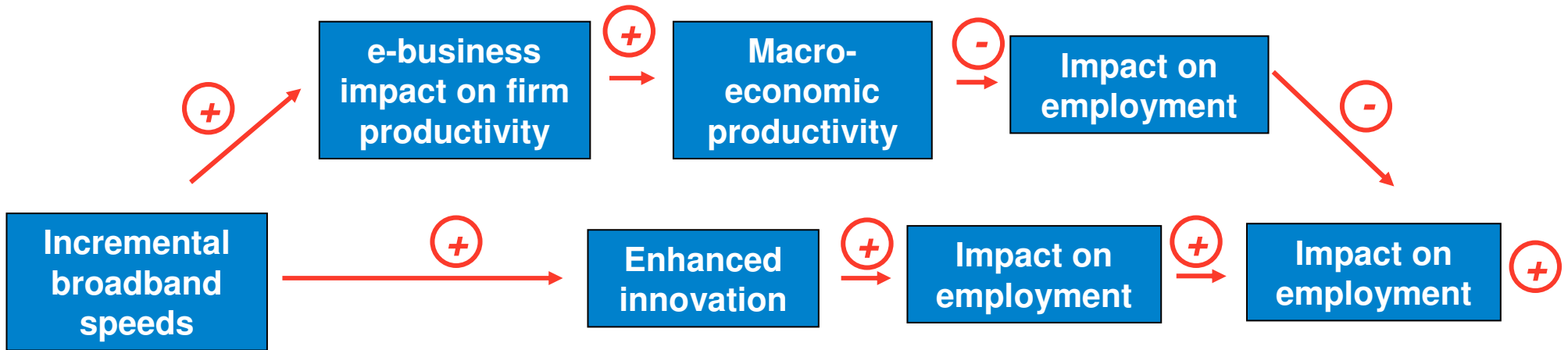


Note: This causality chain was adapted from a model originally developed by Fornefeld et al., 2008 in a report for the European Commission

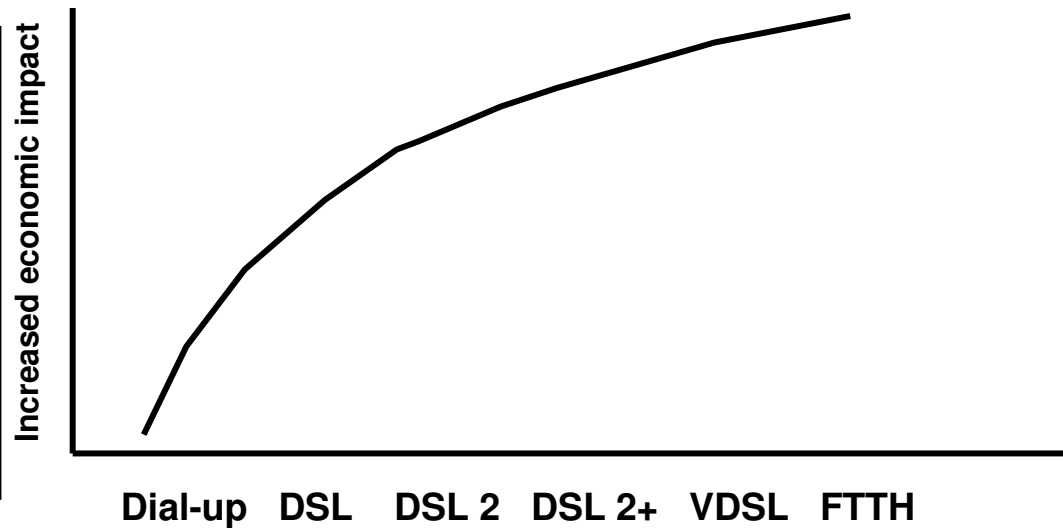
Approach 2: We estimated that network externalities resulting from the US broadband stimulus program could result in 136,000 jobs, although there is a high level of uncertainty of ultimate impact

		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

Finally, we are starting to research incremental socio-economic impact of NGAN



Application	Download speeds		
	500 Kbps	5 Mbps	50 Mbps
Google home page	0.3 sec	0.03 sec	0.003 sec
10 Mbs worksheet	150 sec	16 sec	1.6 sec
High quality videostreaming	Very low resolution	Medium resolution	High resolution



Source: SQW (2006)

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Why Should Governments Invest in NGN in the Current Environment?

- Generate jobs and output as a result of the construction of networks
 - Estimates for network construction jobs are fairly robust and consistent with prior research
 - Network effect multipliers exhibit higher level of uncertainty and therefore have to be ranged
 - Employment multipliers: between 1.92 and 3.42
 - Output multiplier: every Euro invested in infrastructure, generates 0.90 Euros in domestic value added
- Promote innovation, and creation of new businesses once the networks are deployed
 - Accelerate development of core regions
 - Attract new industries, with employment potential

Where should government stimulus be focused?

- Supply vs. demand programs?
- High penetrated areas vs. low penetrated areas?
- Digital divide or innovation?
- Role of private sector: 50% Public Private Partnerships or state focus (medium term: Australia, or long term)?
- Grants (US) or loans (Portugal)?
- Technology neutral (US) or specific (Singapore, Australia)?
- Selection and evaluation metrics: employment, productivity (difficult to measure), digital divide (Ireland, US)

Policy and research implications

- Job fulfillment is driven by success in implementing job creation and retention programs 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:
 - Economic impact of NGAN?
 - Is there a saturation effect limiting broadband impact?