

**TELECOM ADVISORY
SERVICES, LLC**

**The future of telecommunications
regulation**

June 5, 2007

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1. Introduction

The formulation of telecommunications policy and definition of regulatory frameworks is at a transition point

- The phase opened with the privatization of BT by the Thatcher administration and the opening of competition after the formulation of equal access in LD and the Telecommunications Act in the United States is reaching a point of transition
- The expectation of an industry comprised of a multiplicity of players at each stage of the value chain competing based on their own services platforms is giving way to a structure dominated by a few incumbents, three at best
- Furthermore, the need to upgrade access networks to accommodate growing bandwidth requirements can only be met by new networks, exhibiting high economies of scale; this increases the reliance on incumbents, which are the only players capable of committing large capital
- Finally, while the industry has achieved tremendous growth, particularly in wireless and, less so, in broadband, the “digital divide” risks becoming a permanent fixture of future societies unless governments act decisively
- Based on these issues, it is pertinent to start to examine the future role of regulation and telecommunications policy
 - What should the retail pressure points be (wholesale pricing, retail pricing, access, others)?
 - Is the asymmetric model still viable?
 - How do we ensure that adequate capital is invested in the future networks?

The following presentation covers four areas of analysis

- What have we learned from the past years of regulatory experience (review of the US case of unbundling)?
- What are the trends that are driving a reexamination of the regulatory framework?
- What is the expected new mode of regulation?
- Do we expect a convergence of regulatory models across countries or different models?



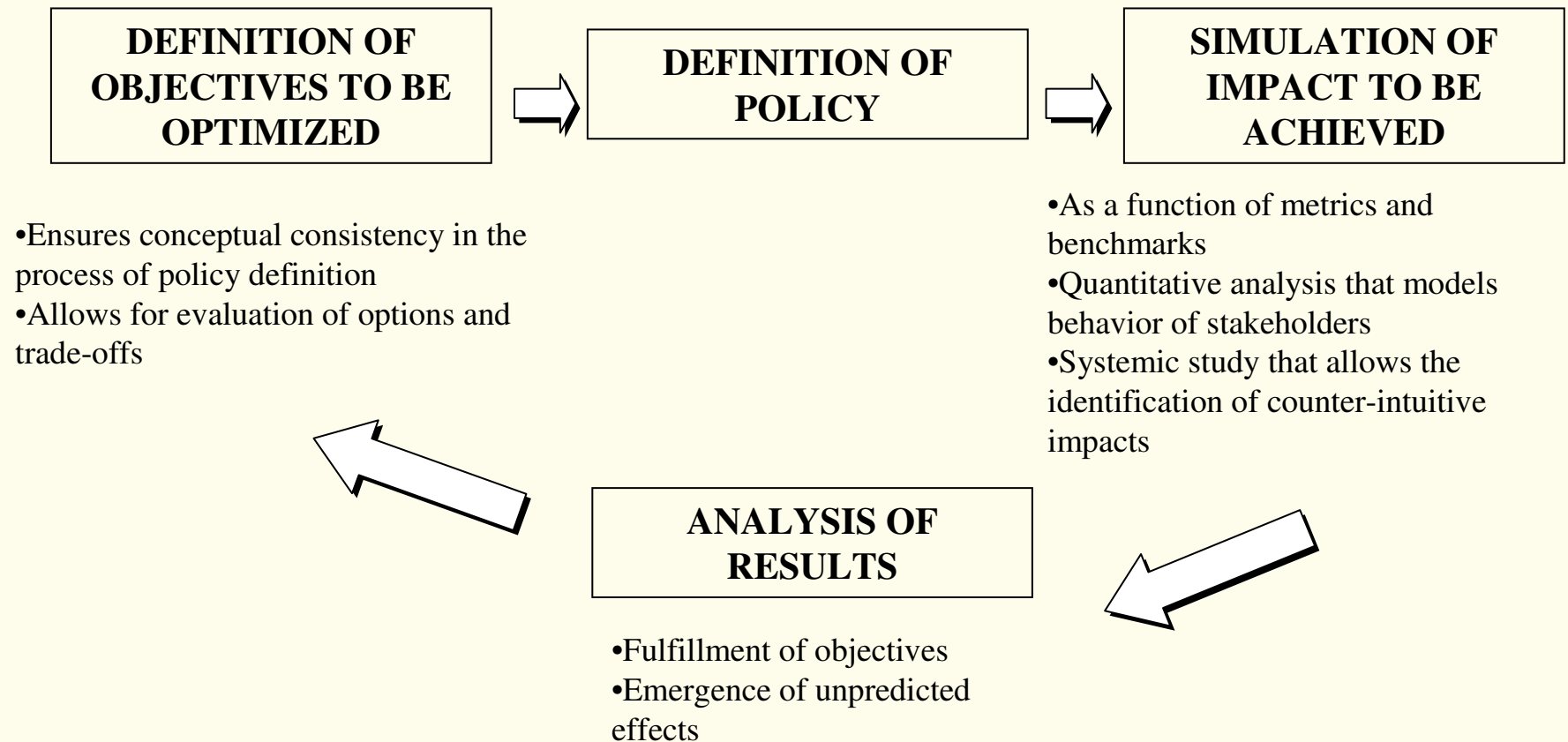
2. Lessons from the past

Key messages

- Regulatory policies, as is the case with any strategic plan, should be defined based on the need to achieve key objectives
- Conceived as a public good, the objectives most commonly cited refer to the need of making the services accessible to broadest universe of users
- However, in many instances the implementation of policies driven by universal access or equality concerns may result in contradictory or negative effects
- Furthermore, it is common to see that the lack of careful definition of objectives to be maximized can lead to misunderstandings and sterile debate
- Therefore, it is critical that the definition of regulatory policies be preceded by a debate of which objectives are we trying to maximize
- Furthermore, having defined those objectives it is critical to conduct the policy definition process based on the quantitative assessment of potential impact; once the policies have been implemented, it is critical to conduct an assessment of their results in order to learn from or successes and mistakes

A process aimed at defining a regulatory policy framework typically involves four tasks

FORMULATION OF REGULATORY POLICIES



As a starting point, regulatory policies in telecommunications have to be defined based on a clear stipulation of objectives to be attained

- In general terms, the objectives that are typically raised when it comes to defining regulatory frameworks evoke the provisioning of services at reasonable prices
 - Access by the population to advanced information and communications technologies and services (for example, broadband)
 - Reduction of prices to prevent them from becoming an obstacle to service adoption and usage (mobile roaming)
 - Closing of the digital divide
- Beyond these objectives, policy makers tend to mention (albeit less frequently) those referred to the need to increase adoption of telecommunications services by the productive side of the national economy
 - Increase of productivity of labor
 - Export promotion
 - Creation of geographic clusters of economic growth
- Finally, there are other objectives that are rarely mentioned publicly but are brought up in all internal discussions
 - Consolidation of “national champions”
 - Gathering of resources for the national treasury as a result of fiscal policies or license auctioning
 - National security and cultural hegemony

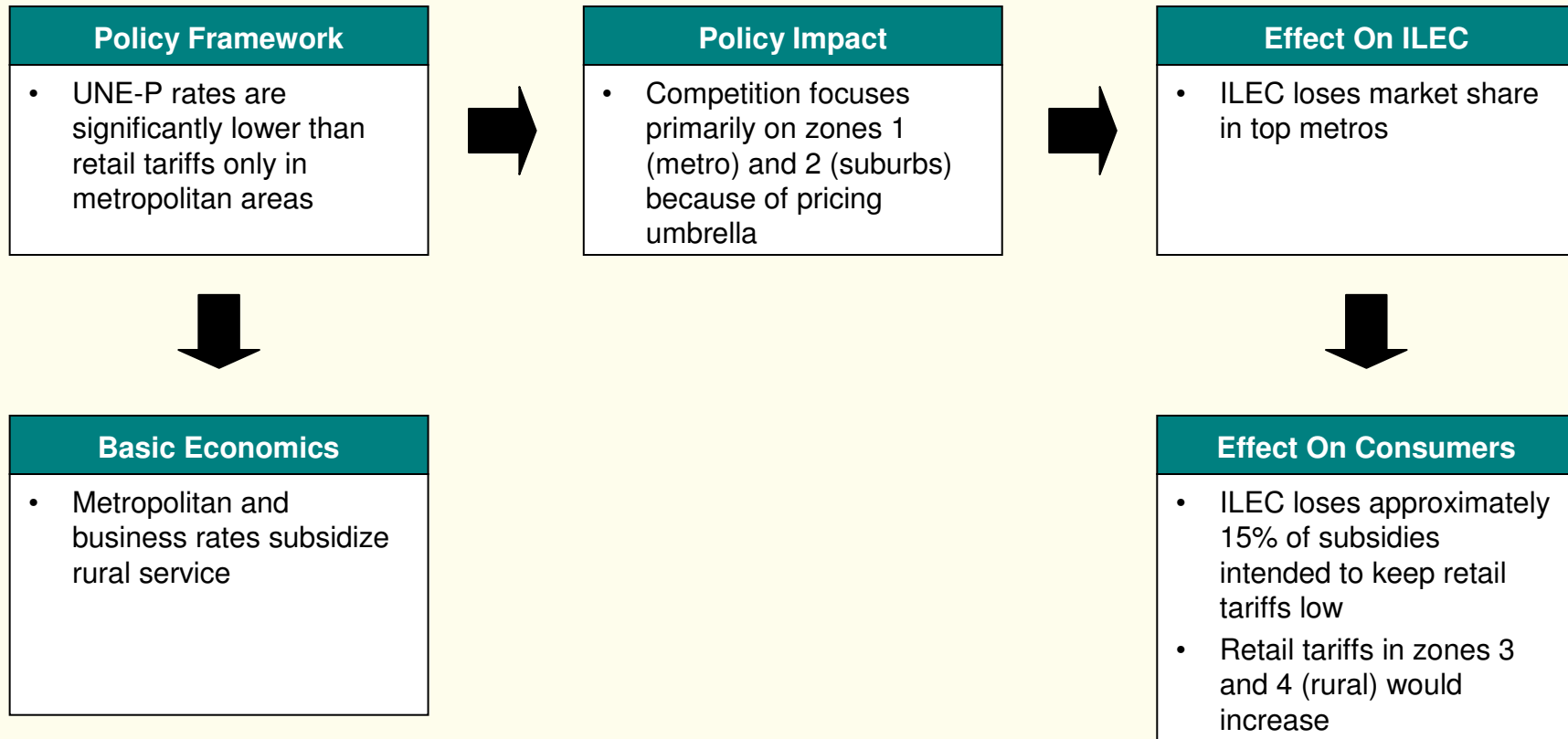
In many cases, the lack of analysis of the potential impact of the policy might lead to a result that is contrary to the original intent

IMPACT OF LOCAL LOOP UNBUNDLING IN THE UNITED STATES

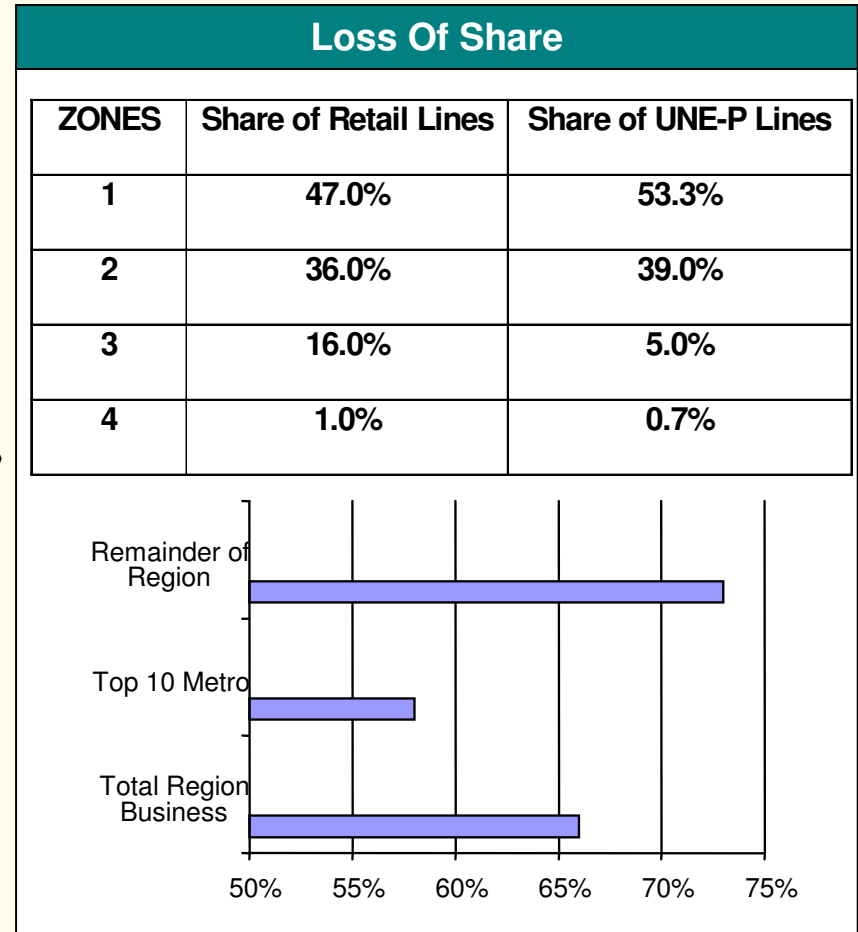
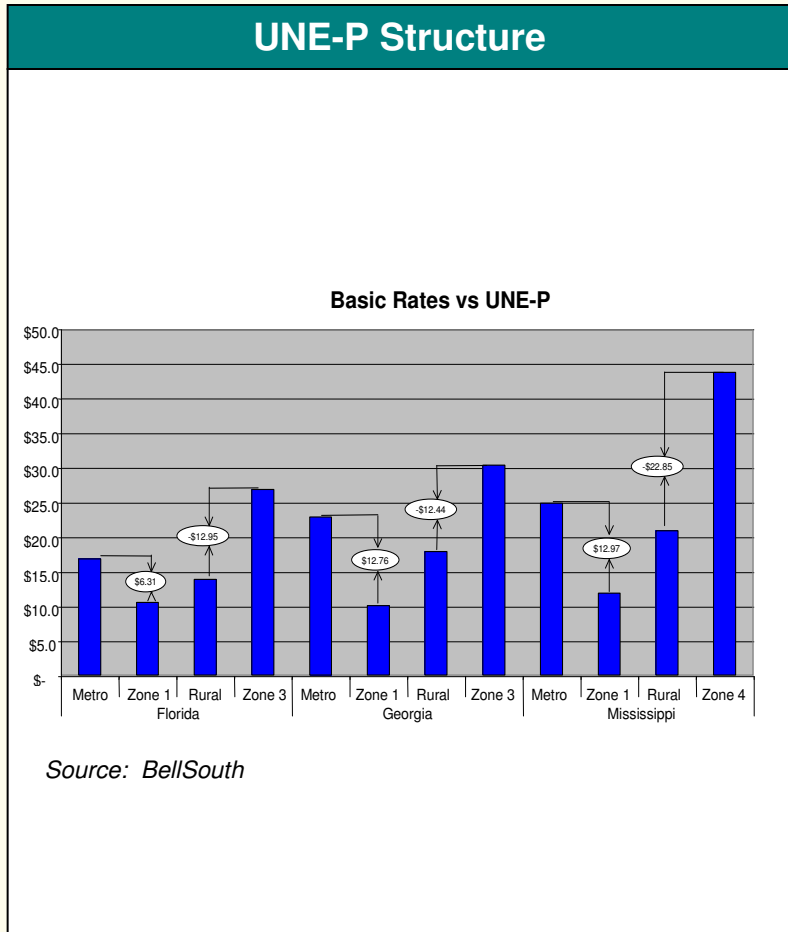
- Wholesale price control of unbundled loops led to an erosion of subsidies utilized to attain universal service objectives
- Unbundled local loops resulted in a negative impact on voice service quality and affected the resilience of the public network
- Local loop unbundling policies benefited upscale residential markets in metropolitan markets where cream-skimming competition usually develops
- Contrary to the theory of investment ladder, loop loop unbundling policies resulted in a significant reduction in the rhythm of innovation and capital investment

Loop unbundling rates led to an erosion of universal service subsidies

UNITED STATES: FIRST NEGATIVE IMPACT OF UNBUNDLED LOOPS



First, the unbundling rate structure led to the incumbent's share erosion in urban and suburban zones, where competition typically developed



As a result, share erosion in metro markets drove a decline in subsidies, and a potential increase in retail rural rates

| BellSouth: Subsidies at time of policy | |
|---|---|
| State | Total High Cost Annualized Projected Support |
| Alabama | \$88,985,246 |
| Florida | \$92,717,068 |
| Georgia | \$97,059,492 |
| Kentucky | \$45,924,218 |
| Louisiana | \$80,802,192 |
| Mississippi | \$139,458,202 |
| North Carolina | \$46,182,107 |
| South Carolina | \$58,196,148 |
| Tennessee | \$42,218,880 |
| Total | \$691,543,573 |



Impact Of Share Loss On Subsidies

- If 83% of line losses are only in the zones 1 and 2, most often in zone 1
- The incumbent loses 15% of subsidy potential

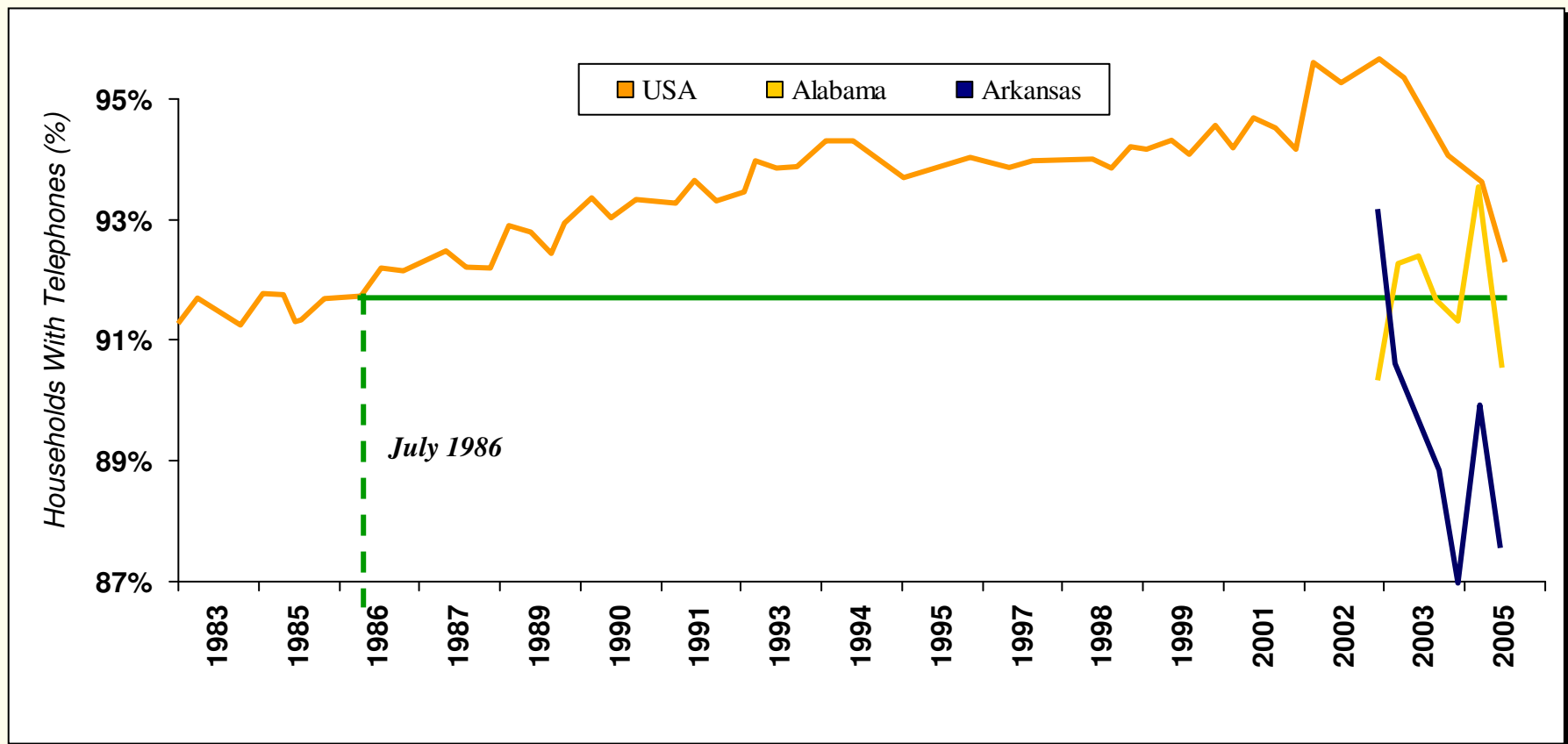


Impact On Retail Rates

- Retail rates in zones 3 and 4 will increase (either 1FR or other components of service basket: directory assistance)

The erosion of subsidies could be linked to a decline in teledensity in disadvantaged regions of the United States

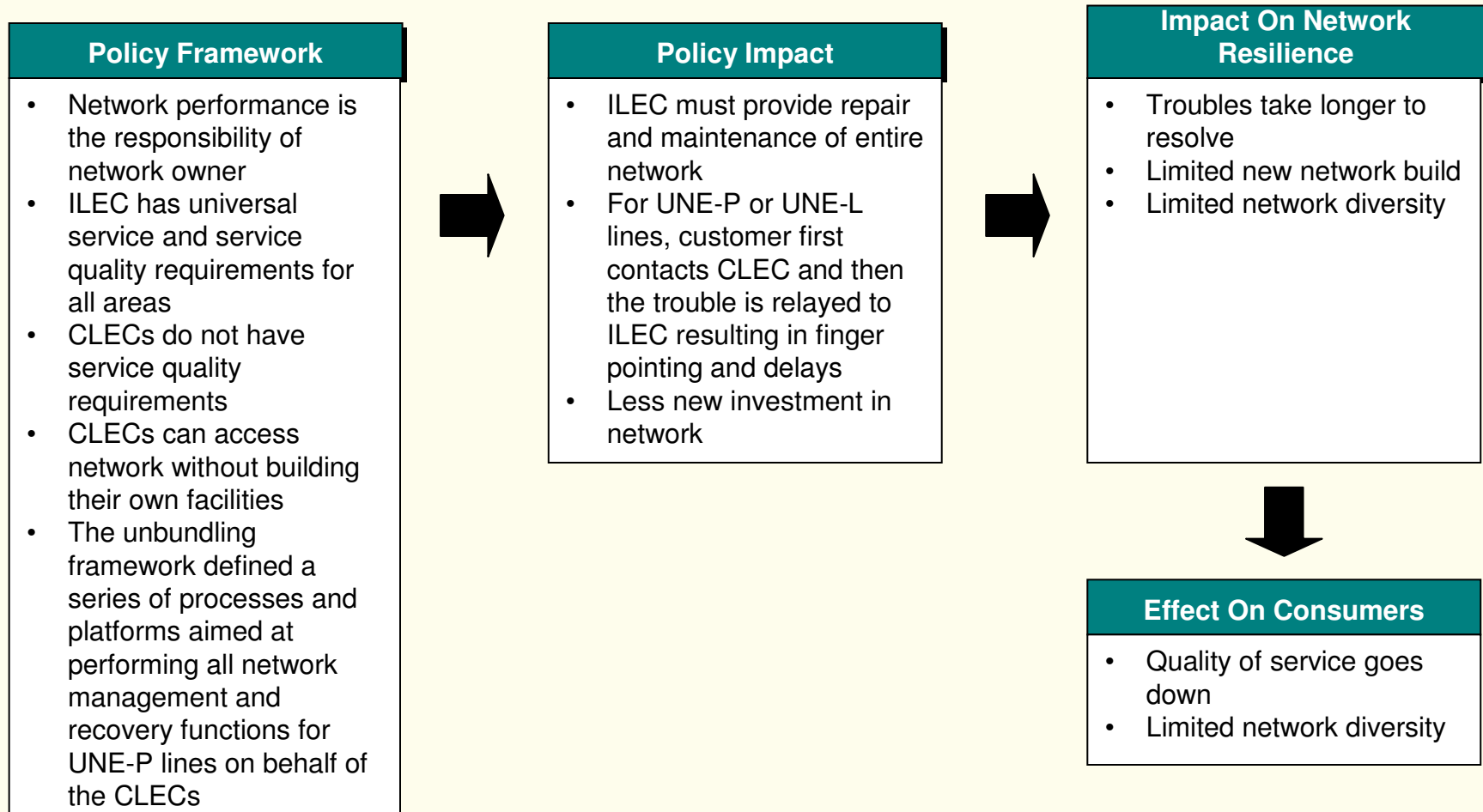
UNITED STATES: PERCENTAGE OF HOUSEHOLDS WITH TELEPHONE SERVICE



Source: Gabel et al. (2005)

Local loop unbundling has negatively affected the resilience of the public network

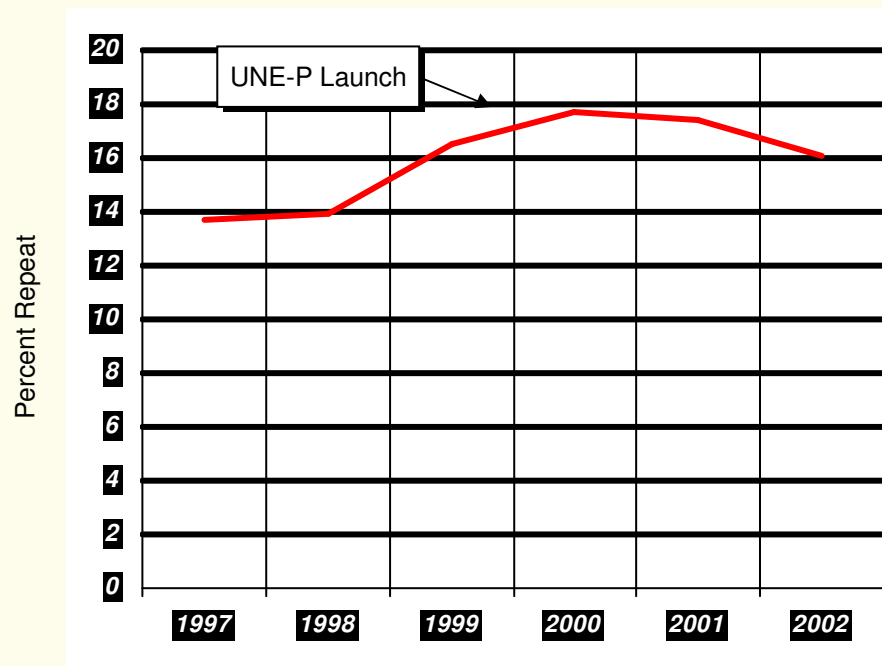
UNITED STATES: SECOND NEGATIVE IMPACT OF UNBUNDLED LOOPS



The launch of local loop unbundling caused a spike in trouble reporting and repair intervals that are just now being fixed

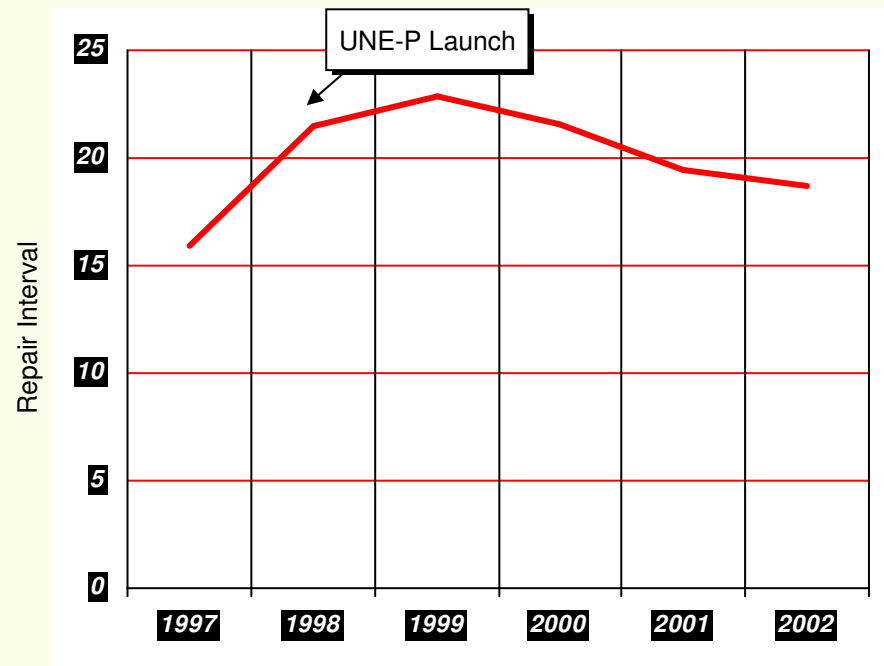
BELLSOUTH: SERVICE QUALITY INDICATORS

Repeat Out Of Service Troubles As A Percent Of Initial



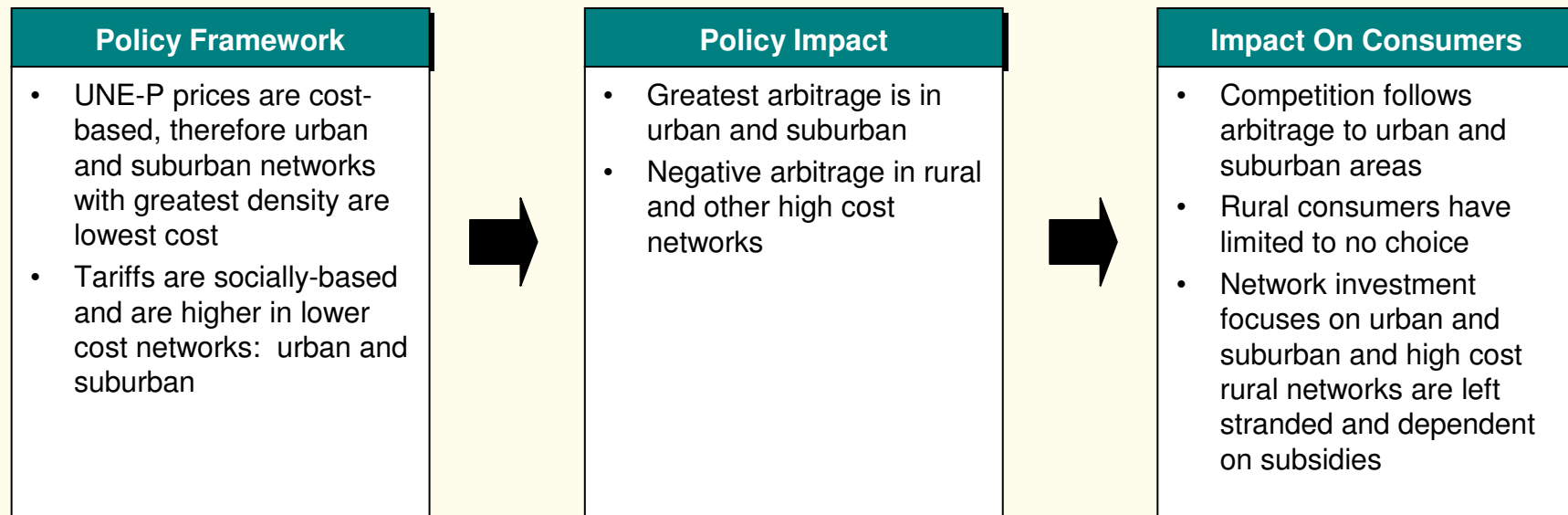
Source: ARMIS Report 43-05

Out Of Service Repair intervals



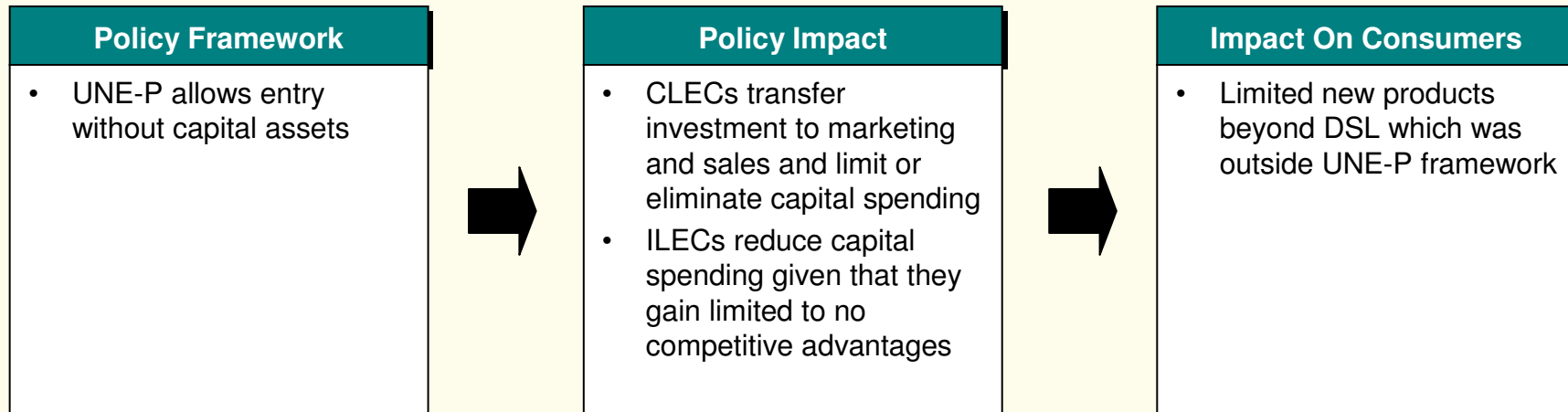
In the US, Local loop unbundling benefits accrued primarily to higher end consumers

UNITED STATES: THIRD NEGATIVE IMPACT OF UNBUNDLED LOOPS

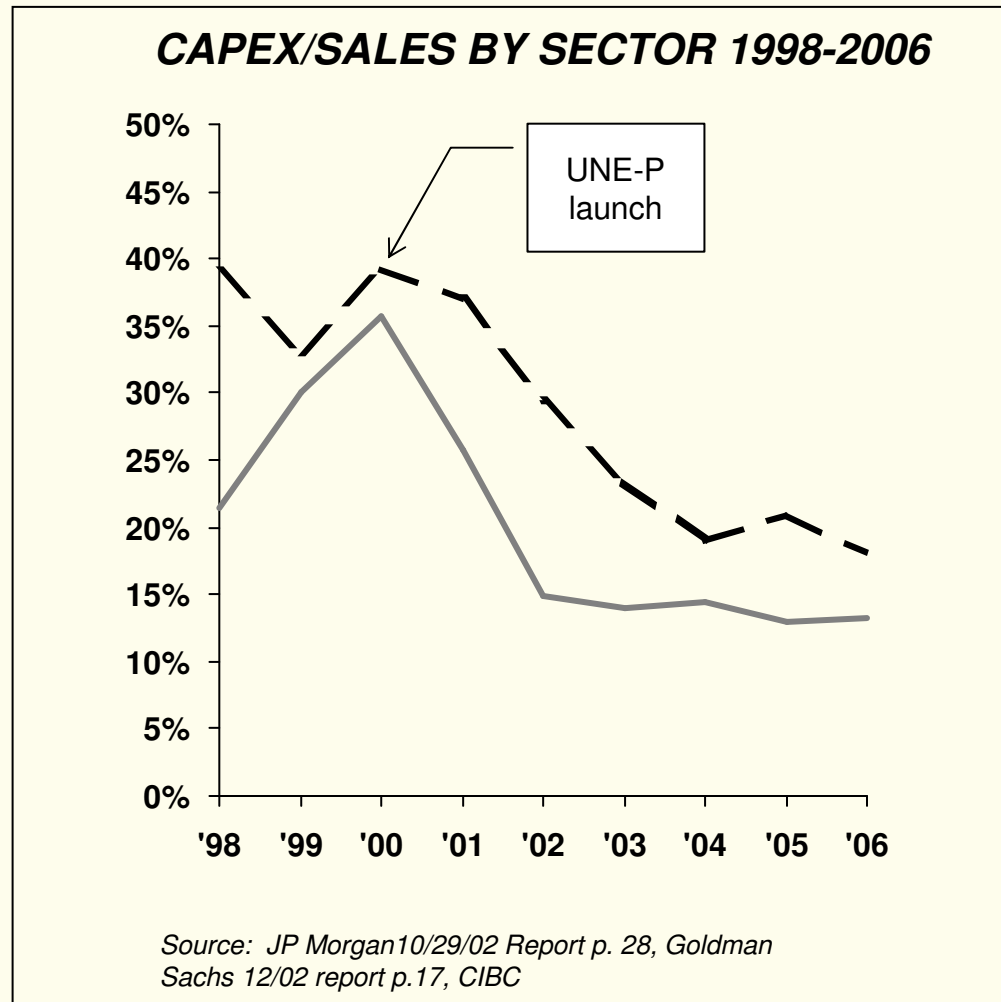


Voice local loop unbundling resulted in a significant slow down in innovation and new investment

UNITED STATES: FOURTH NEGATIVE IMPACT OF UNBUNDLED LOOPS



Voice Loop unbundling has resulted in a significant slow down in innovation and new investment: product offers were the same and severely reduced capital spending



In other cases, regulatory policies can satisfy objectives to be achieved but, in addition, have an impact in other relevant areas

- Pro-competition policies can dramatically affect the aggregate profitability of an industry...
 - Price wars
 - Over-investment in infrastructure
 - Over-spending in functions and activities which are not linked to the production of services (e.g. Advertising)

- ...or the loss of jobs, ...
 - Resulting from the need to recover M&A premiums by generating synergies

- ...or the loss of resources by frictional effect
 - Lateral spending driven by either acquisitions or divestitures

For the original AT&T, the changes in regulatory policy and consequent management decisions were disastrous

AT&T STRUCTURE (1954-2005)

| | OPERATING IMPACT | FINANCIAL IMPACT |
|---|---|---|
| Vertically integrated monopoly (1954-1983) | <ul style="list-style-type: none"> • Reduced local competition, especially in residential markets • Little competition in long distance • Monopoly advantages | <ul style="list-style-type: none"> • The cost of separation amounted to \$15 billion¹ <ul style="list-style-type: none"> – Acces infrastructure: US\$11,3 billion – Inter-intra LATA separation: US\$1.6 billion – Legal: US\$0.9 billion – Switching: US\$0,7 billion – Redundant operator services: US\$0.5 billion |
| Structural separation (1984-1989) | <ul style="list-style-type: none"> • Intense long distance competition • Not allowed to enter in local or wireless businesses | <ul style="list-style-type: none"> • Between 1984 and 1989, ATT's annual net income stayed at US\$1,94 billion |
| Vertical reintegration (1990-2000) | <ul style="list-style-type: none"> • Hypercompetitive LD market as result of RBOC entry • Acquisition costs of McCaw, Media One, Telepoort and Capex for construction of redundant networks | <ul style="list-style-type: none"> • The acquisition costs of Teleport (US\$11.3 billionm), McCaw (US\$11.5 billion), Media One (US\$44 billion) rrepresented accumulated costs of US\$66.8 billion without any vertical or horizontal integration advantages² |
| Separation (2001-2005) | <ul style="list-style-type: none"> • Intense competition in Long Distance • No possibility of entering local segment • No more revenues from wireless after sale of business | <ul style="list-style-type: none"> • Between 2003 and 2005 ATT EBITDA declined from US\$10.142 billion to US\$7.174 billion² |

Sources: (1) Kraus, C.R. y Duerig A.R. (1988); (2) Annual Reports AT&T

The deregulation of the US local telecommunications market resulted in substantial employment losses, a portion of them due to over-investment

US: LOSS OF EMPLOYMENT IN THE TELECOMMUNICATIONS SERVICE SECTOR

| | JOB LOSSES |
|---------------------|-------------------|
| Jan 2001 – Dec 2002 | 135,000 |
| Feb 2003 | 6,169 |
| March 2003 | 2,428 |
| April 2003 | 11,397 |

Source: Columbia Insitute for Tele-information

In conclusion, one of the most important lessons learned from the US experience of past years is the importance of avoiding over-regulation

US: LESSONS LEARNED FROM THE REGULATORY EXPERIENCE

- Plan for piloting of decisions in order to base policy decisions on empirical evidence rather than opinions or qualitative predictions
- Assume a global and integrated vision of the regulatory process to avoid the “parcelization” of policies and gain the ability to understand the systemic impact of all initiatives
- De-bureaucratize the regulatory process
- Use subsidies for universal service to resolve digital divide problems rather than relying on price manipulation
- Eliminate regulation of wholesale and retail prices, intervening only when there is no effective competition
- Plan for the convergence of regulatory frameworks as the platforms start converging
- Recognize that, since the industry is being affected by a new cyclical, introduce adjustment mechanisms that are counter-cyclical (pricing?)



3. Drivers of future regulatory frameworks

The telecommunications industry will be confronting a new wave of regulation driven by five economic and political trends

- 1 • Confirmation of the role of information and communications technologies as platform for promoting social and economic development
- 2 • A growing return to scale in transport, distribution and access networks combined with an erosion of economies of scale in content production
- 3 • Migration of productive capacity and innovation in high technology to emerging economies, particularly Asia
- 4 • Entry of private equity and hedge funds which are acquiring financial and operational control of telecommunications operators
- 5 • Increasing importance of sub-sovereign initiatives, with state and local governments assuming responsibility for deploying infrastructure and services

The telecommunications industry will be confronting a new wave of regulation driven by five economic and political trends

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- Confirmation of the role of information and communications technologies as platform for promoting social and economic development

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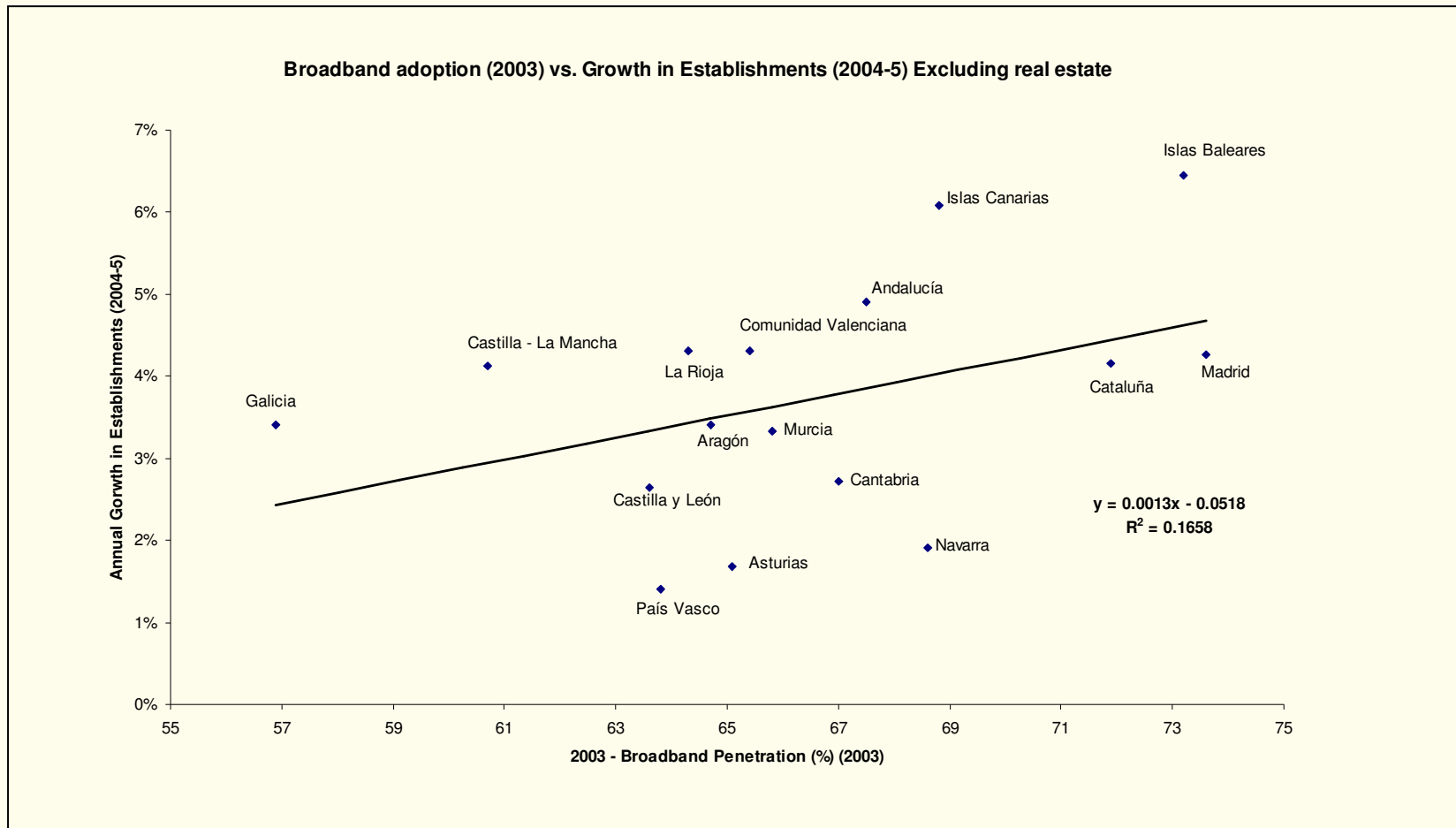
Key messages

- Research conducted over the past ten years has shown the impact that ICT, particularly telecommunications, have on economic growth and society as a whole
 - Productivity of ICT-intensive industries with spill-over effects on non-ICT intensive sectors
 - Job creation and enablers of labor cost arbitraging
 - Distribution efficiencies (price signalling, logistics, etc.)
- The assessment of socio-economic impact has been made primarily after observing the spectacular changes in technology adoption that occurred during the 1990s
- The changes were fostered by two drivers: policy changes and technology innovation (with consequent price dramatic improvements)
- Yet, looking forward we need to determine whether the policy frameworks predicated on unrestricted liberalization of the past decade are appropriate going forward
 - Will those frameworks continue to promote innovation and infrastructure investment?
 - Or, alternatively, could they play a negative role having an ultimate effect in limiting future ICT socio-economic impact?

Research conducted until now has proven without any doubts the socio-economic impact of ICT

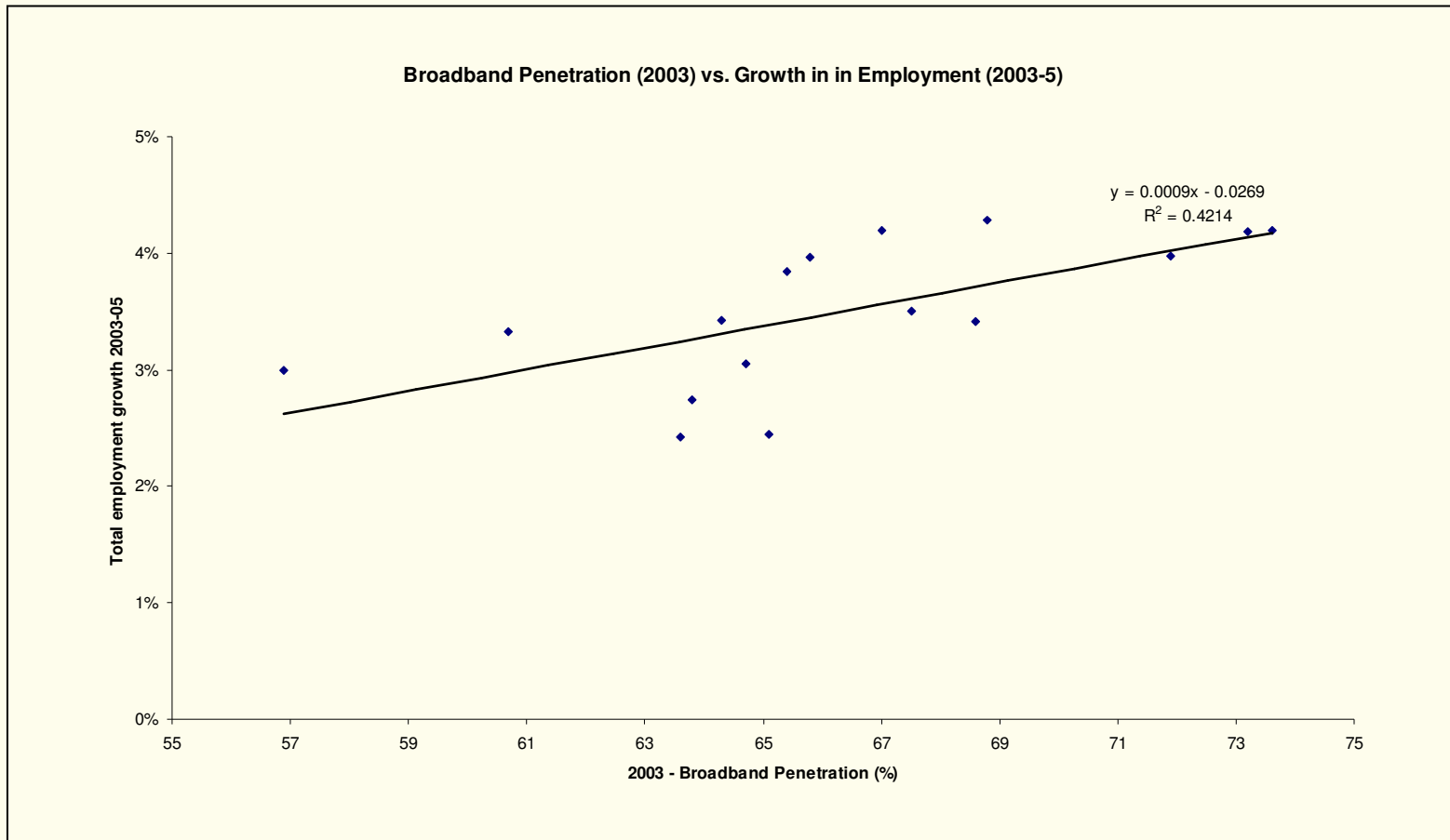
| AREA OF IMPACT | BENEFIT |
|----------------------------------|---|
| Productivity | <ul style="list-style-type: none"> •Total Factor productivity in ICT intensive and non intensive industries |
| Creation/location of enterprises | <ul style="list-style-type: none"> •Relocation of enterprises as a function of availability of high capacity telecommunications (as one of many factors) and quality of life (driven by communications services availability in hospitals, schools, etc.) |
| Employment | <ul style="list-style-type: none"> •Creation of employment resulting from the relocation of enterprises in search of labor cost arbitrage •Creation of self-employment due to communication services availability •Generation of employment for the manufacturing and installation of telecommunications equipment |
| Economic growth | <ul style="list-style-type: none"> •Strengthening of economic activity of industrial sectors with high transaction costs (trade, finance, etc.) •Consumer surplus generated by new telecommunications services, reduction in travel time, etc. |

For example, our analysis has shown that broadband penetration in Spain is driving increase in the number of private sector establishments



Sources: Instituto Nacional de Estadística – INE, Directorio Central de Empresas – DIRCE, TAS Analysis

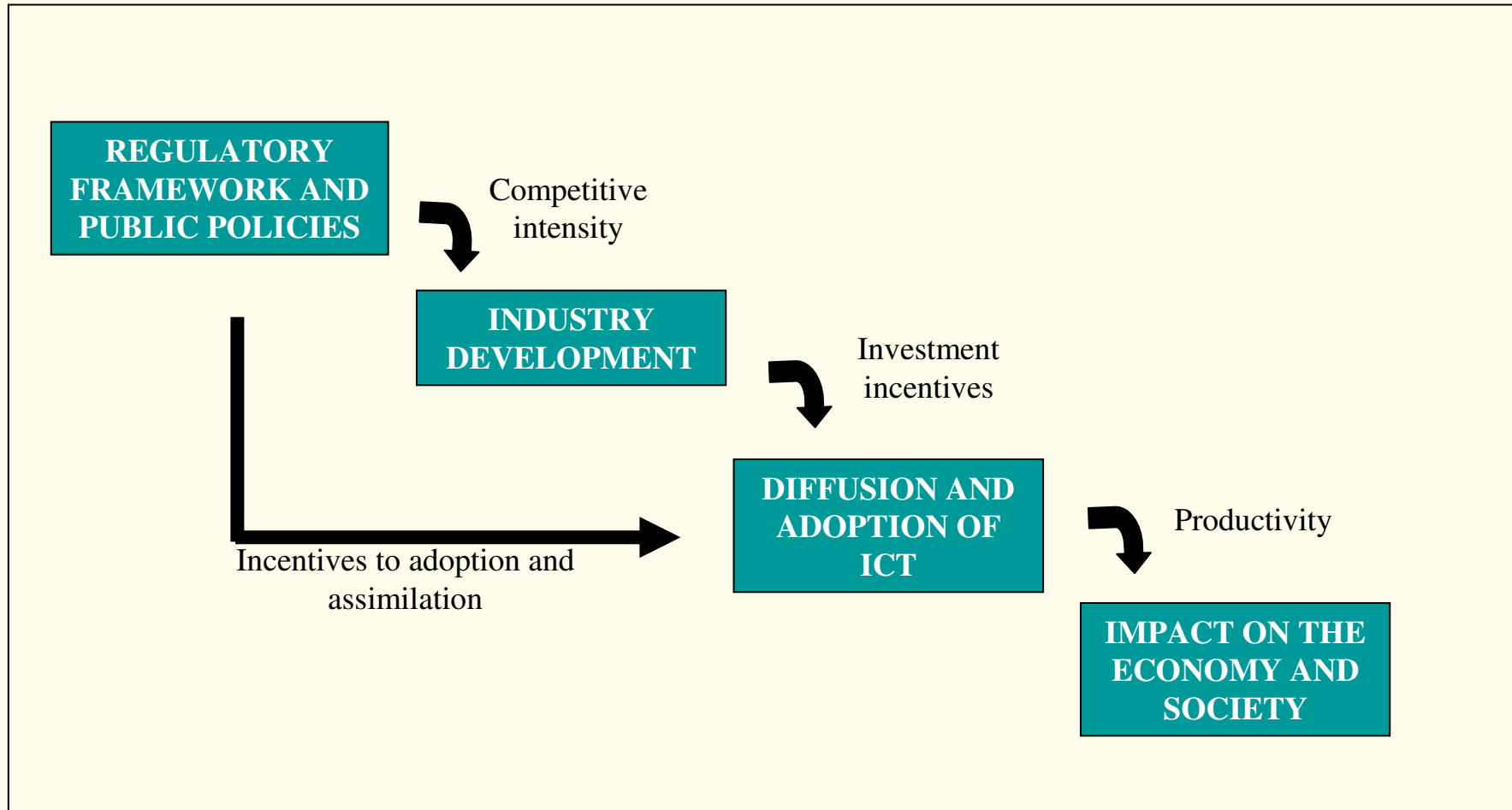
Similarly, we were able to show that broadband was having a direct impact in the creation of jobs



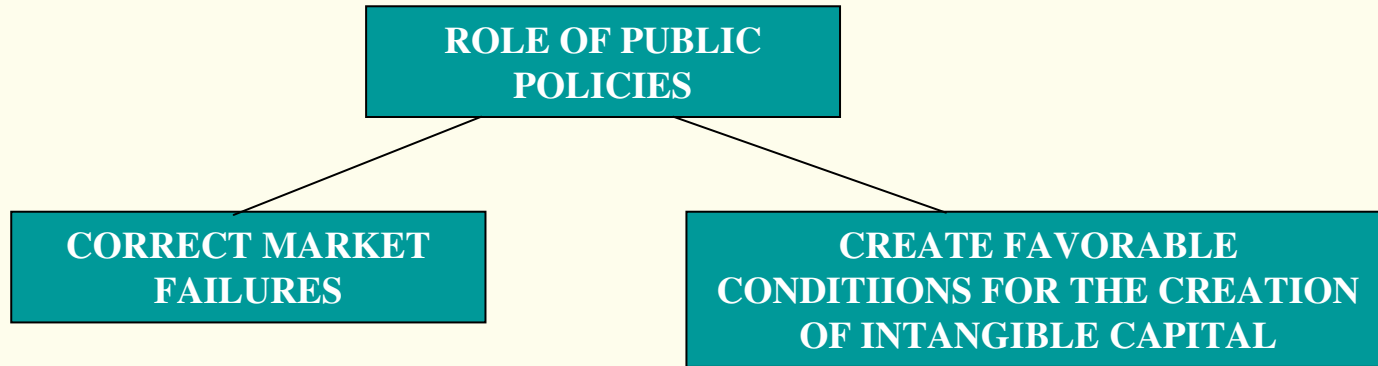
Source: TAS Analysis

The impact of telecommunications on society and the economy is directly dependent on the regulatory framework

IMPACT AND INTERRELATIONSHIP OF VARIABLES



The regulatory framework has an impact on ICT diffusion and adoption at two levels

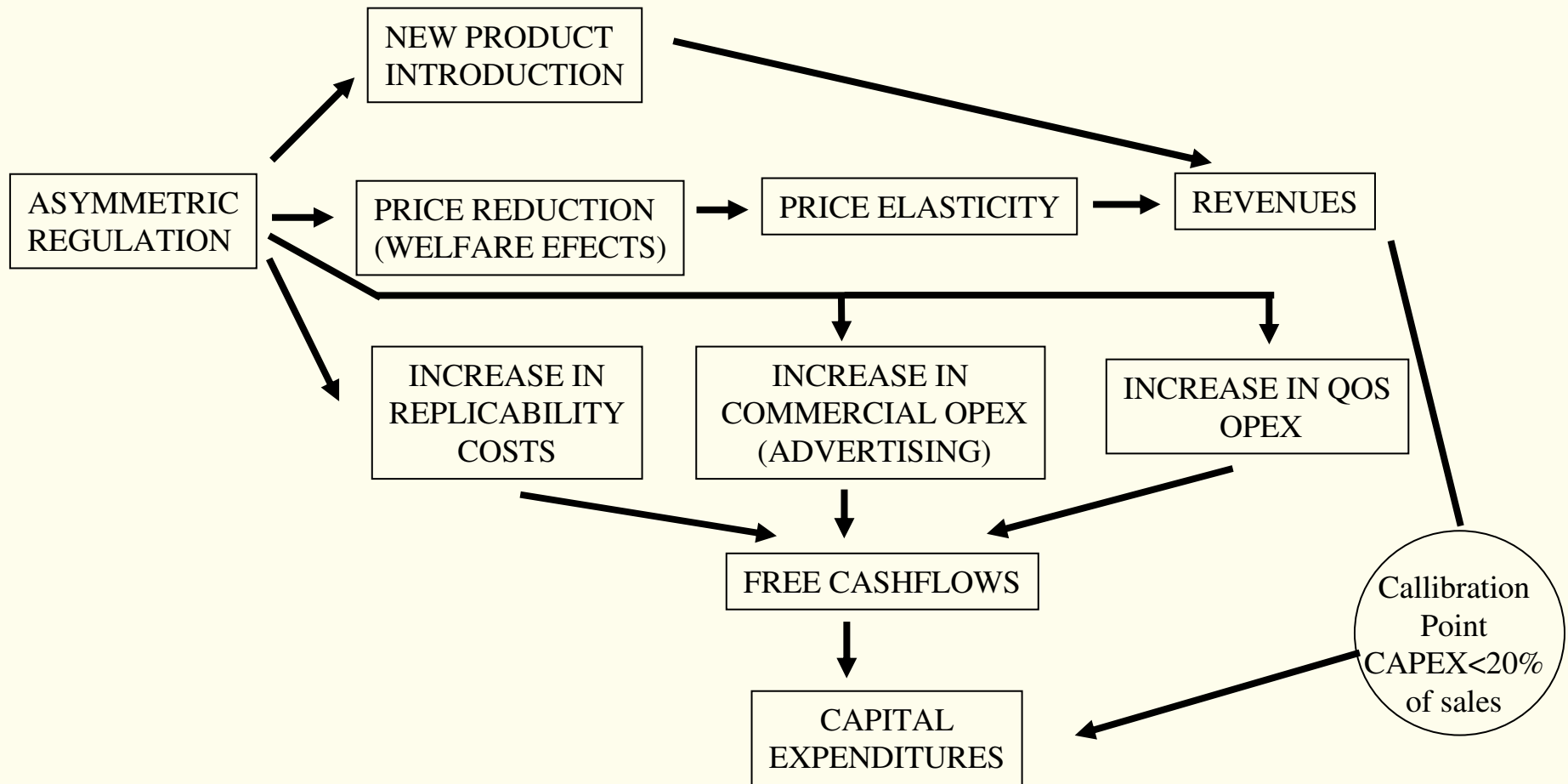


- Ensure universal access, by means of addressing the difference between private and social costs
- Build efficient competition in those markets affected by network externalities or asymmetric distribution of information

- Promote development of human resources (education and training)
- Promote innovation in organizations and modes of production
- Utilize the public sector as an R&D incentive mechanism
- Create capilarity effects that allow for the propagation of the impact of ICT in all industrial sectors (spillover effect)

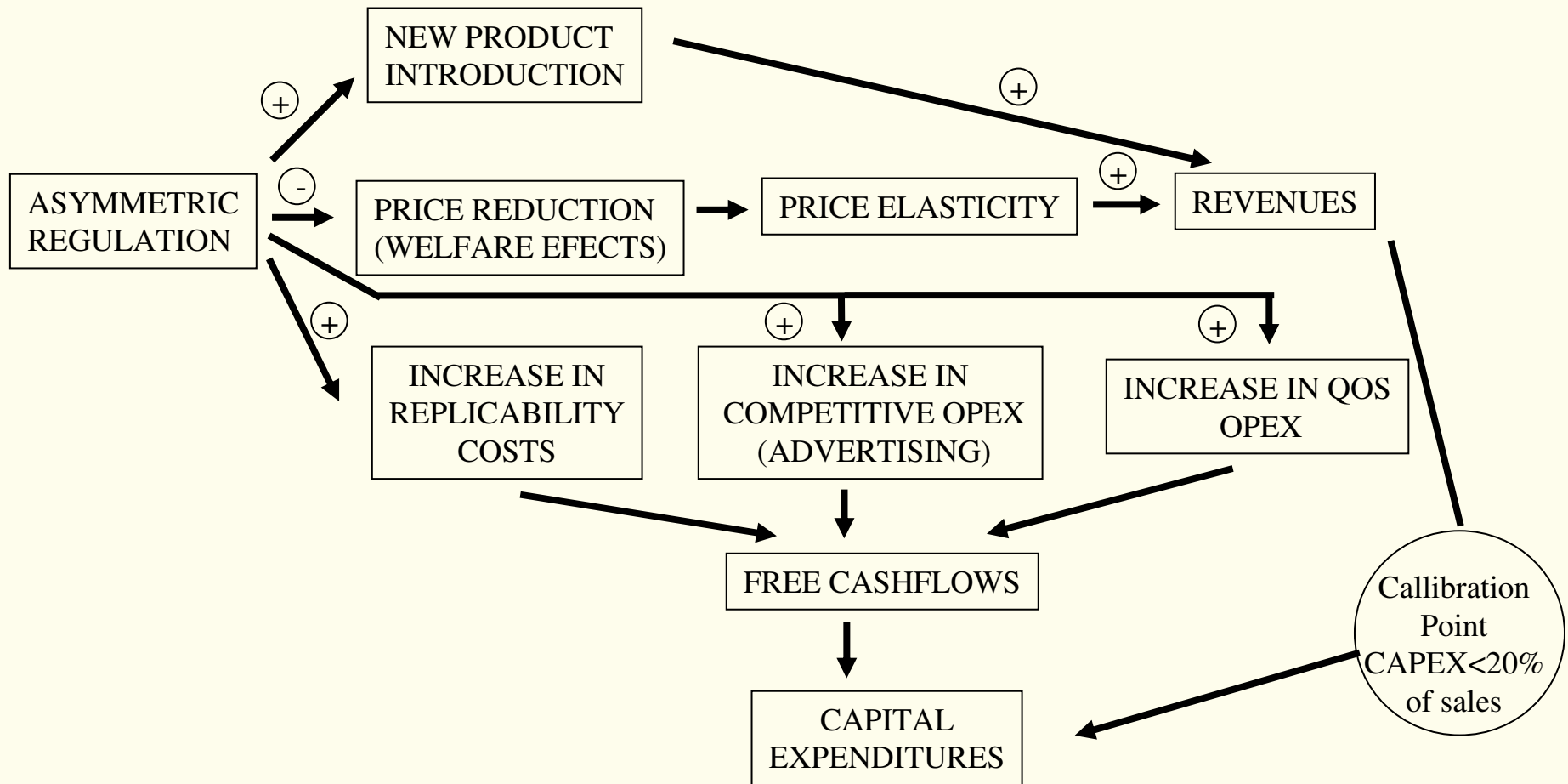
The regulatory framework has a direct impact on the industry's investment in infrastructure and, consequently, on the pace of innovation

DEREGULATION AND INVESTMENT CYCLE



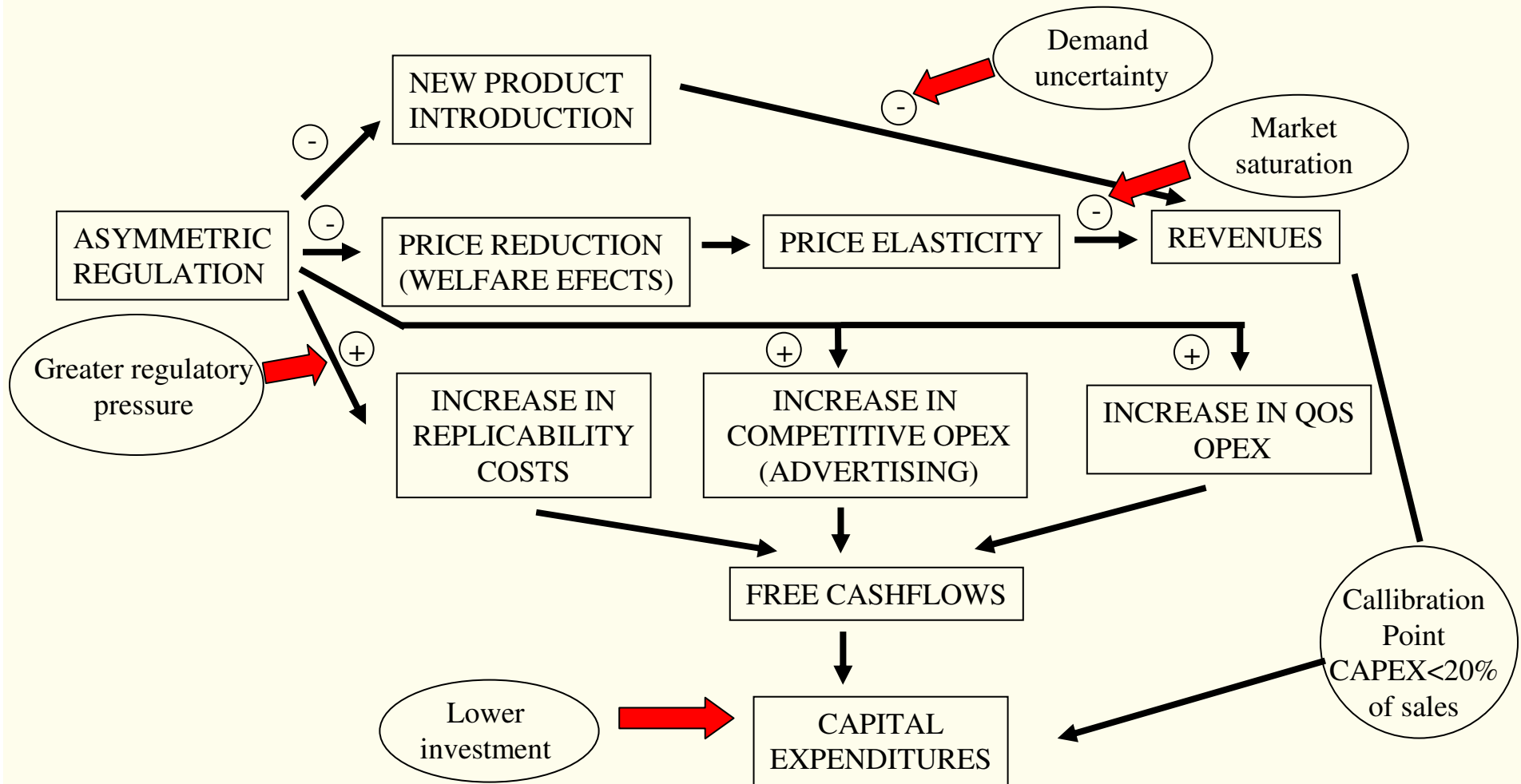
Under the positive cycle, the increase in opex due to competition is more than compensated by the growth in revenues due to price elasticities and new product introductions

DEREGULATION AND INVESTMENT CYCLE: THE POSITIVE CYCLE



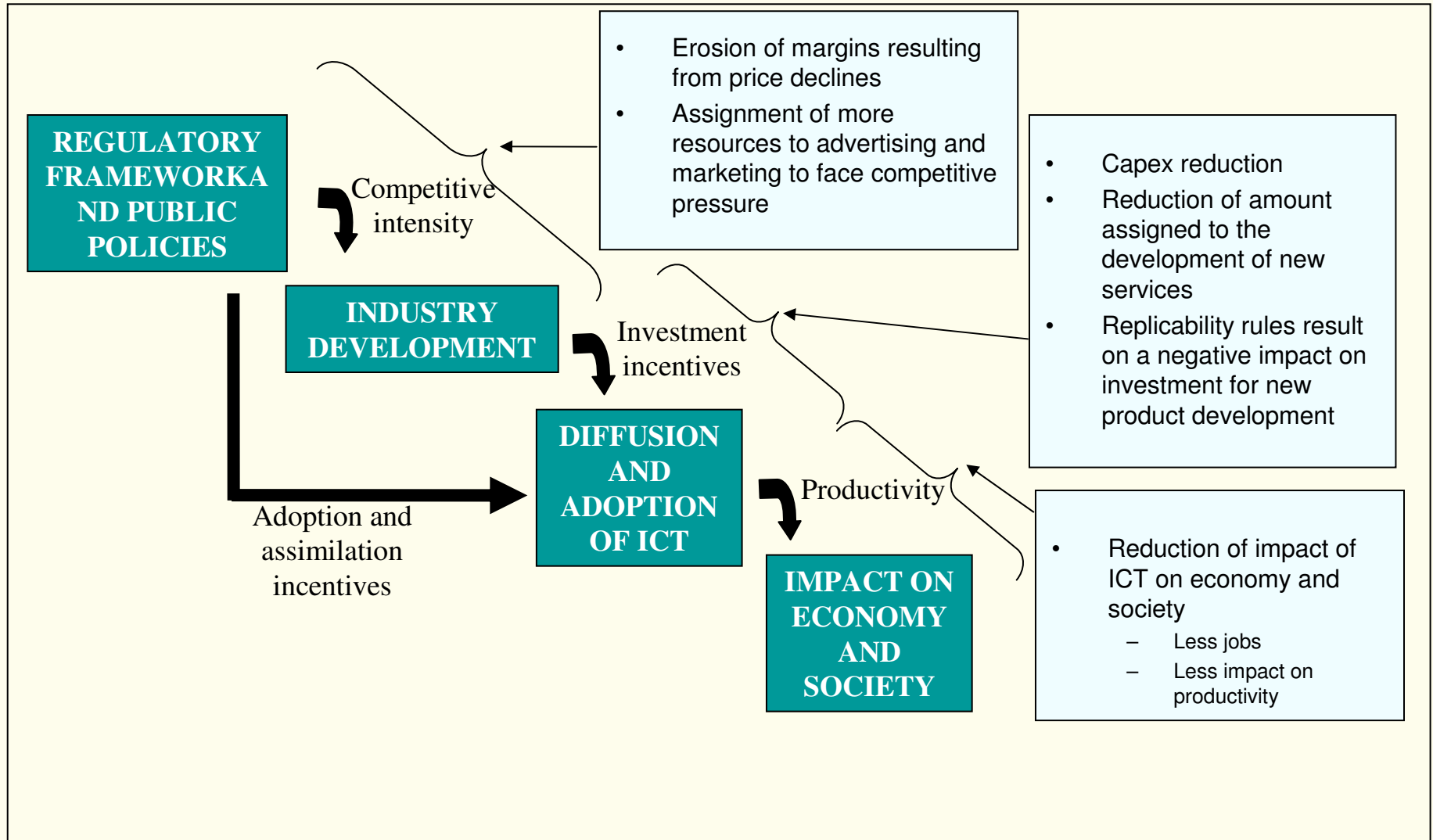
But the cycle can turn negative if revenues stop growing due to either market saturation of uncertainty in demand of new products and the regulator continues putting pressure on incumbent

DEREGULATION AND INVESTMENT CYCLE: THE NEGATIVE CYCLE

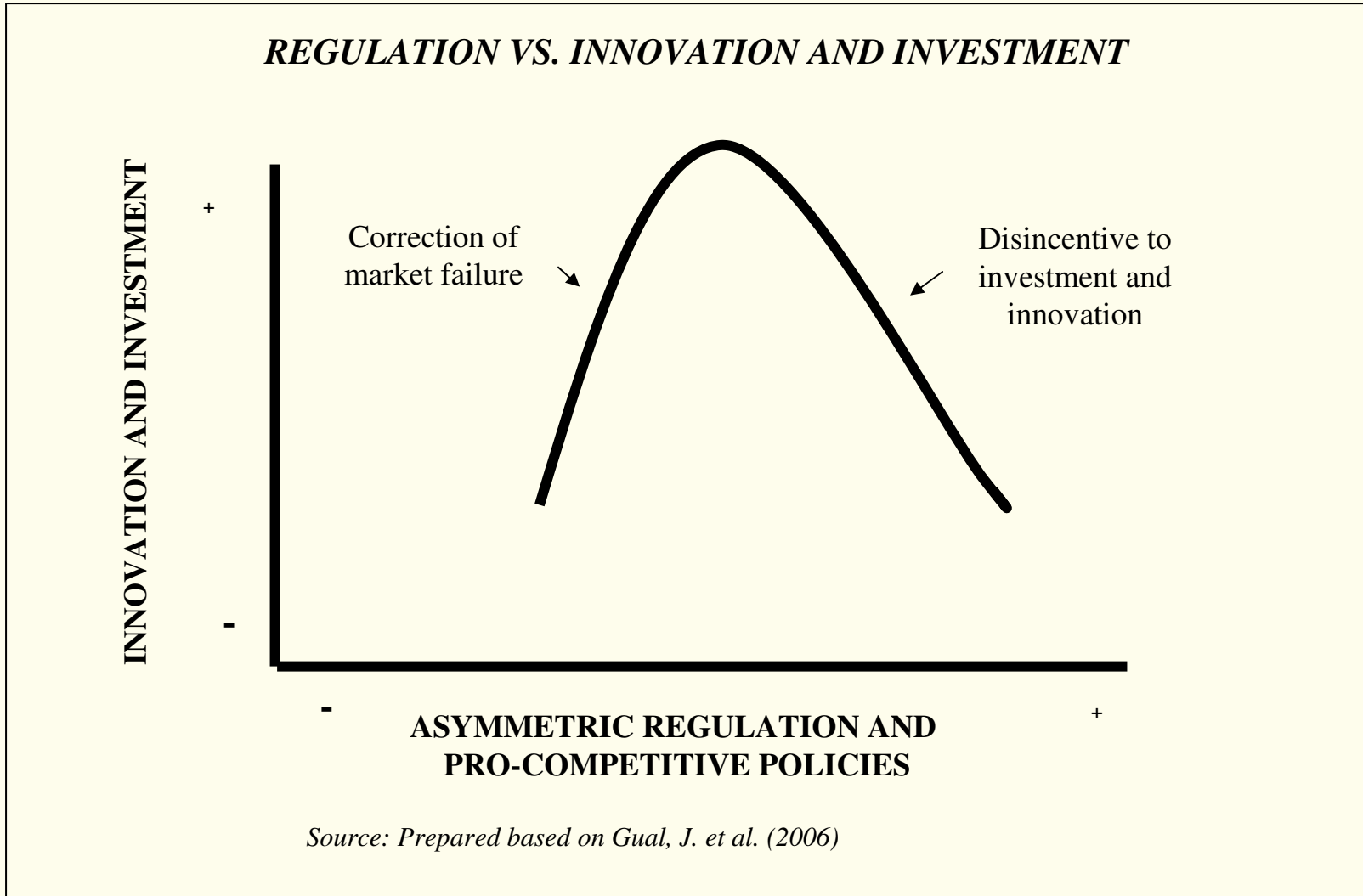


If the cycle turns negative, ICT diffusion could be affected and the positive impact on the economy and society could decrease

IMPACT AND INTERRELATIONSHIP OF FACTORS



According to these concepts, excessive regulation promoting irrestrictive competition could have a negative impact on the telecommunications industry's innovation and investment



The growing awareness of the importance of ICT in driving productivity improvements and economic growth will lead national governments to fine-tune their approach to telecommunications regulation

- Given the importance of keeping a balanced pressure on pro-competitive regulation, one would expect that governments will reduce their drive to unrestricted asymmetric regulation which would likely affect the industry's pace of innovation and infrastructure investment
- Conversely, we expect governments to pay increased attention to the definition of regulatory frameworks, with an emphasis on:
 - Withdraw from retail price regulation
 - Monitoring of service quality
 - Promotion of universal service and emphasis on addressing the digital divide
- Similarly, governments would be expected to pay a lot more attention to those policies that are oriented to the creation of intangible capital
 - Training
 - Promotion of innovation in modes of production and organization
 - Leverage of the public sector to promote R&D

The telecommunications industry will be confronting a new wave of regulation driven by five economic and political trends

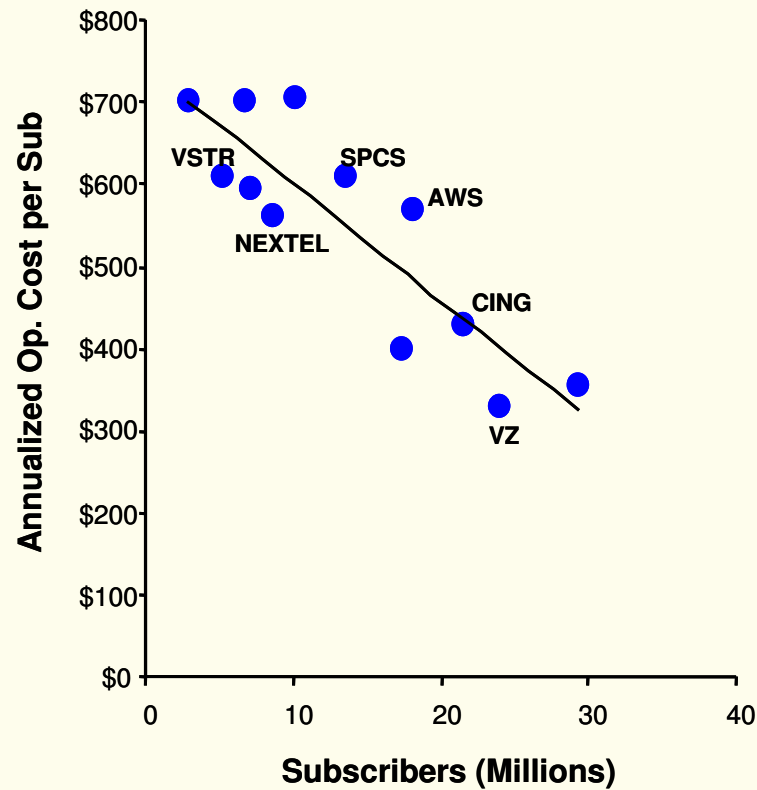
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Key messages

- The telecommunications industry exhibits high economies of scale, particularly in wireless and also at a functional level of wireline networks
- On the other other hand, economies of scale of content production are dramatically diminishing, resulting on the emergence of a multiplicity of players seeking access to universal distribution networks
- While the original regulatory intent was to foster through asymmetric regulation the creation of a multiple viable competitors, the industry is migrating to an industry structure composed of one, maybe two, dominant infrastructure players, and a number of service-based competitors that continue to be protected by the regulator with little hope of climbing the “investment ladder”
- The emphasis on economies of scale in transport is leading to a worldwide trend towards consolidation of industry players and a reaffirmation of incumbents as dominant players; the return to scale is further reinforced by the need to migrate to high capacity access networks, which accentuate the industry’s capital intensity
- In this context, the need emerges to redefine the role of the regulator, transitioning from a mediator of industry transactions among equally powerful operators to an overseer of a central player serving the content generation community

Economies of scale in the wireless industry are significant

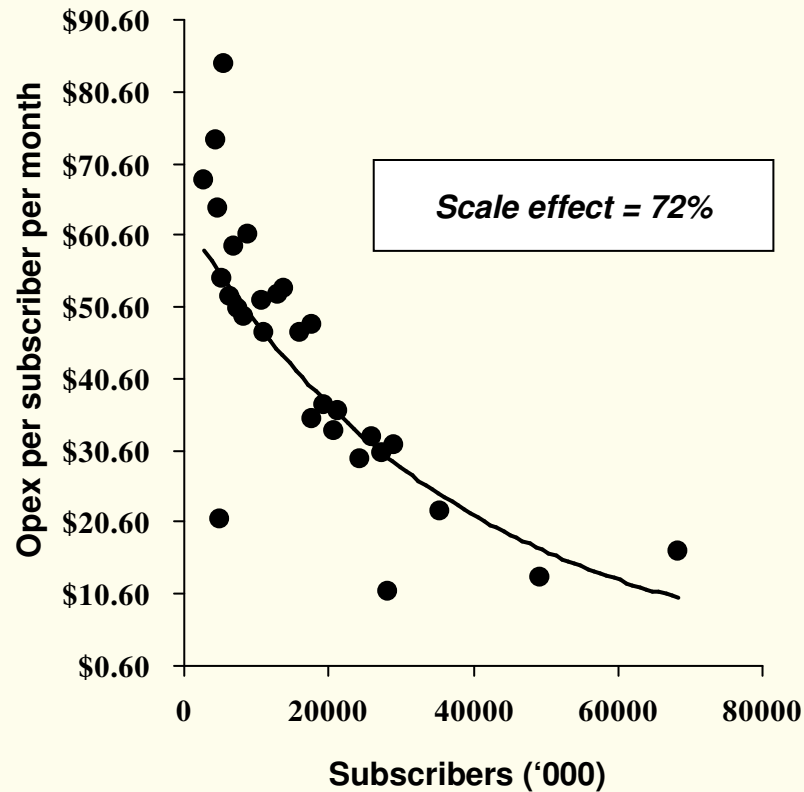
UNITED STATES: COST PER SUB VS. SUBSCRIBERS
(National operators)



Note: 2001 Operator Data, only one observation labeled by carrier
Source: Katz et al. (2002)

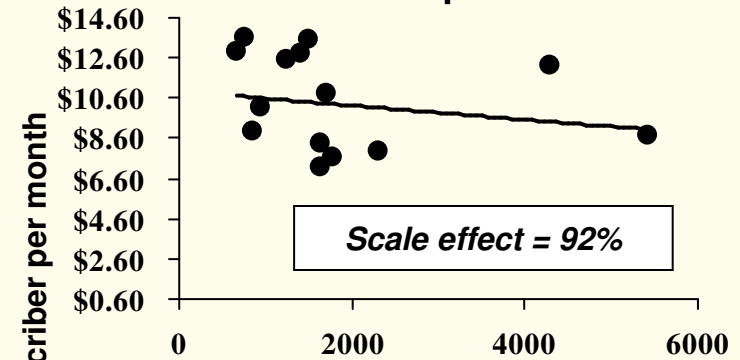
However, scale effects can vary regionally as a function of production factor costs

Economies of Scale for US and European Operators

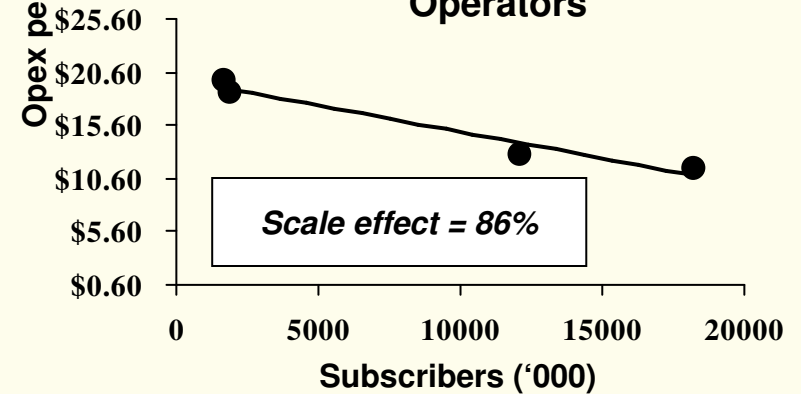


Source: TAS Analysis

Economies of Scale for Brazilian Operators

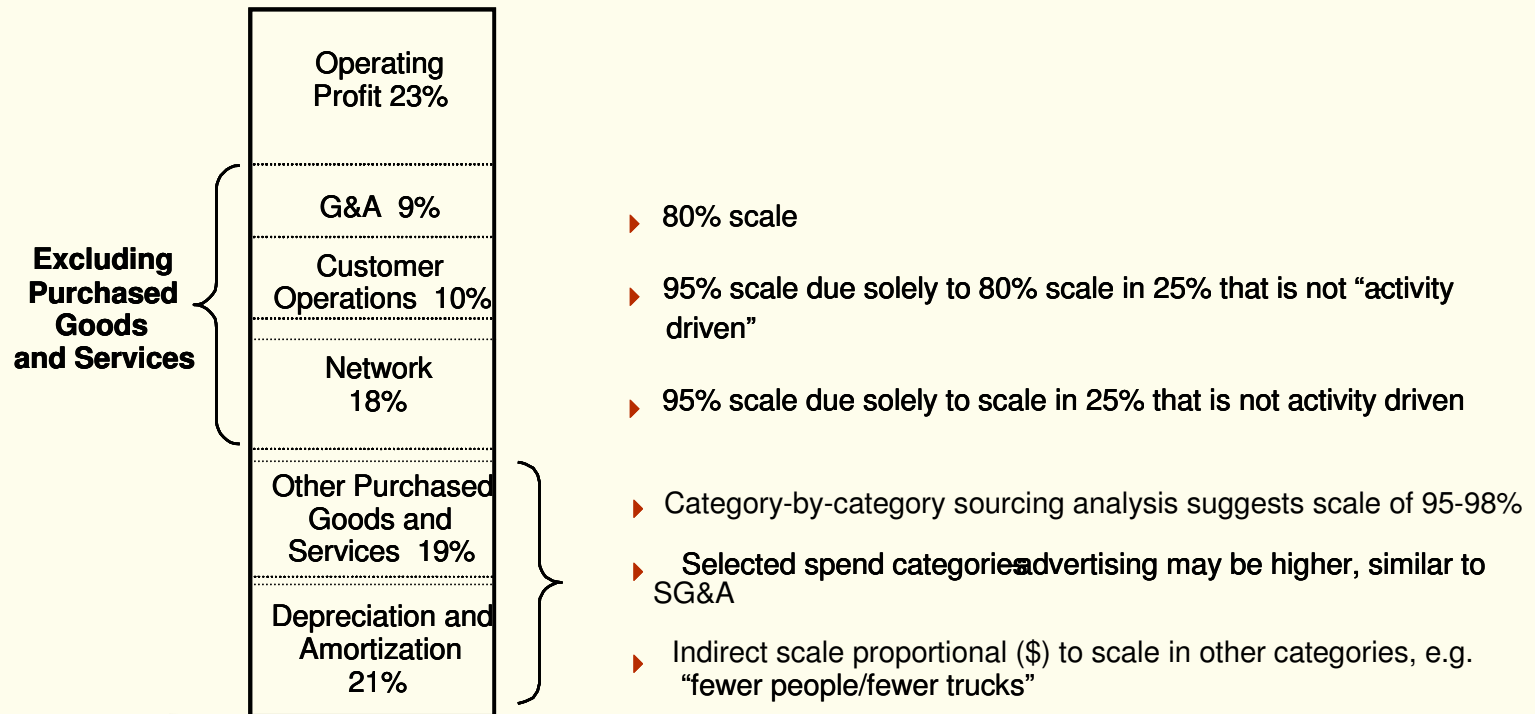


Economies of Scale for Mexican Operators



Economies of scale in wireline are less significant than wireless

ECONOMIES OF SCALE OF FIXED TELEPHONY INCUMBENTS



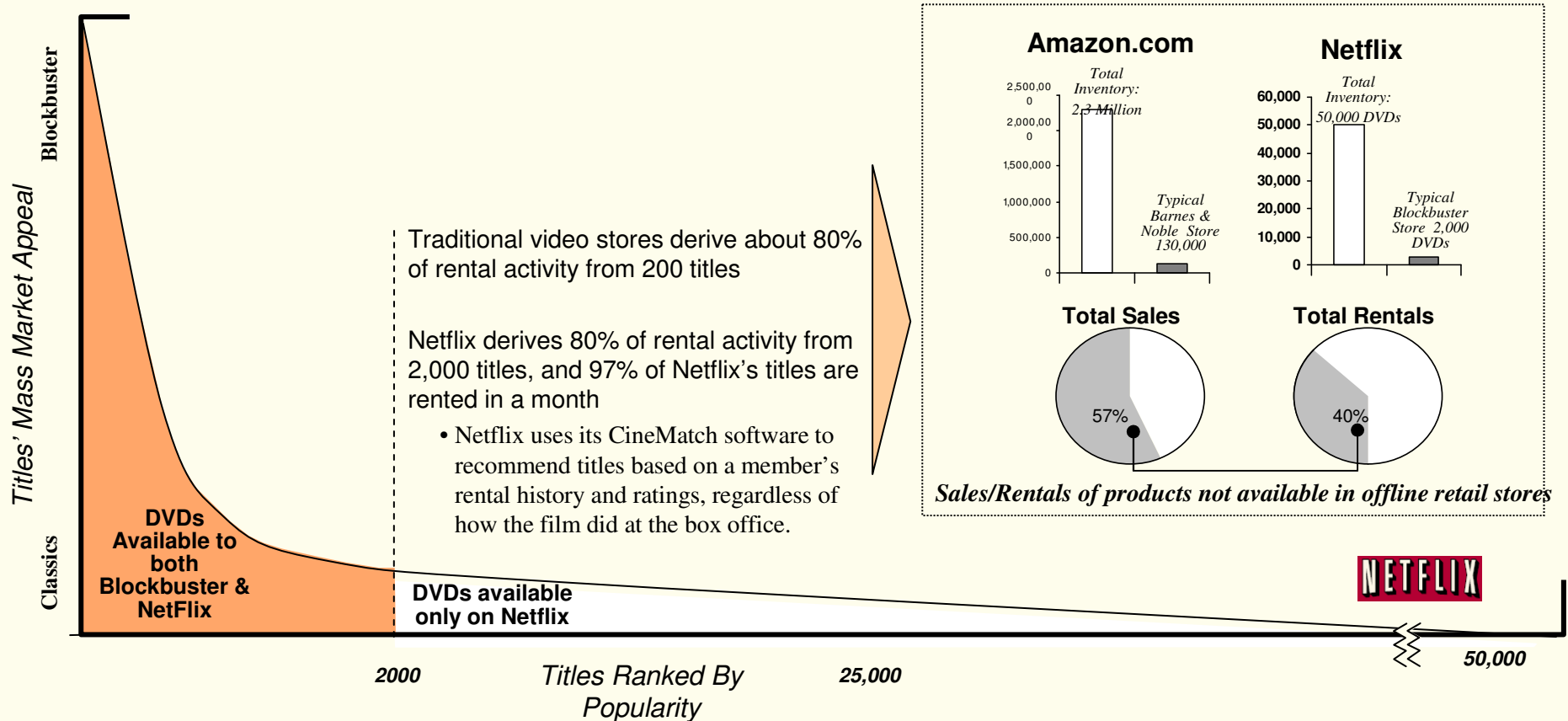
Source: Annual Reports, FCC Reports

But, scale remains important at the functional level of wireline carriers

| <u>FUNCTION</u> | <u>EVIDENCE</u> |
|--|--|
| <ul style="list-style-type: none">• Procurement | <ul style="list-style-type: none">• No evident scale in cross-company data• Benefits in consolidation of function within a single company |
| <ul style="list-style-type: none">• Advertising | <ul style="list-style-type: none">• Economies of large scale promotion proven both across firms and in company mergers |
| <ul style="list-style-type: none">• Wire Centers | <ul style="list-style-type: none">• Systemic scale in wire center design |
| <ul style="list-style-type: none">• Call Centers | <ul style="list-style-type: none">• Significant scale in infrastructure, workforce management and training |

On the other hand, the erosion of scale in content generation leads to the emergence of a multiplicity of players

NETFLIX LONG TAIL EFFECT

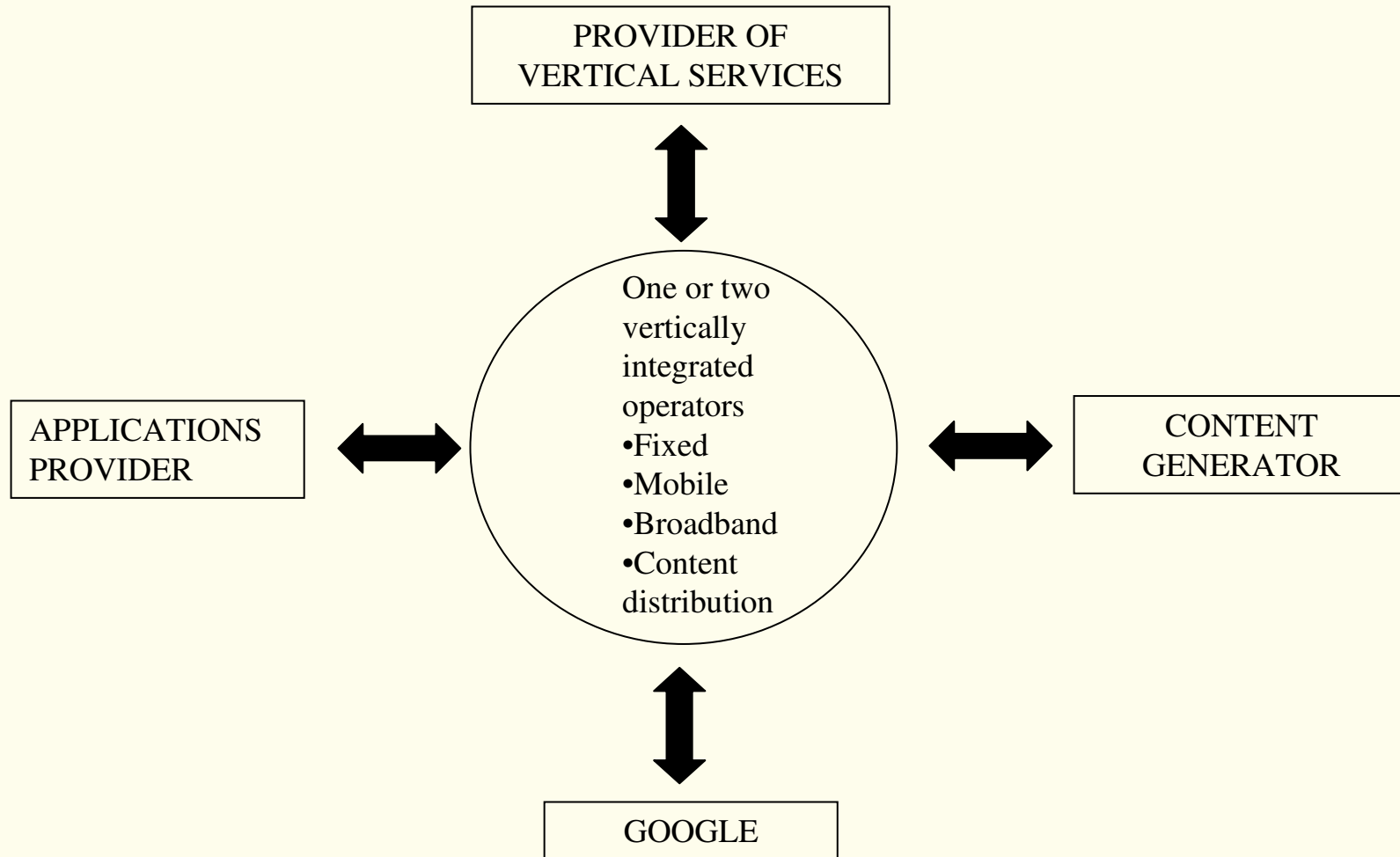


The 'Long Tail' Shows that the Total Volume of Classic DVDs Exceeds The Volume of High Popularity DVDs (Blockbusters) and Drives Between ~50% of Total Revenues

Source: NetFlix

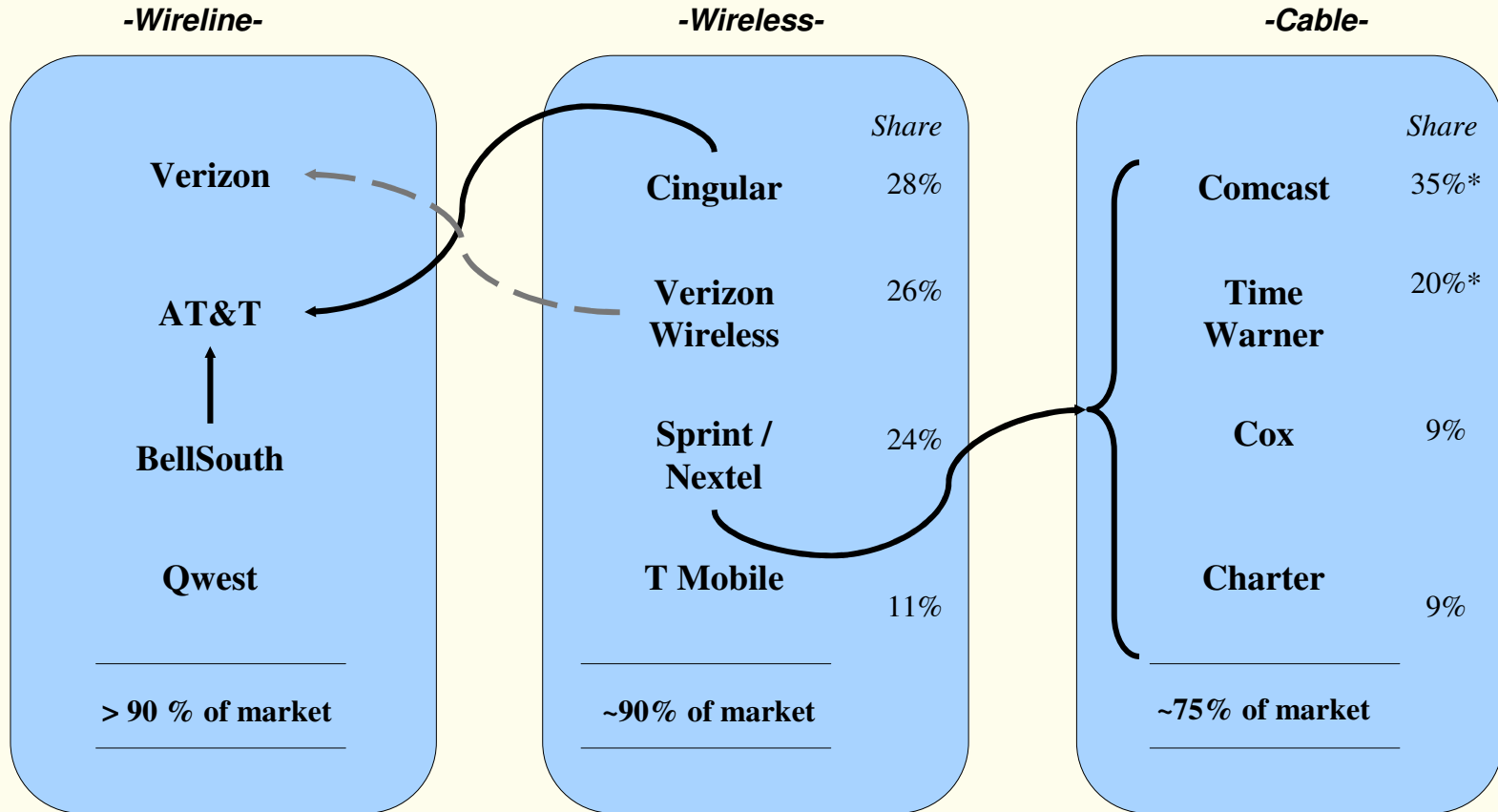
The return to scale in distribution combined with the erosion of scale in content generation is leading to a new industry structure

EMERGING INDUSTRY STRUCTURE



ECONOMIES OF SCALE

This consolidation pattern is consistent with what has been observed in other countries – In the United States, consolidation is resulting on the “Competitive Rule of Three”



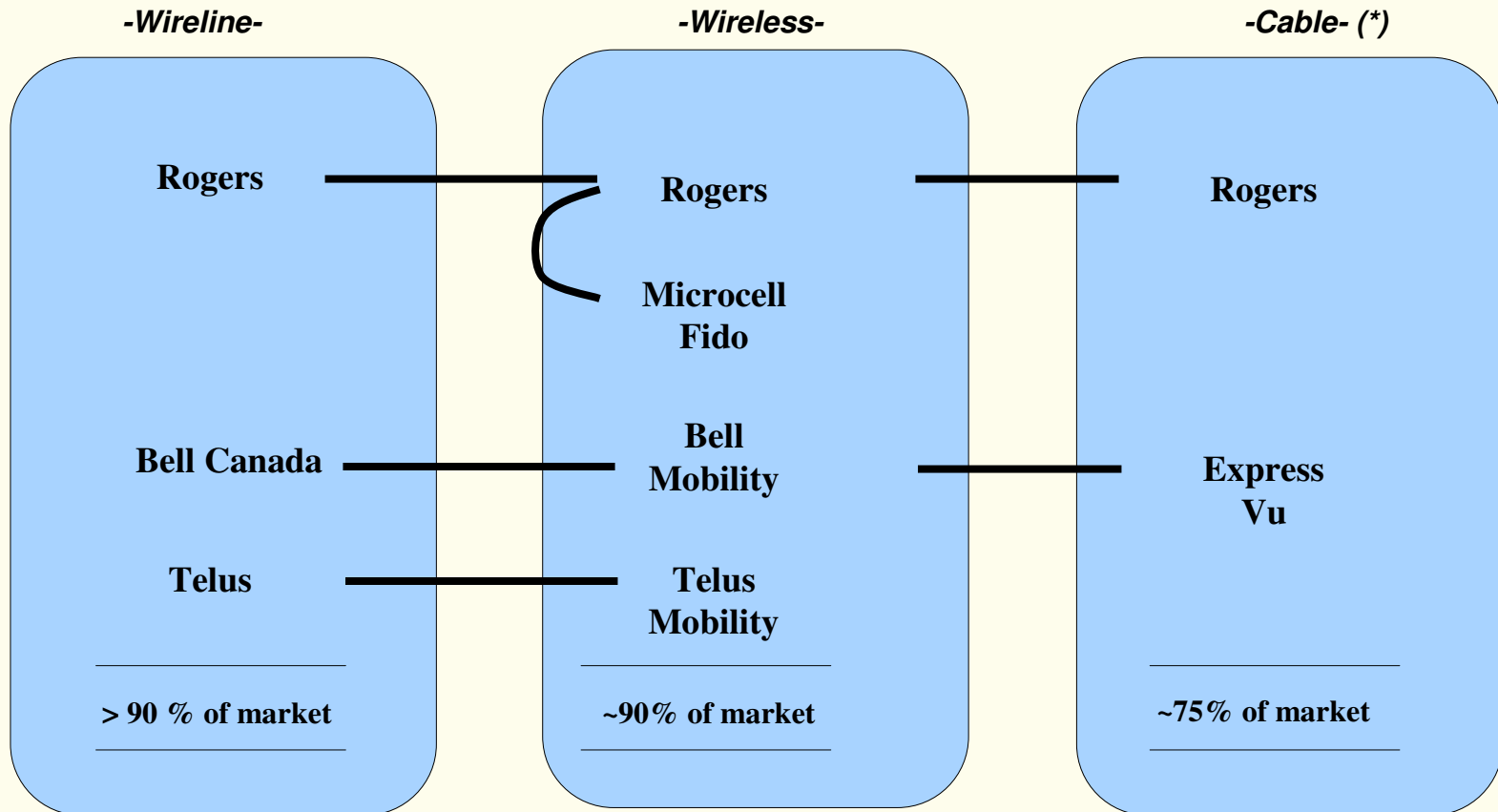
** Note: Market share unknown as numbers unreported since close of recent acquisitions*

** Note: Adelphia Market Share equally split between Comcast and Time Warner Cable*

The final round of consolidation will create two categories of competitors - Integrated Wireline /Wireless Companies vs. Integrated Cable /Wireless Companies

ECONOMIES OF SCALE

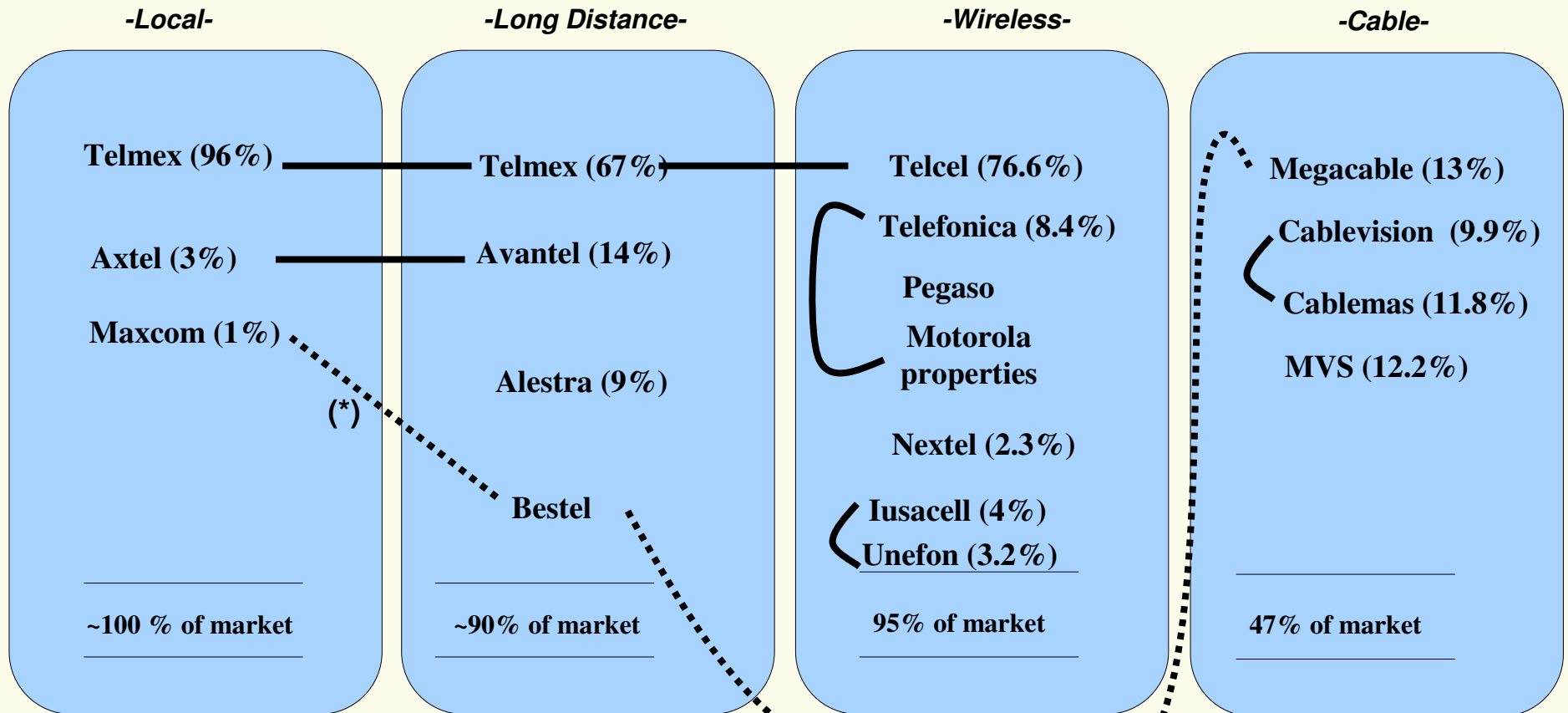
This consolidation pattern is consistent with what has been observed in other countries – Canada has also evolved to a three vertically-integrated structure



() Consolidation in the cable TV industry is expected*

Source: TAS interviews

The consolidation trend is also occurring in emerging economies: Mexico...

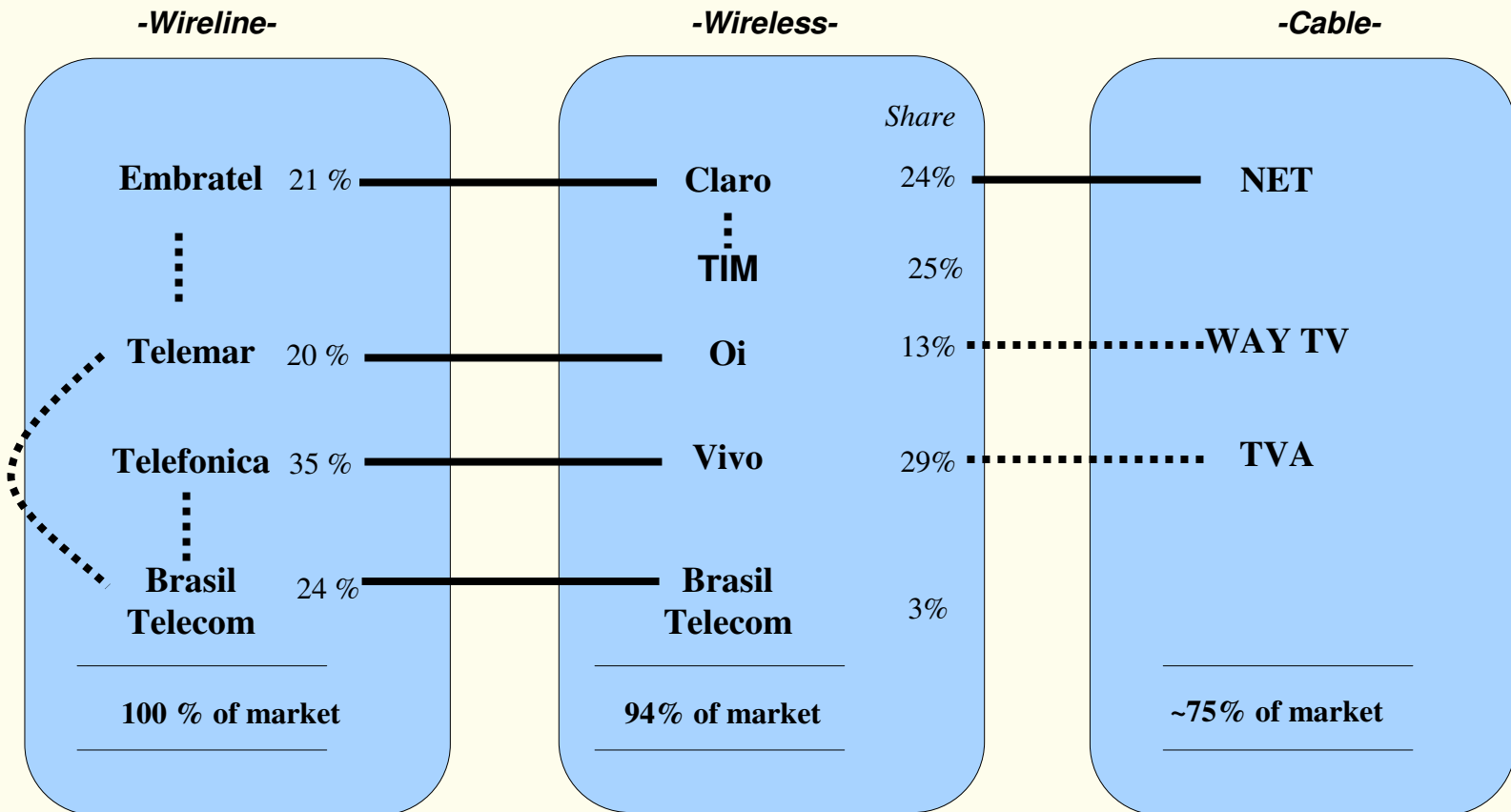


(*) Maxcom sold approximately 20% of its equity to a private telecommunications company related to Bestel

(**) There is partnership between Bestel and Megacable

Source: TAS interviews

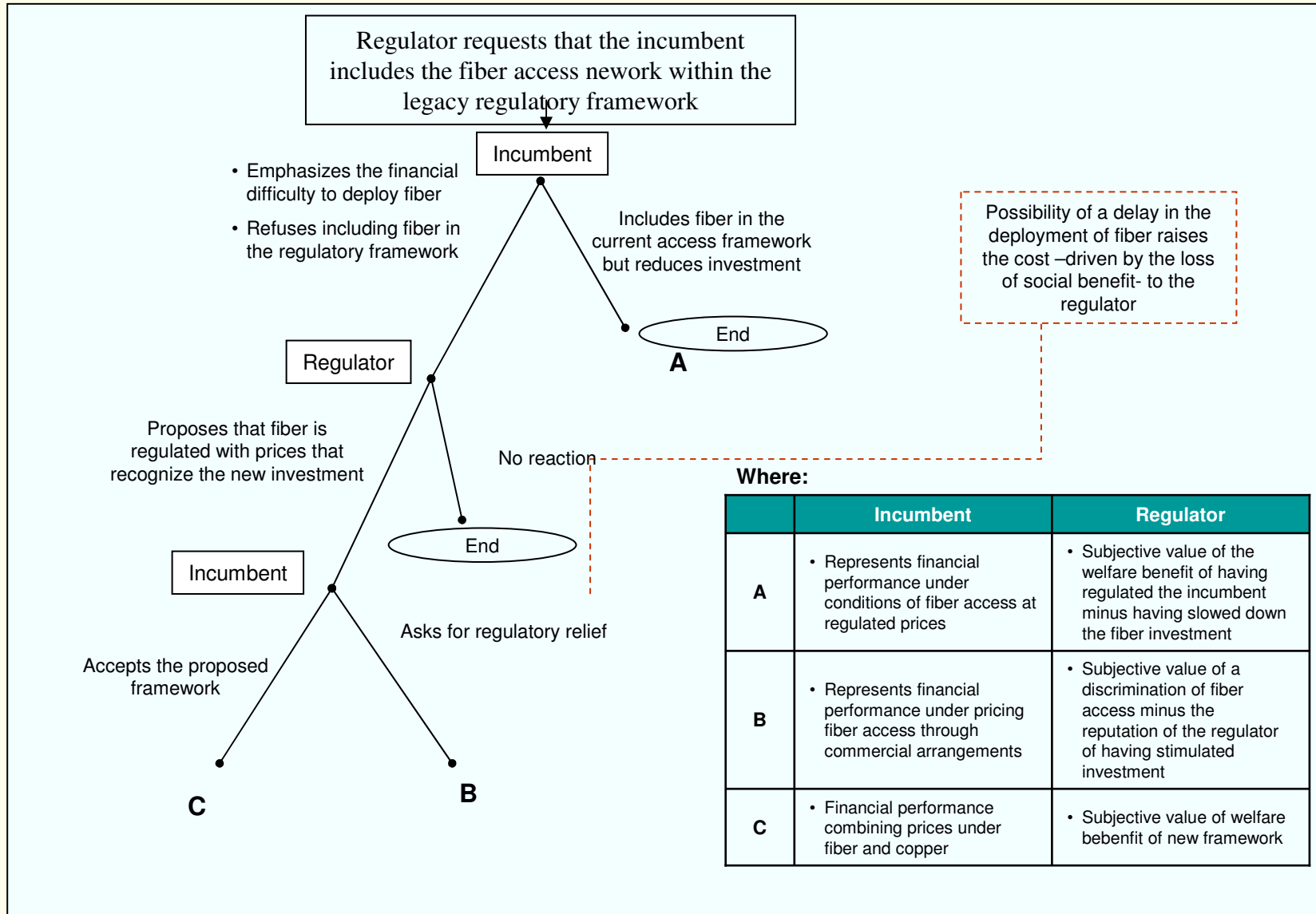
Brazil could move to a triopoly or duopoly in the medium term



The final outcome depends on the outcome of Telecom Italia's divestiture and exit strategy of financial investors in Telemar and Brasil Telecom

Source: TAS interviews

The deployment of next generation access networks introduces another layer of regulatory conflict between incumbents and governments



In the very near future, we estimate five European incumbents to have implemented a Structural or Functional Separation

| COUNTRY | FRONTIER | MODEL | IMPLEMENTATION | DRIVER |
|------------------------------|-----------------------------|--------------|-----------------------|--|
| Italy (TI) | LoopCo / ServCo y NetCo | Functional | Voluntary | <ul style="list-style-type: none"> • Reduce regulatory pressure |
| Portugal (PT) | LoopCo / ServCo y NetCo | Functional | Voluntary | <ul style="list-style-type: none"> • Authorize merger |
| | Fixed / Cable | Physical | Voluntary | <ul style="list-style-type: none"> • Obatin resources to cover shareholded incentives |
| Ireland (EIRCOM) | NetCo / ServCo and Wireless | Physical | Voluntary | <ul style="list-style-type: none"> • Financial engineering |
| United Kingdom (BT) | LoopCo / ServCo y NetCo | Functional | Voluntary | <ul style="list-style-type: none"> • Reduce regulatory pressure |
| Sweden (Telia Sonera) | Wholesale/ retail | Functional | Imposed | <ul style="list-style-type: none"> • Reduce pressure as a result of fusion |

To sum up, the industry consolidation could lead to the need to redefine the regulatory framework

- First phase of regulation (pre 1985):
 - State-owned monopoly
 - Rate of return regulation
 - Utility-based regulation (universal service, service quality monitoring)
- Second phase of regulation (1985-2004):
 - Asymmetric regulation
 - Industry fragmentation
 - Unbundling and access rules
 - Liberalization of retail prices
 - Monitoring of competition
- Third phase of regulation (2005-?):
 - Natural oligopolies (private)
 - Utility based regulation (universal service, interconnection, network neutrality)
- Fourth phase (?):
 - Deregulation
 - New industry cycle

The telecommunications industry will be confronting a new wave of regulation driven by five economic and political trends

1

- Confirmation of the role of information and communications technologies as platform for promoting social and economic development

2

- A growing return to scale in transport, distribution and access networks combined with an erosion of economies of scale in content production

3

- Migration of productive capacity and innovation in high technology to emerging economies, particularly Asia

4

- Entry of private equity and hedge funds which acquire financial and operational control of telecommunications operators

5

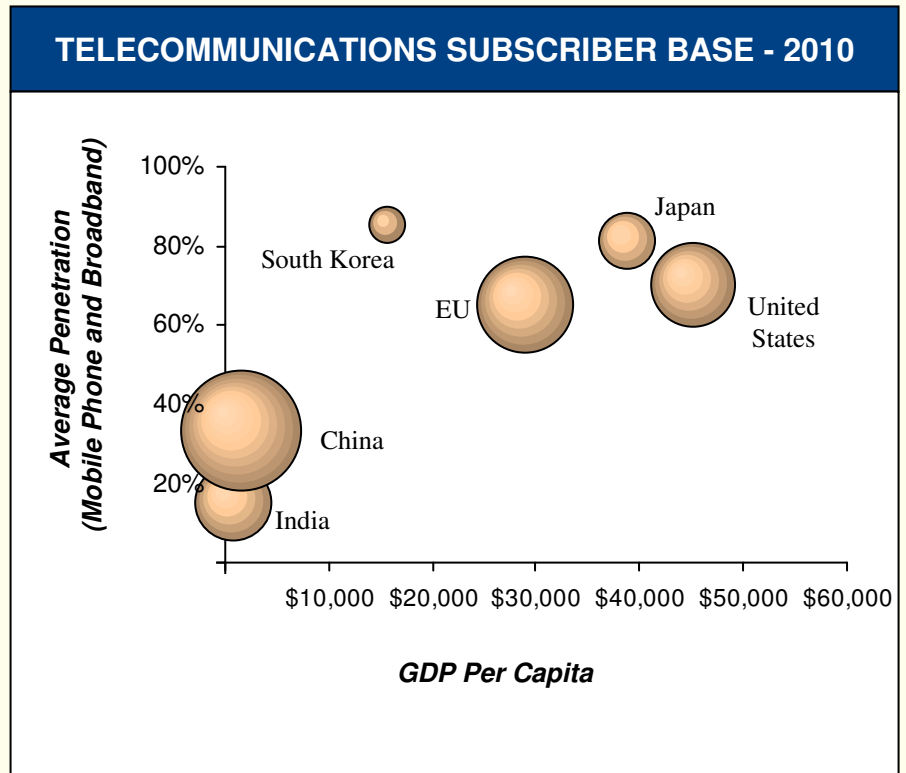
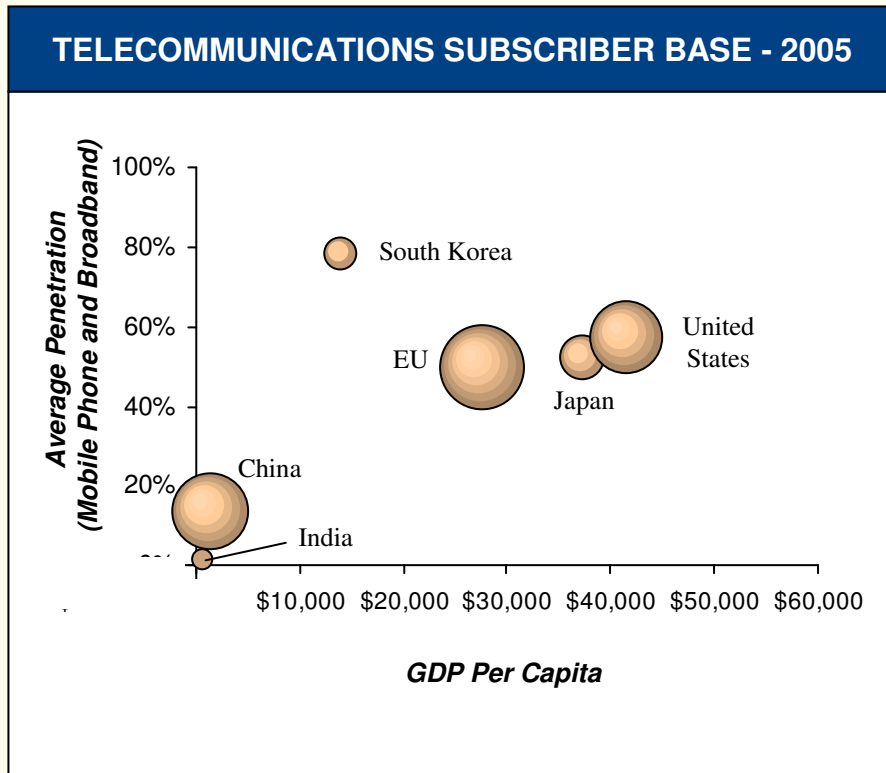
- Increasing importance of sub-sovereign initiatives, with state and local governments assuming responsibility for deploying infrastructure and services

Key Messages

- The locus of innovation for the global telecommunications industry is shifting to Asia
 - Demand side factors are aligned
 - Critical mass reached in consumer and business markets in China and India: More than 80% of the next billion subscribers will be found in emerging markets
 - Asia includes the most advanced wired and wireless broadband markets in the world (e.g., Korea, Japan)
 - Supply side indicators show accelerating momentum
 - Dramatic increases in number of skilled engineers/scientists graduating in Asia
 - VC funds and MNCs are allocating more and more investment money to Asia
- The shift in each individual Asian country is driven by the interplay of three key factors:
 - Government policies and priorities reflected in industrial and education policies in particular
 - Consumer profile and demographics
 - Capital market sophistication and efficiency
- Complex commercial ecosystems are emerging, which continue to be different in-kind from the US and EU
 - Strong government leadership / engagement
 - Distributed, modular, “open” innovation networks integrating people, processes, and technology
- These trends have significant implications for government regulation
 - Reenergizing of national industrial policies
 - Leveraging the purchasing power and R&D depth of telecommunications companies

MIGRATION OF PRODUCTIVE CAPACITY

Major Asian Markets Are Either World-Class Technology Powers or Rapidly Accelerating Giants

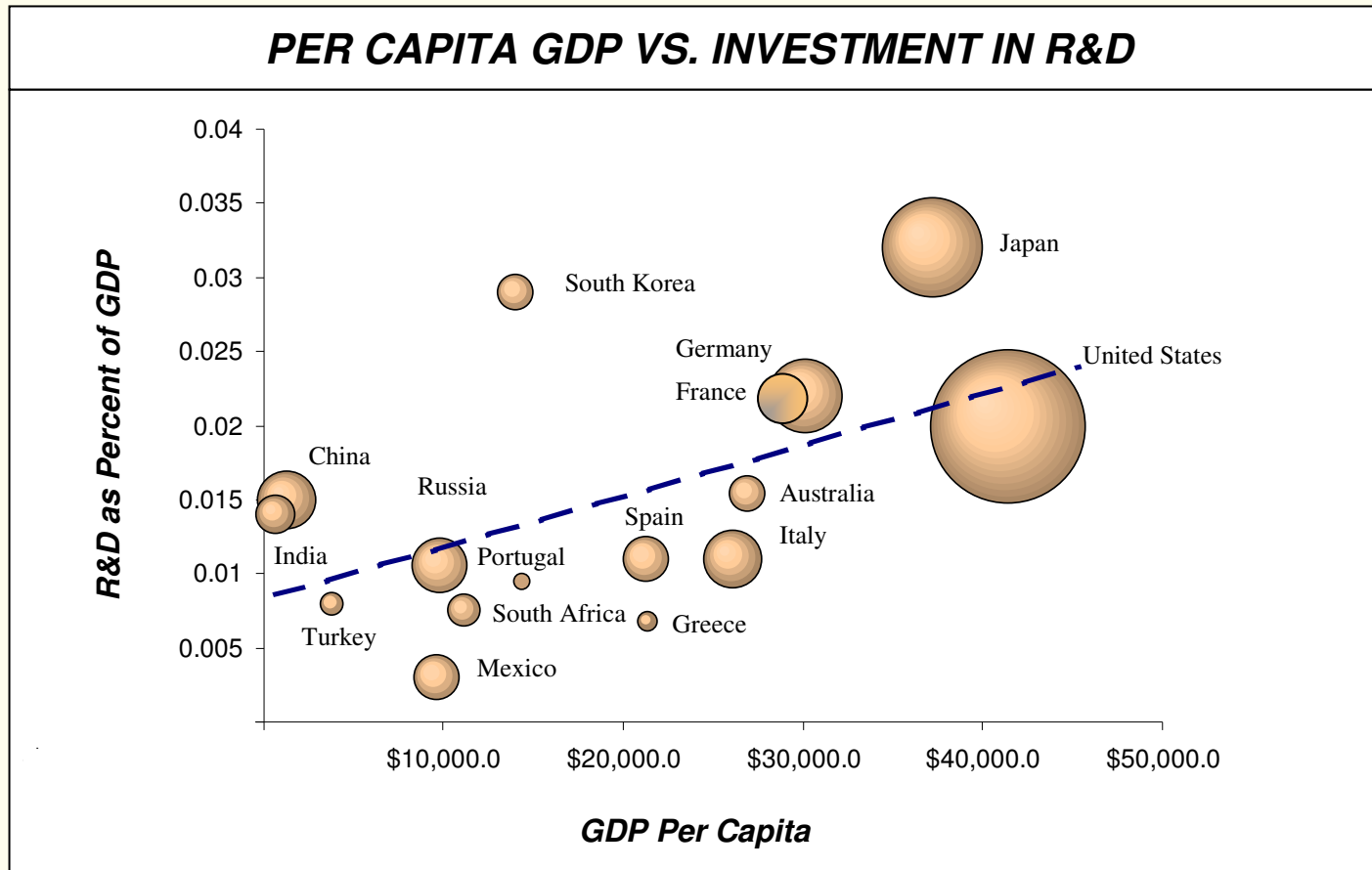


- Mobile phone and broadband penetration in South Korea exceeds that of the US and EU today and both Japan and South Korea are expected to be ahead by 2010
- Wireless and broadband penetration levels in China and India are low but rising fast; by 2010 the number of wireless and broadband subscribers in China will exceed the number in the US by a factor of two

**Size of bubble reflects an average of the wireless and mobile phone subscriber bases in the respective countries*

Source: R&D Magazine, Battelle, OECD, World Bank, K4D, UNESCO; CIA World Factbook

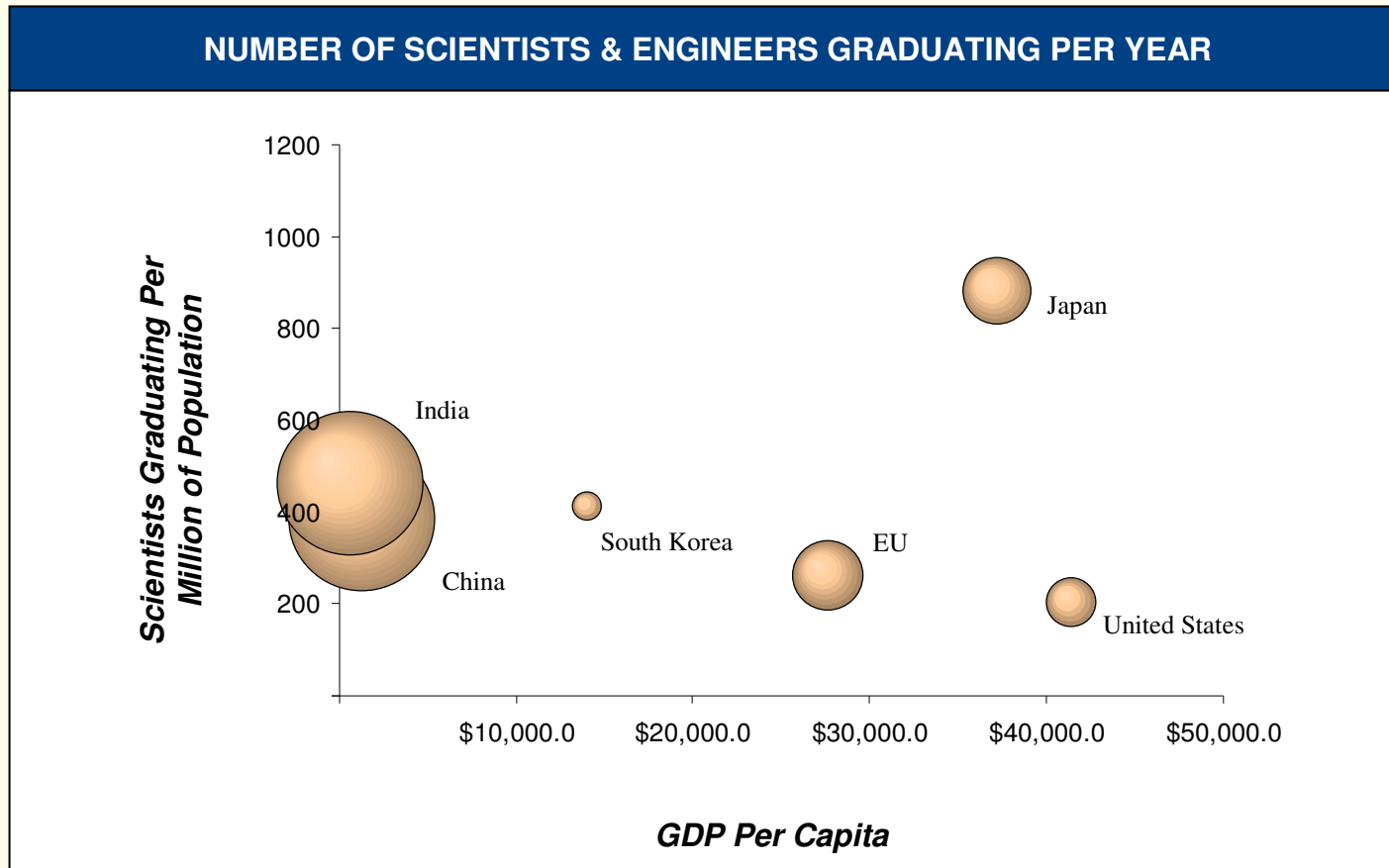
Aggressive Investment in R&D Is a Characteristic of the Asian Economies and Is One Driver of Their Technological Advancement Against the Rest of World



- The major Asian economies – China, India, Japan, and South Korea – are all above the regression line and invest a higher proportion of economic resources in research and development compared with other countries at their stage of development

**Size of bubble reflects GDP of the individual countries*
 Source: R&D Magazine, Battelle, OECD, World Bank, K4D, UNESCO

Aggressive Educational Policies Are Fueling Technological Progress With Large Numbers of Science and Engineering Graduates



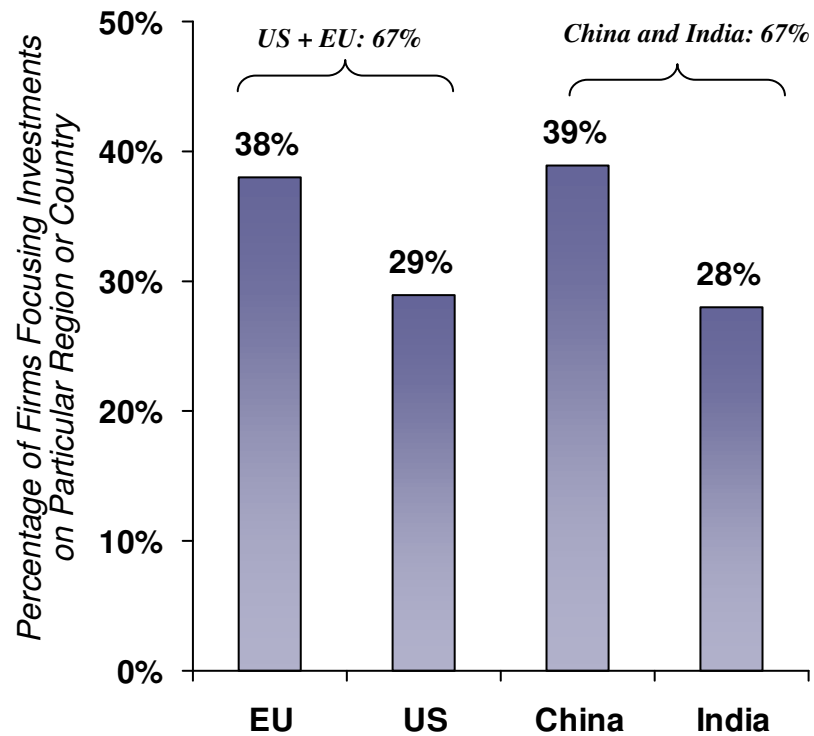
- China and India each graduates 500,000 scientists per year compared to 60,000 in the US

**Size of bubble reflects number of scientists and engineers graduating per year in the economy in question
Source: R&D Magazine, Battelle, OECD, World Bank, K4D, UNESCO*

MIGRATION OF PRODUCTIVE CAPACITY

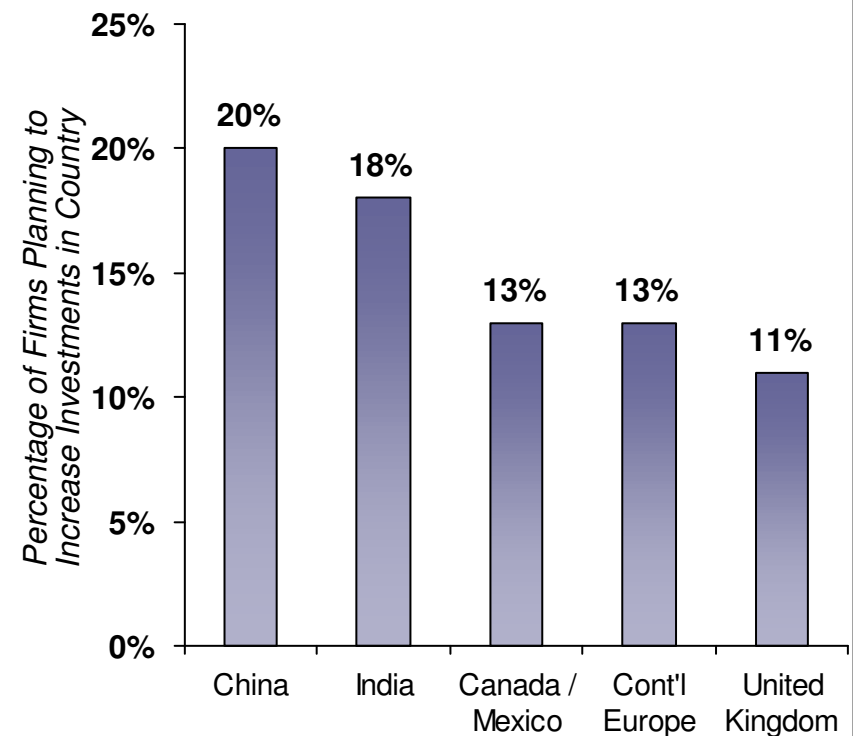
The Business World Has Taken Note of the Rapid Growth in India and China and Is Allocating an Increasing Amount of Investment to These Countries

67% OF FIRMS SURVEYED IDENTIFIED CHINA AND INDIA AS ONE OF THEIR TOP THREE DESTINATIONS FOR R&D SPEND



* EU includes Germany, Italy, and France


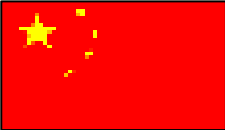


US VENTURE CAPITAL FUNDS CONSIDER INDIA AND CHINA TO BE THE MOST PROMISING REGIONS



Source: Global R&D Report; Deloitte & Touche; National Venture Capital Association

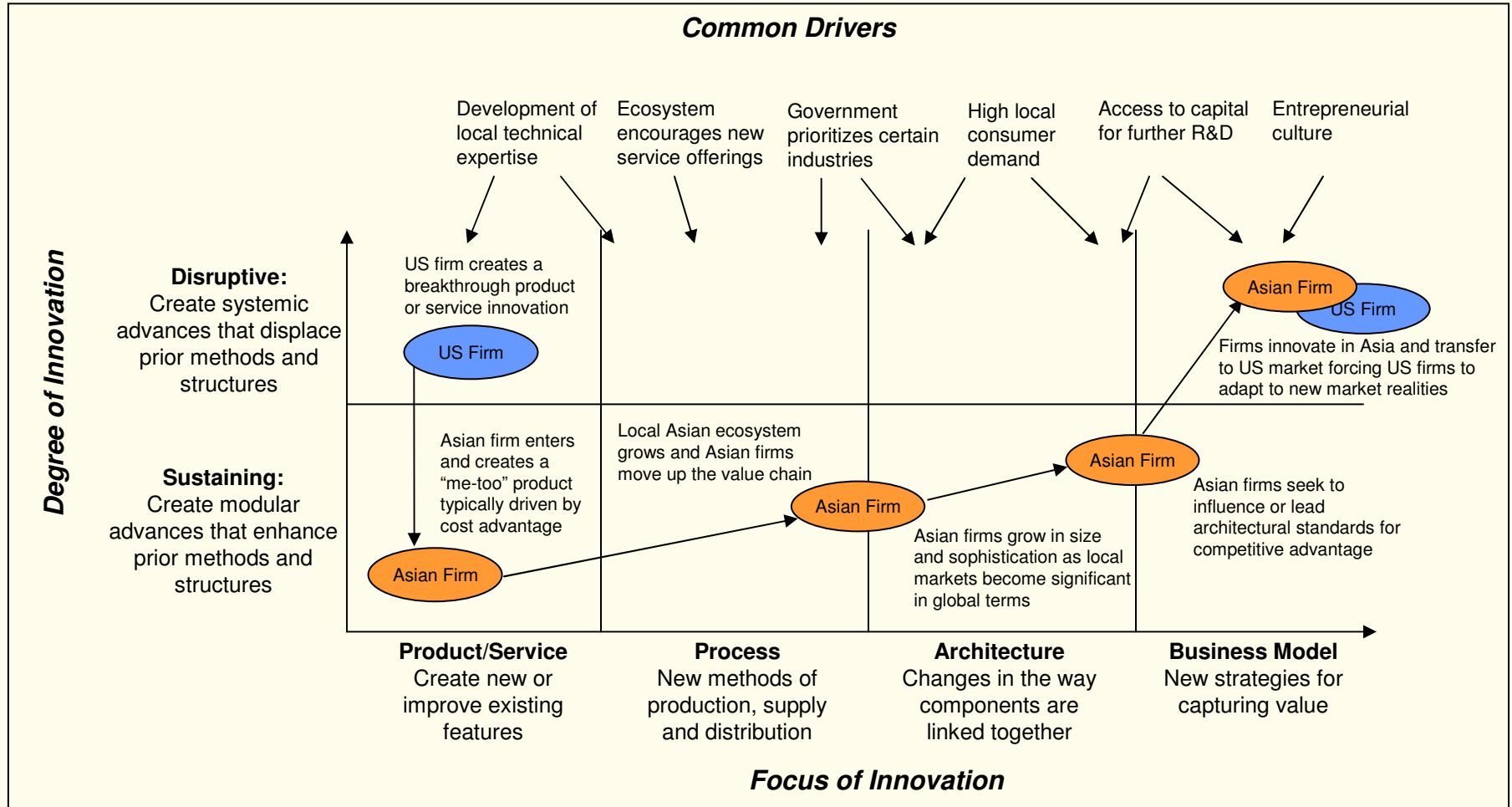
The four major Asian markets have one thing in common: government intervention, albeit following different patterns

TECHNOLOGY DEVELOPMENT DRIVERS MATRIX

| DEVELOPMENT DRIVER |  |  |  |  |
|--|--|--|--|---|
| Degree of general government intervention in economy | Medium | High | Medium | High |
| Public/private sector collaboration in technology and R&D | Low | High | Medium | High |
| Fertile technology market ecosystems | Low (in-country) High (export services) | Medium | High | High |
| In-market consumer pull | Low | Medium | High | High |
| Availability of highly skilled people | High | High | High | High |
| Patent enforcement | Low | Low | Medium | High |
| Access to risk capital | Medium | Low | High | High |
| | ▼ | ▼ | ▼ | ▼ |
| | <ul style="list-style-type: none"> • IT Services • Export-led • Bangalore is Beacon of Progress for India | <ul style="list-style-type: none"> • “China” Miracle • The “Korean Model” Plus Scale | <ul style="list-style-type: none"> • Technology Applications Powerhouse | <ul style="list-style-type: none"> • Pan-Asian Trendsetter • Increasing Global Impact |

Asia assumes a leadership role through the transfer of product/service innovation

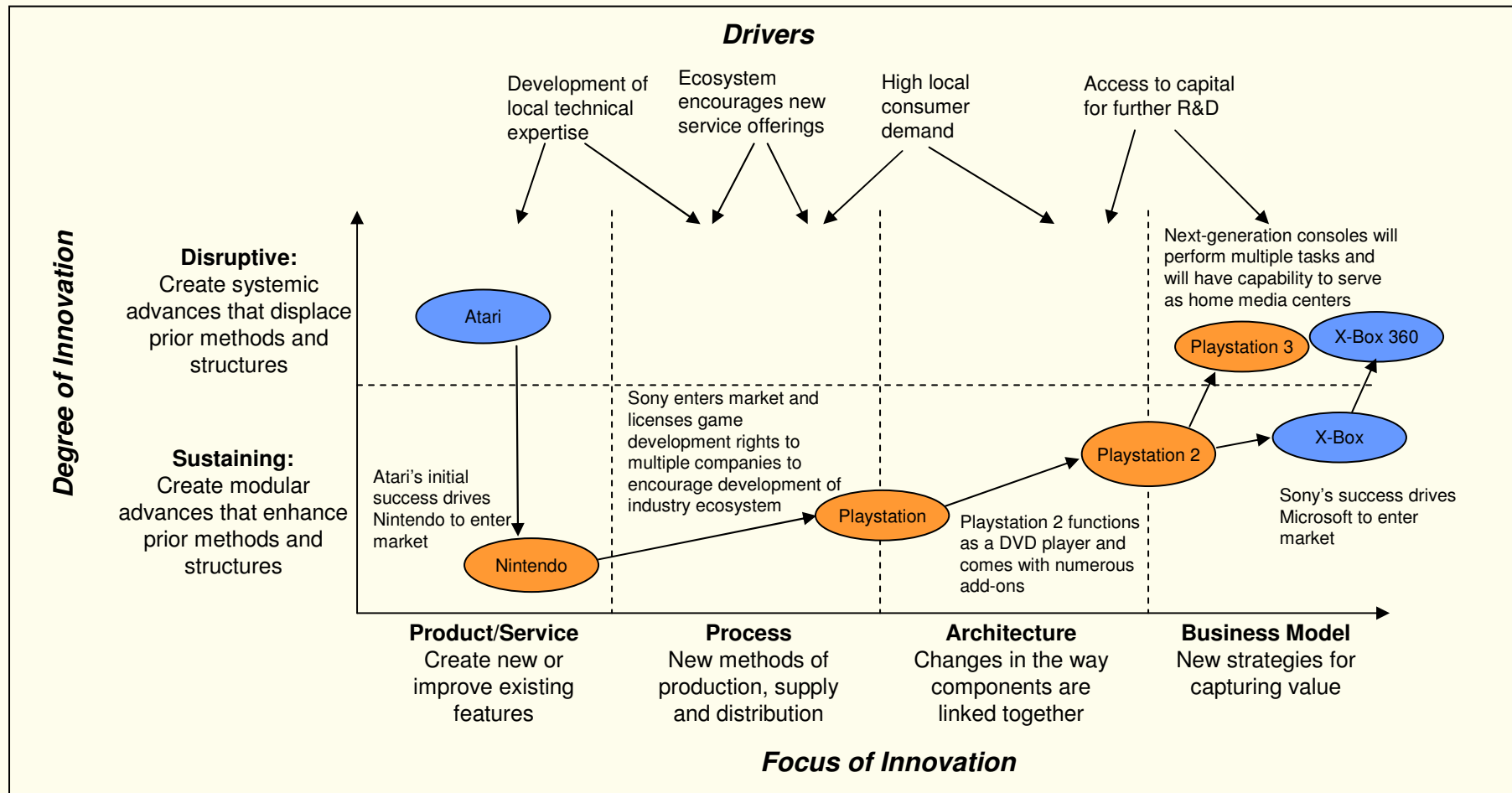
THE INNOVATION “EVOLUTION ROADMAP”



MIGRATION OF PRODUCTIVE CAPACITY

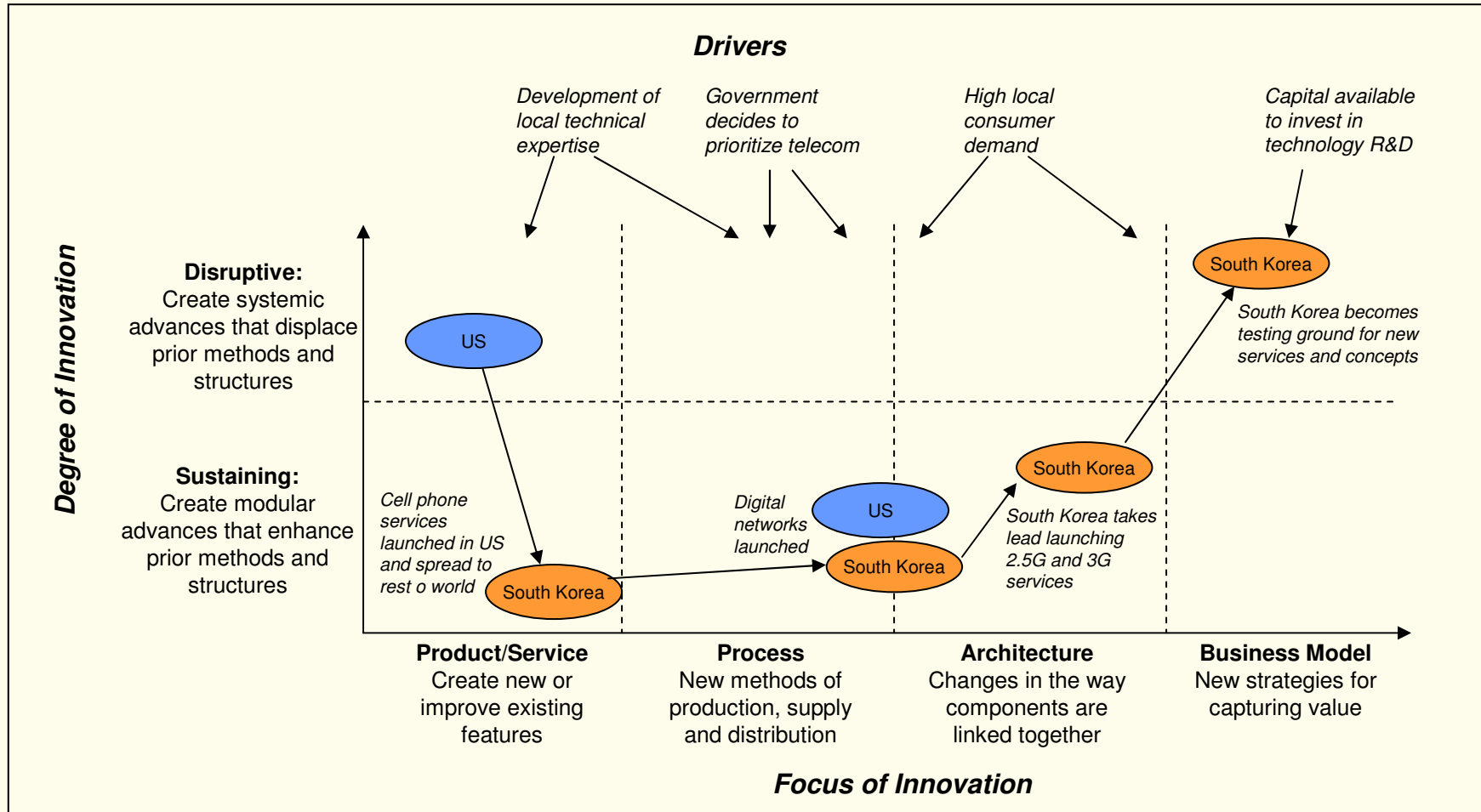
For example, Japan proved to be a disruptive force in the market for video game consoles

THE INNOVATION “EVOLUTION ROADMAP”



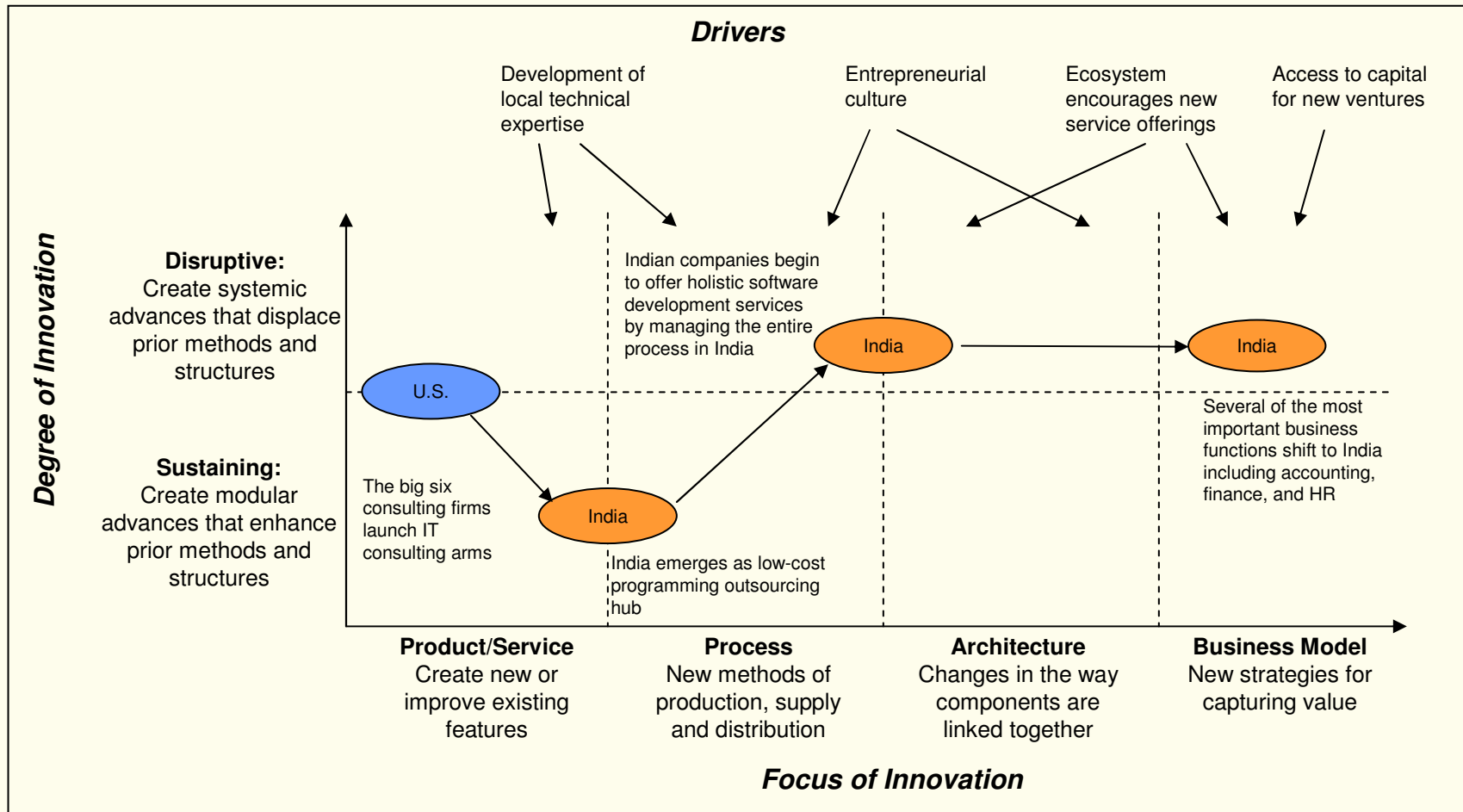
Similarly, South Korea has become the one of the leaders in mobile services

THE INNOVATION “EVOLUTION ROADMAP”



India is increasingly innovative in informational technology services

THE INNOVATION “EVOLUTION ROADMAP”



Due to the loss of high technology industrial capability to Asia, governments in Europe and North America could revive telecommunications driven industrial policies

- Europe and North America have lost important capabilities for development and manufacturing of high technology products
 - 70% of worldwide LCD displays are manufactured in Taiwan
 - A substantial portion of semiconductor manufacturing is spread between Korea, Taiwan and China
 - 30% of commercial software sold in the US (excluding in-house development) is produced in India
 - Mobile handset innovation is, in large part today, resident in Korea
- This trend is beginning to raise political implications
 - National security
 - Loss of jobs (blue collar, white collar, research)
- This could lead to enactment of industrial policies that foster regaining a technology edge
- The telecommunications industry has known to play a key role as a linchpin of high technology industrial plans
 - Leverage its purchasing power
 - Force industry players to channel a portion of their profits in R&D

The telecommunications industry will be confronting a new wave of regulation driven by five economic and political trends

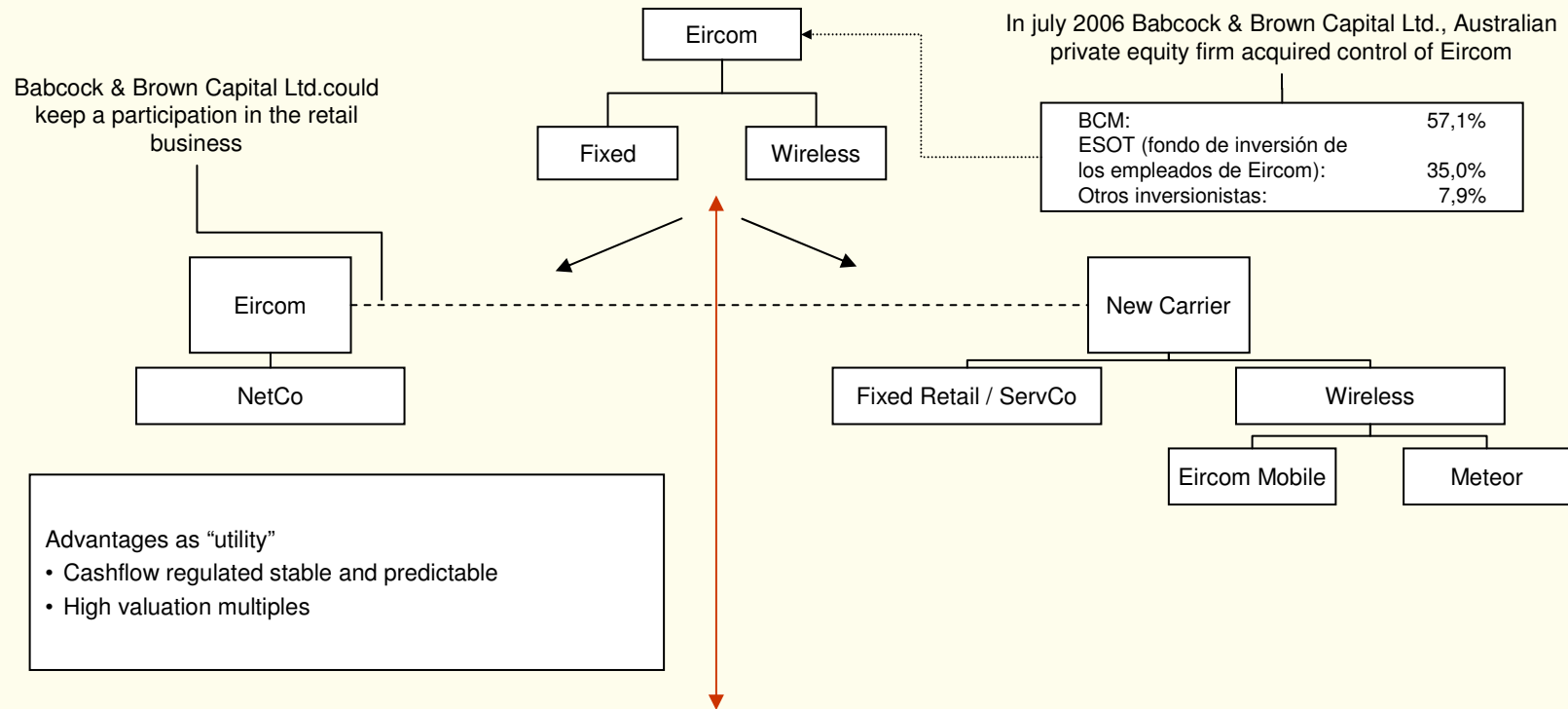
- 1 • Confirmation of the role of information and communications technologies as platform for promoting social and economic development
- 2 • A growing return to scale in transport, distribution and access networks combined with an erosion of economies of scale in content production
- 3 • Migration of productive capacity and innovation in high technology to emerging economies, particularly Asia
- 4 • Entry of private equity and hedge funds which acquire financial and operational control of telecommunications operators
- 5 • Increasing importance of sub-sovereign initiatives, with state and local governments assuming responsibility for deploying infrastructure and services

Key messages

- In recent years, private equity, venture capital and hedge fund rates have started to take investment positions in the telecommunications industry
 - Financial/operating control of incumbents
 - Challengers
- Their approach, consistent with consistent investment objectives, follows a common pattern
 - Incumbents: acquisition based on heavy debt leverage, spinning off of portions of the carrier and selling to other investors, short time horizons
 - Challengers: short term investment in infrastructure aimed at capturing fairly small market positions with a proven business concept, exit strategy within five year time horizon
- This approach raises several important regulatory issues
 - Does a fairly invisible/anonymous investment ownership model serve well an industry with such an important role in providing a public service?
 - What will the ultimate impact be of unrestricted debt leverage on the health of the industry?
 - Does an unrestricted investment and entry model serve the purposes of consumers and society (in other words, does the Schumpeterian principle of creative destruction make sense in this context)?

ENTRY OF NEW INVESTORS

As an example, the structural separation proposed for Eircom is driven by financial engineering considerations and a valuation of the access network as a utility



Advantages as "utility"

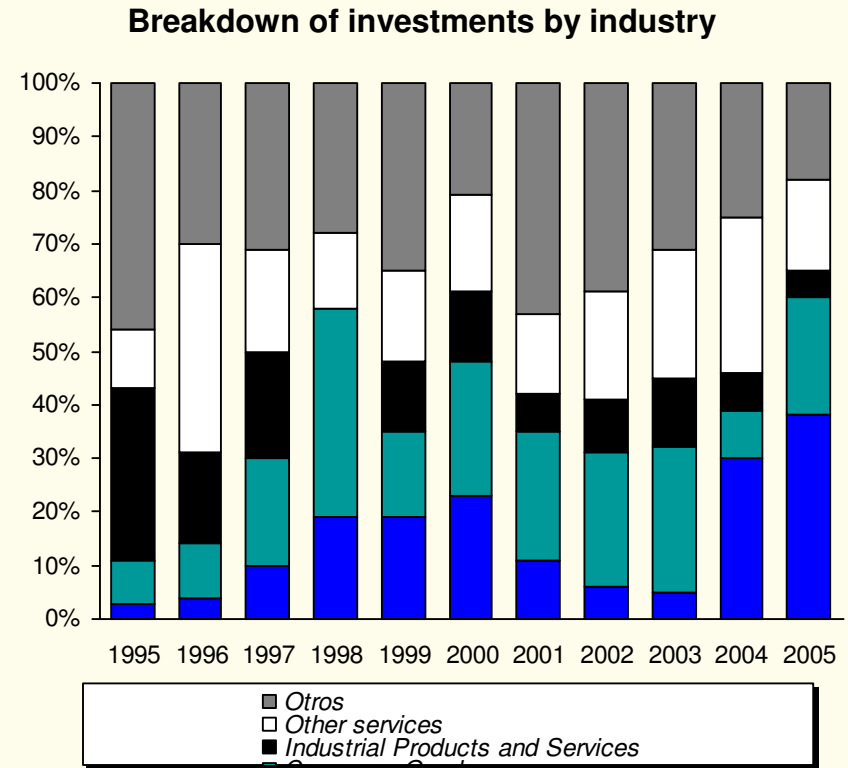
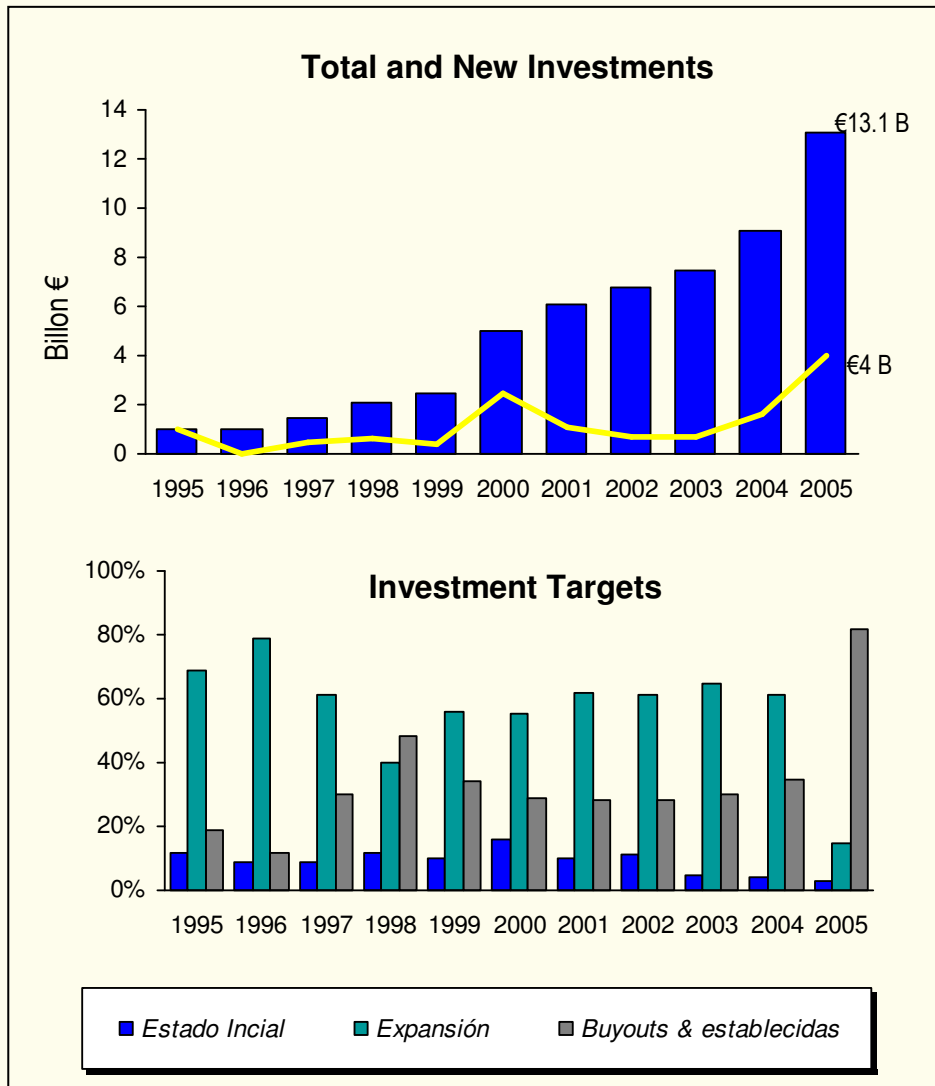
- Cashflow regulated stable and predictable
- High valuation multiples

- Babcock & Brown (BCM) wants to separate Eircom in a wholesale business (NetCo) and a fixed retail business (ServCo) linking it to wireless
- The separation aims at extracting a good exit value of the wholesale business, operated as a "utility"
- Additionally, the separation would reduce the regulatory pressure and liberate the ServCo of its debt burden in order to make it attractive to investors – possibly in view of a leveraged buy out

Source: Dow Jones; The Wall Street Journal; HSBC

ENTRY OF NEW INVESTORS

In Spain, private equity investments have been increasingly targeting telecommunications and information technology sector



- In 2005, the most important investments were Ono in Auna, Amadeus in ICT – others were Cortefiel, Panrico
- In 2006, investments amounted to €2.5 Billion

Source: Equity in Spain 2005, Jose Marti Pellón, Universidad Complutense de Madrid, Abril 2006

The cost of construction of WiFi or Wimax networks is relatively low, becoming a potential incentive for investment of private equity investors

EXAMPLE OF NEW WIRELESS INVESTMENT

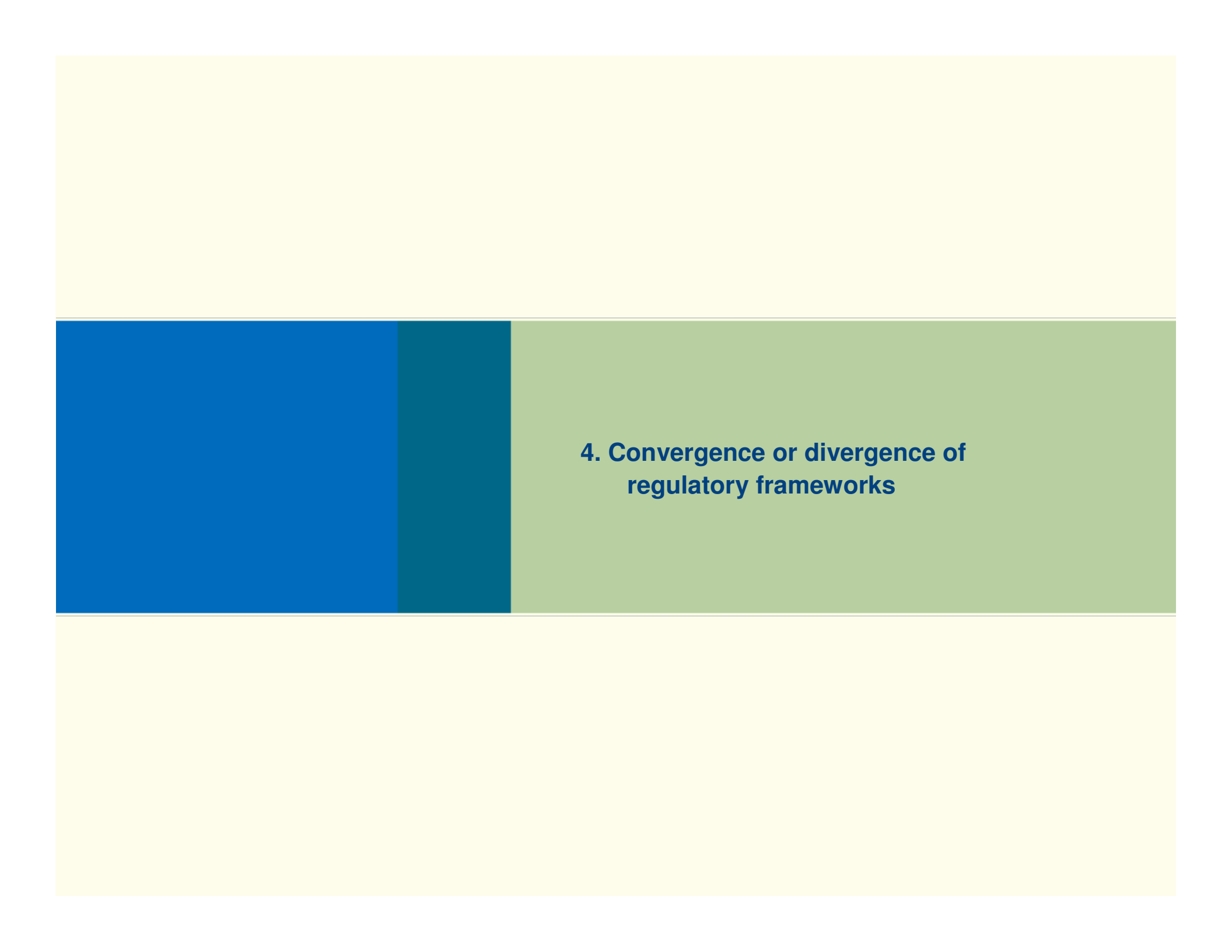
| | DESCRIPTION | TARGET MARKET | EST. CAPEX 15 CITIES | TECHNOLOGY AVAILABILITY | EXPECTED VIABILITY |
|--------------|--|---|-----------------------------|--------------------------------|---------------------------|
| WiFi | Wireless technology in IEEE standardized area. A municipal network comprises a network of hot spots providing broadband access | Targeting users with high mobility needs, focused on data transmission at moderate prices | \$350-450 MM ⁽¹⁾ | 2006-2007 | MEDIUM |
| WiMax | Wireless technology in standardized IEEE areas for offering broadband connectivity in longer distances | Needed for areas of lesser density and markets unserved by fixed broadband | \$300-400 MM | 2008-2009 | HIGH |

Note (1): Key assumptions: coverage of municipalities in the following cities: Madrid, Barcelona, Valencia, Sevilla, Zaragoza, Málaga, Murcia, Las Palmas, Palma de Mallorca, Bilbao, Córdoba, Valladolid, Alicante, Granada, Tenerife. 300 Kbps por suscriptor, penetración entre 40-50%

Sources: INE, Análisis TAS

This new investment pattern could lead to some public policy reaction

- Restrictions in capital structure of utilities
 - Stipulated by law in a fashion similar to foreign ownership restrictions
 - Conducted in the context of transactions (like Italian governments reaction in the case of Telecom Italia)
- Restrictions to debt leveraging to preserve sustainable balance sheets
- Obligations of transparency



4. Convergence or divergence of regulatory frameworks

Key Messages

- Convergent regulatory frameworks are important for implementing strategies and managing investment risk
- Worldwide convergence around the competitive paradigm
- Transition to competitive paradigm follows divergent paths
- Divergence around regulatory frameworks continues to exist
- Divergence around the response to VoIP is apparent
- Regulatory variable will become more complex to manage

Common Regulatory Frameworks Are Critical For Reducing Uncertainty and Managing Risk of Cross-Border Carriers and Global Players

FACTORS PUSHING FOR COMMON REGULATORY FRAMEWORKS

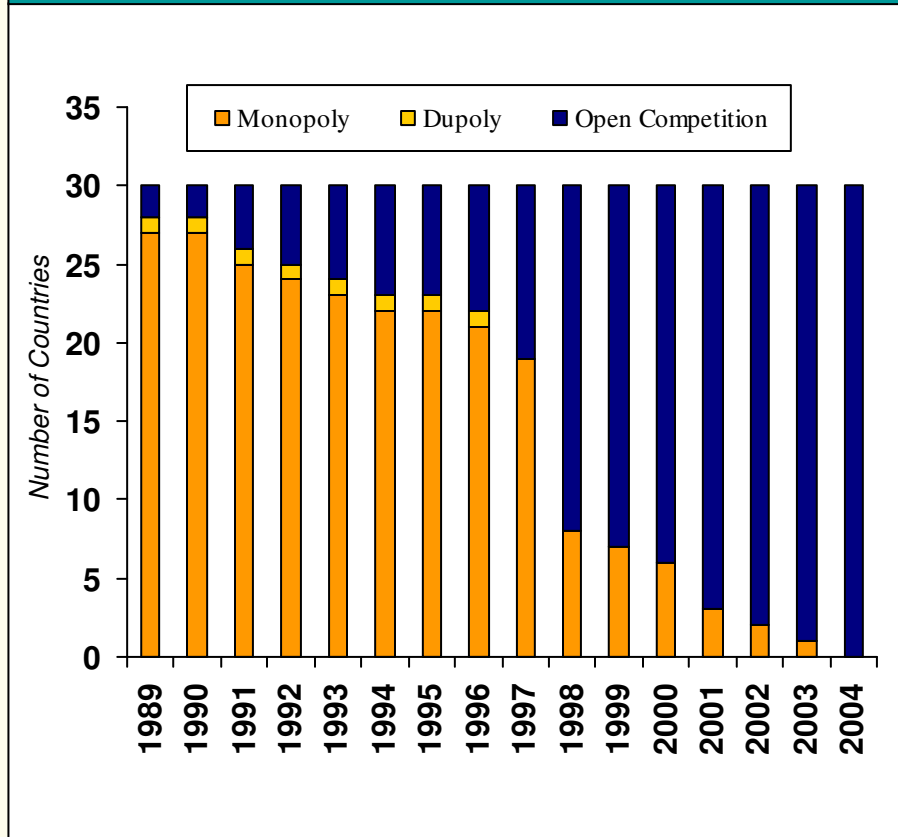
- Supra-National Organizations (European Regulators Group, ITU)
- Policy Imitation Processes
 - Political Communities
 - “Copy Your Neighbor” (Latam Southern Cone)
- Regulatory Strategies of global players

FACTORS PUSHING FOR DIVERGENT REGULATORY FRAMEWORKS

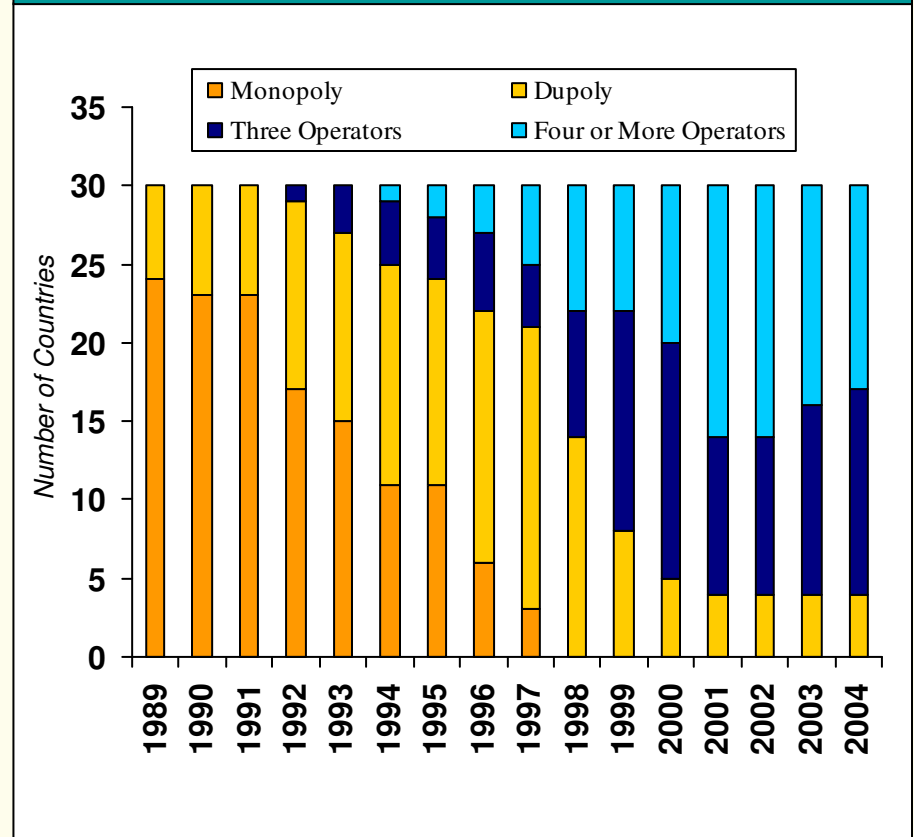
- Distinct Balance of Power Derived From National Industry Structures (e.g., Market Power of Incumbents)
- Idiosyncratic Regulatory/legal Systems(e.g., Rules-based vs. Ad-hoc)
- Political Systems (e.g., PRC)
- Industrial Policies (e.g., Korea)

A Homogeneous Competitive Paradigm Is Emerging In The Industrialized World

COMPETITION IN FIXED NETWORKS (OECD COUNTRIES)



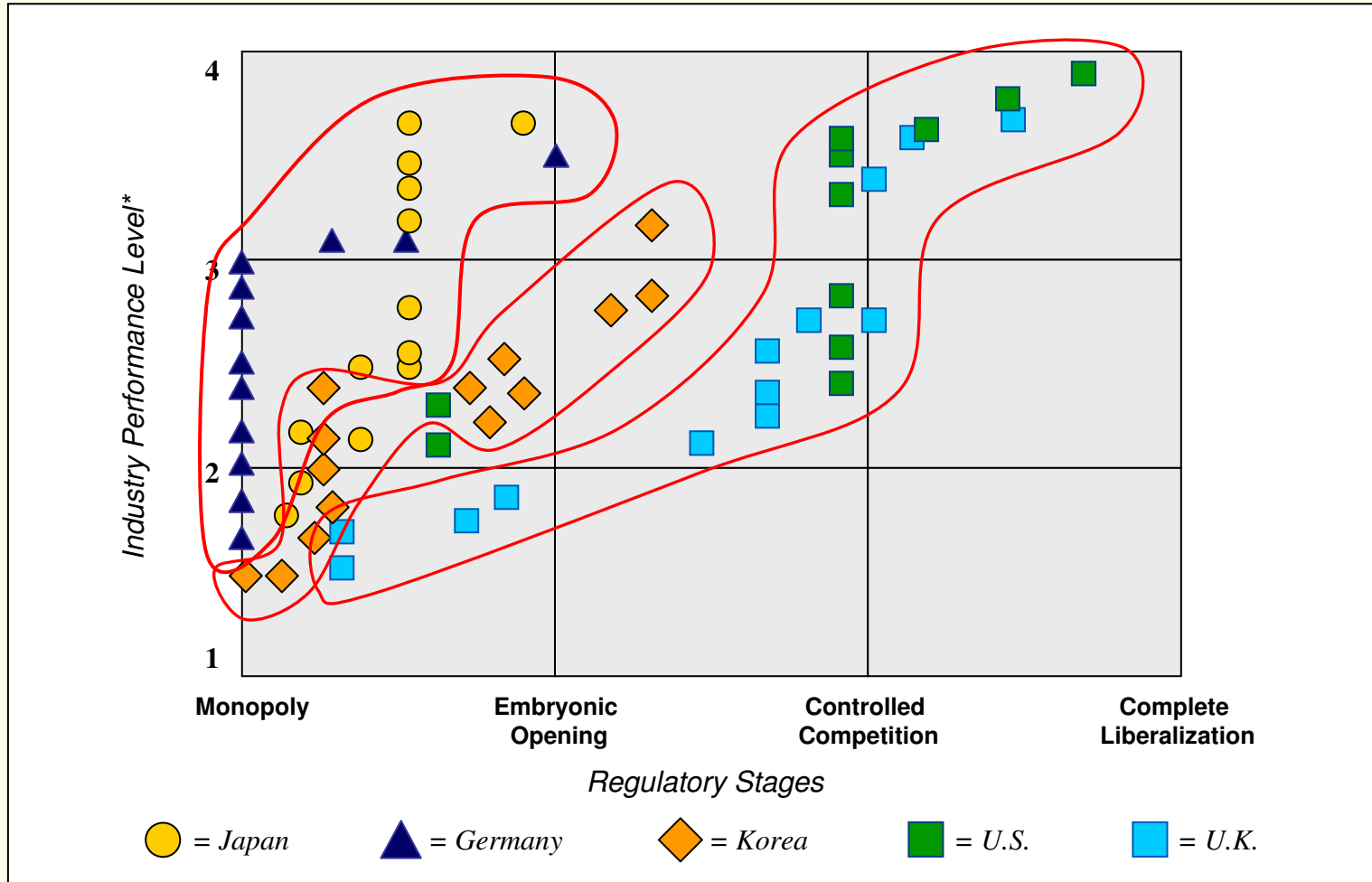
COMPETITION IN MOBILE INFRASTRUCTURE (OECD COUNTRIES)



Source: OECD

However, The Transition To Competition Differs From Country to Country

REGULATORY FRAMEWORK AND INDUSTRY DEVELOPMENT



*Index based on service penetration, pricing, productivity and introduction of new services

On The Other Hand, Regulatory Divergence Is Still Pervasive Outside The OECD Countries

ASIA EXAMPLE

| | LICENSING FRAMEWORK | LLU | INTERCONNECT REGIME | VOIP | FOREIGN OWNERSHIP | UNIVERSAL SERVICE | PRICE CONTROLS |
|--------------------|--|---|--|--|--|--|---|
| Australia | Open licensing regime | Unbundled, TSLRIC pricing | Lowering fixed-to-mobile termination | TBD | Current limit of 35% will likely disappear | Resulting losses are shared among all carriers | CPI-based |
| Hong Kong | Unlimited number in 2 tiers & 8 categories | Phasing out incumbent requirement | Incumbent's termination is mandated | 2 tiered licensing regime | None | Contributions mandated from all carriers | None |
| India | 31 licenses covering both fixed & mobile | None, but change to allow for 5+ year old loops | Consistent termination across networks | Domestic restriction on PSTN interconnect | Tiered limitations based on service classification | 5% of adjusted gross revenue | None |
| Korea | 3 classifications of licensing | Allowed beginning in 2003 | Required, but commercially based | Regulated carriers allowed to offer | 49% on Key Communications | Resulting losses are shared among all carriers | KT's BB pricing requires approval, voice price caps |
| Malaysia | Infrastructure & application licenses | Currently none, but changing | Guidelines for LRIC interconnect arrangements | Providers required to have application license | Current limit of 40% in local companies | "Involved" carriers contribute 6% of weighted revenues | Regulated & periodically reviewed |
| Philippines | 335 licenses for 10 different categories | | Mandatory, but commercially arranged | Treated as a voice service requiring license | 40% limit on all local utilities | Yes, common fund is planned | Voice tariffs must fall in regulated guidelines |
| PR China | Licenses limited to present incumbents | | | | Phasing in higher limits and available regions | | Strict regulatory control & monitoring |
| Singapore | Facilities-based and service-based | Mandatory provision of UNEs by SingTel | Mandatory, but commercially arranged | Requires license, but little other regulation | Currently no limit for any licensees | Only imposed on SingTel currently | Only SingTel must seek approval |
| Taiwan | 3 classifications of licensing | LLU for voice only agreed to by incumbent | Favored mobile operators, but in state of flux | Interconnection with PSTN restricted | 0%, 49% or 60% based on license type | Shared contributions to cover losses | CPI-based for Type I licensees |
| Thailand | Currently restricted to incumbents for voice | | Must interconnect through national incumbents | Basically unregulated | 49% for non-reserved businesses | Mandatory without subsidization | Nat'l incumbents effectively set prices |




However, Some Commonalities Do Emerge Within Specific Regulatory Areas

| | LICENSING FRAMEWORK | LLU | INTERCONNECT REGIME | VOIP | FOREIGN OWNERSHIP | UNIVERSAL SERVICE | PRICE CONTROLS |
|-------------|----------------------------|---|--|----------------------------------|---|----------------------------------|----------------|
| Australia | Tiered licensing available | Unbundling favored as a means to growth | Interconnection required but on commercial terms | Uncertainty on how to treat VoIP | Generally restricted to minority stakes | Shared burden among all carriers | A mixed bag |
| Hong Kong | | | | | | | |
| India | | | | | | | |
| Korea | | | | | | | |
| Malaysia | | | | | | | |
| Philippines | | | | | | | |
| PR China | | | | | | | |
| Singapore | | | | | | | |
| Taiwan | | | | | | | |
| Thailand | | | | | | | |

| | | | |
|------------|---|--|---|
| KEY | ■ <i>Unregulated or Relatively Liberal</i> | ■ <i>Highly Regulated</i> | <i>Unknown</i> |
|------------|---|--|---|

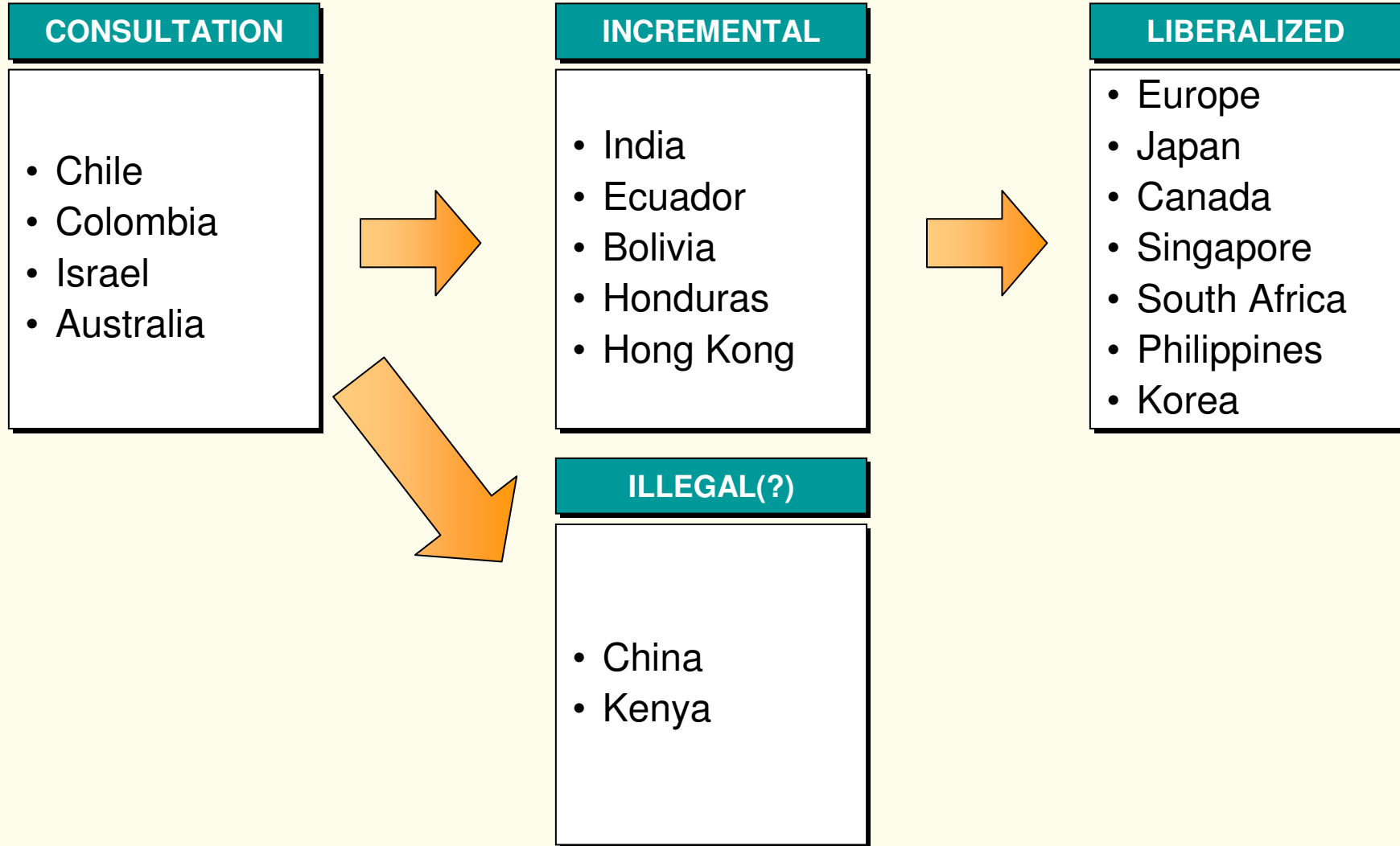
Asian Countries Fall Into Three Broadly Defined Regulatory Models

| | LICENSING FRAMEWORK | LLU | INTERCONNECT REGIME | VOIP | FOREIGN OWNERSHIP | UNIVERSAL SERVICE | PRICE CONTROLS |
|-------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Hong Kong | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal |
| Australia | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal |
| Singapore | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Highly Regulated | Unregulated or Relatively Liberal |
| Korea | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Highly Regulated | Unregulated or Relatively Liberal | Highly Regulated |
| India | Unregulated or Relatively Liberal | Highly Regulated | Highly Regulated | Highly Regulated | Highly Regulated | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal |
| Malaysia | Unregulated or Relatively Liberal | Highly Regulated | Highly Regulated | Highly Regulated | Highly Regulated | Unregulated or Relatively Liberal | Highly Regulated |
| Taiwan | Highly Regulated | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Highly Regulated | Highly Regulated | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal |
| Philippines | Unregulated or Relatively Liberal | Unknown | Unregulated or Relatively Liberal | Unregulated or Relatively Liberal | Highly Regulated | Unregulated or Relatively Liberal | Highly Regulated |
| PR China | Highly Regulated | Unknown | Unknown | Unknown | Highly Regulated | Unknown | Highly Regulated |
| Thailand | Highly Regulated | Unknown | Highly Regulated | Unregulated or Relatively Liberal | Highly Regulated | Highly Regulated | Highly Regulated |

| | | | |
|------------|--|---|--|
| KEY |  <i>Unregulated or Relatively Liberal</i> |  <i>Highly Regulated</i> |  <i>Unknown</i> |
|------------|--|---|--|

In the Medium Term, A Convergence Between Industrialized and Emerging Countries Could Materialize

VOIP REGULATION



Key Take Away For Industry Players: Elevate Regulatory Strategy Management At the Top Of Management's Agenda

- Organization: Central functional accountability complemented with regional resources
- Analytical Capability: Systematic stakeholder incorporated in strategy/business planning process
- Specific Approaches: Trade-offs, alliances, scenario building



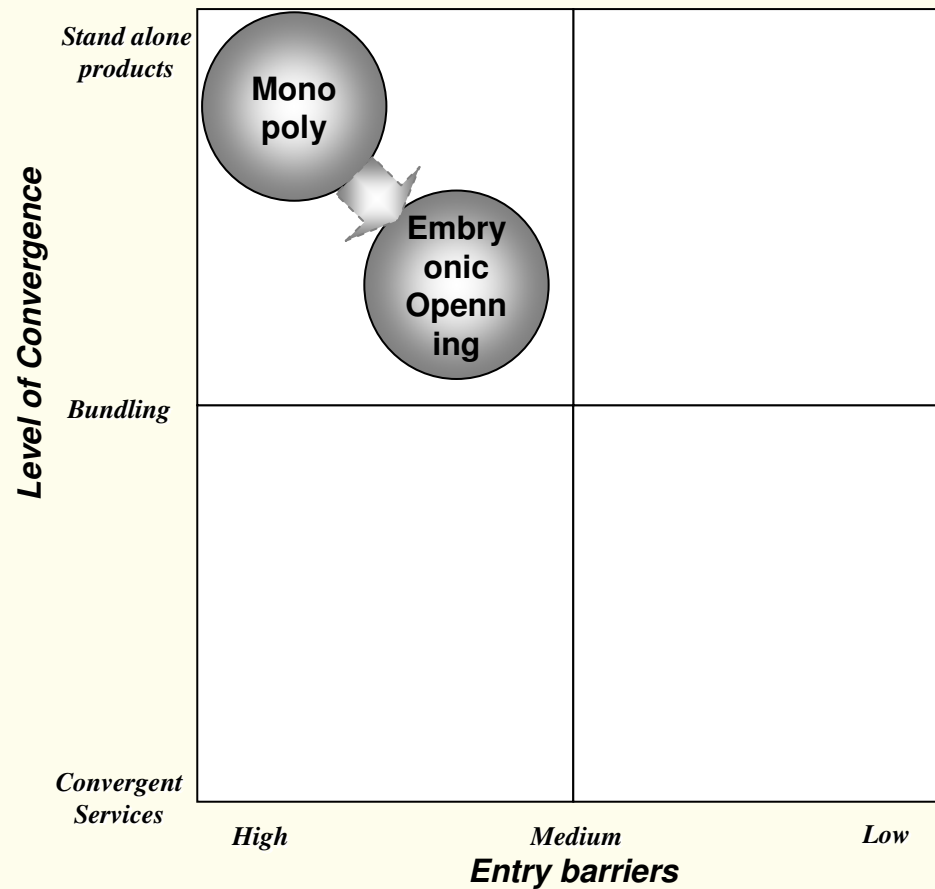
5. Looking at the future of regulation

Key messages

- The process of industry deregulation has resulted in the emergence of a competitive industry with benefits to consumers and society
- Going forward, however, two alternative regulatory models exist:
 - Extension of current framework resulting in hypercompetitive dynamics, a decline in industry profits and a potential negative impact on the rate of innovation and capital investment
 - Redefinition of the framework that results in selected areas of intervention aimed at ensuring that the natural oligopolies operate fairly to consumers and other industry players
- The model to be chosen will have fundamental implications of the future of the industry

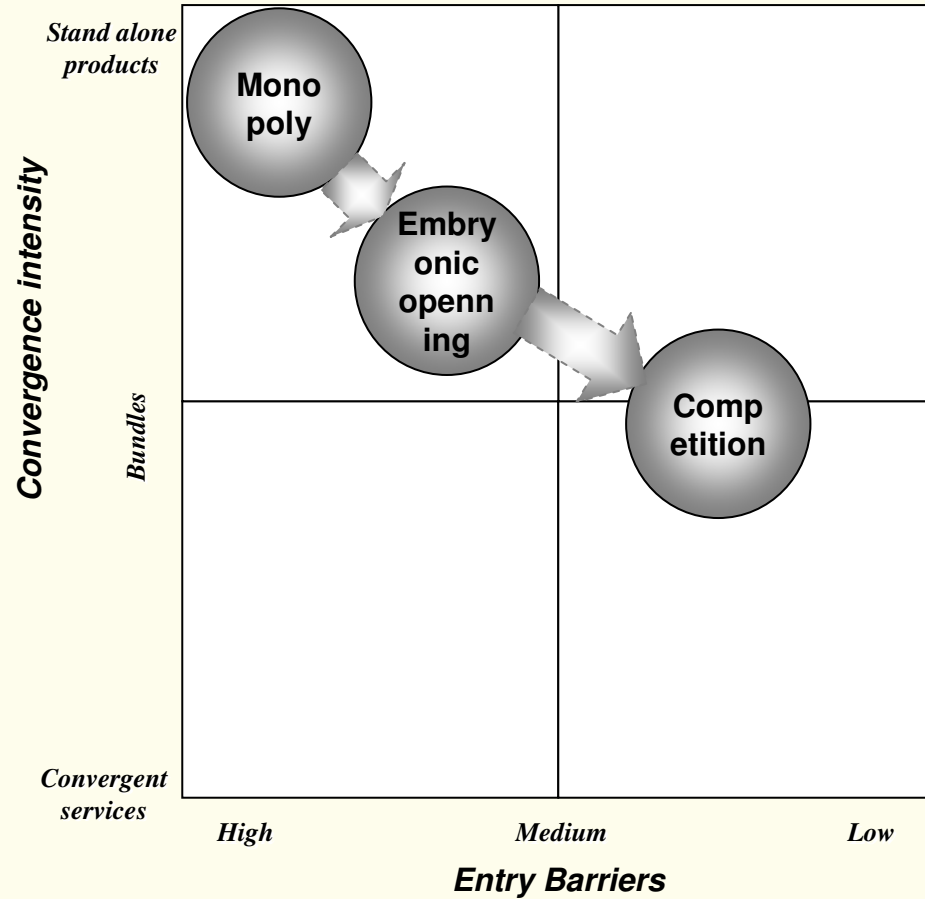
The telecommunications industry in the industrialized world has been evolving to a more competitive environment with erosion of barriers to entry and embryonic convergence

CHANGES IN INDUSTRY DYNAMICS



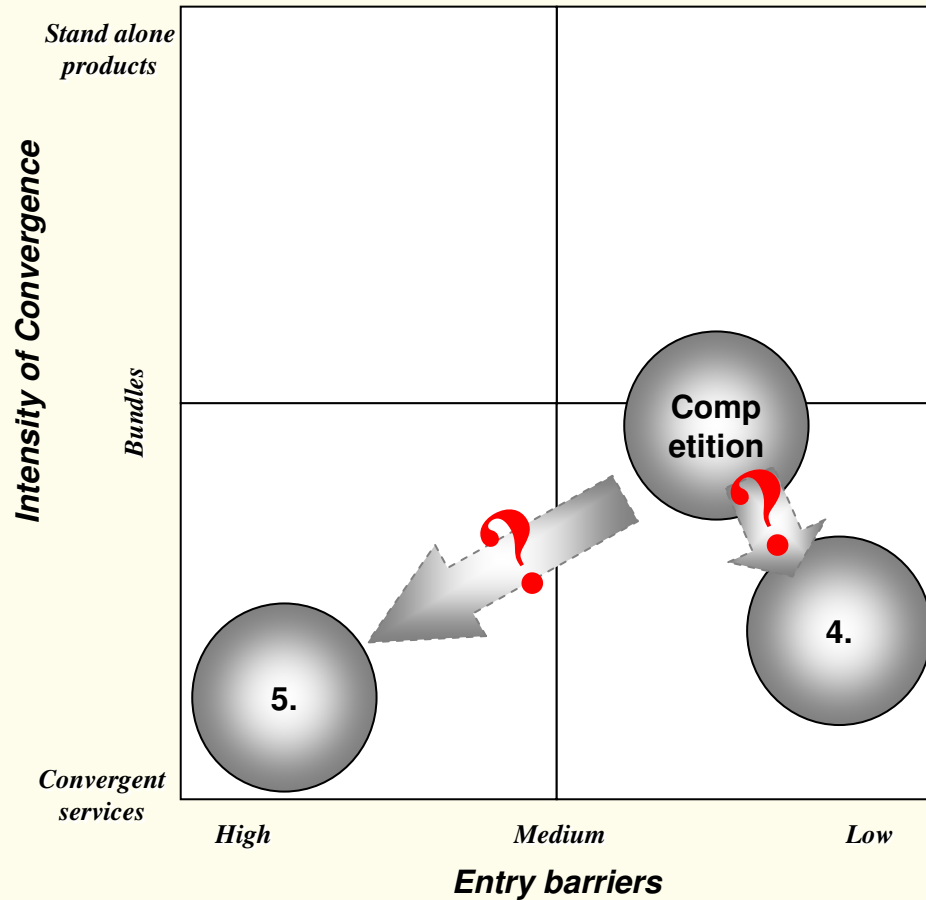
The current trends indicate an increase in competitive intensity and convergence

CHANGES IN INDUSTRY STRUCTURE



Two industry structure options are possible in the longer term

CHANGES IN INDUSTRY STRUCTURE



4. Service competition

- Entry of more operators, some based on low value-added business models
- Margin erosion for the whole industry
- Limited sustainability for less established players
- Decrease in innovation rate
- Limited infrastructure investment

5. Intermodal competition

- Industry integration of vertically integrated operators with fully owned platforms, that might be different::
 - Telco
 - Cable
 - Wireless
- The rest of industry players will continue participating in service distribution
- Sustainable margins for the whole industry
- Competition among different converging business models
- Infrastructure investment to support delivery of new services

Regulation will be playing an extremely important role in driving the dynamics of the telecommunications industry in the short and medium term

- The worldwide wave of consolidation and the investment of private equity players is prompting the need to regulate an oligopolistic industry structure, prone to some market inefficiencies
- The need to upgrade access networks to accommodate growing bandwidth requirements can only be met by new networks with high economies of scale, thereby increasing the pressure to get incumbents to allocate capital to infrastructure renewal
- While the industry has achieved tremendous growth, the digital divide risks becoming a permanent fixture of future societies unless governments act decisively

Regulatory pressure will be acting at three levels: multinational, national and subsovereign

- Multinational: prominent role to organizations such as the European Commission
- National: dominant role of country-level agencies, generally split between telecom regulators, competition authorities and cabinet-level ministries (Information and Communication, etc.)
- Sub-sovereign: provincial agencies and municipalities
- Relative importance of these entities will vary by region and country
 - North America: dramatic reduction of industry-specific regulatory roles assumed in the past decade
 - Europe: combination of multinational, national and sub-sovereign entities will continue putting pressure on industry dynamics around unbundling, access rules, tariffs and spectrum allocation
 - Asia/Pacific: not following a common model
 - Countries exhibiting a dominant state presence (China)
 - Countries exhibiting industrial policy vectors (Japan, Korea)
 - Countries following a European model (Australia, New Zealand)

Regulatory pressure might end up having an impact on industry performance

- Tariffs (primarily roaming rates and broadband wholesale access)
- Spectrum allocation
- Rules regarding industry structure in terms of restrictions to vertical integration of incumbent carriers
- The continuing regulatory pressure, combined with slowing industry growth will have an impact on industry performance
 - Wireless is reaching a saturation point in the industrialized world and in many emerging economies
 - Broadband penetration is slowing down in the United States, Japan and Korea and is expected to reach a similar stage in other industrialized economies within the next five years
- The slowing down of the two main areas fueling industry growth combined with continuing regulatory pressure will lead to an erosion of revenues and profit margins

**TELECOM ADVISORY
SERVICES, LLC**

For more information, contact:

Raúl Katz, raul.katz@teleadvs.com, (845) 868-1653

TELECOM ADVISORY SERVICES LLC
182 Stissing Road
Stanfordville, New York 12581 USA