

Regulatory federalism in telecommunications*

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«Por otra parte, estamos en el siglo XXI y España y Francia ya no son lo que eran en 1939, ya no hay pesetas ni francos, ni siquiera hay frontera entre los dos países (...). Lo más sencillo hubiera sido desconectar el móvil, ignorar microondas y vibraciones de la modernidad y regresar la montaña a su estado original, pero resulta que el teléfono, además de ser un trasto molesto que obstaculizaba mi experiencia, era el indicador de la frontera entre los dos países. De un lado operaba una compañía telefónica, y del otro, otra, y cada vez que, en mi camino levemente errático por la cima, cruzaba la línea virtual que divide España de Francia, mi incursión se registraba en la pantalla del teléfono, que cambiaba de Movistar a Bouygtel.»

From Jordi Soler (2009), *La Fiesta del Oso*, Literatura Mondadori.

Abstract

The liberalization of telecommunications and technological change have unbundled a vector of public interventions in this industry. Now different government levels interact. The economics of federalism shed light into this new landscape. The insights from this branch of research are used to analyze the European Union common telecommunications policy (as compared to the history of federal and state regulations in the US) and the role of local and regional powers in the promotion of broadband new generation networks. Decentralized non-specialized policies internalize policy externalities, whereas specialized centralized authority internalizes territorial spillovers. Preliminary empirical evidence shows that decentralization of policies inside member states is not detrimental for broadband investment in the European Union.

Keywords: federalism, regulation, telecommunications.

JEL Classification: H77, K23, L50, L94, L96, L97.

Resumen

La liberalización de las telecomunicaciones y los cambios tecnológicos han dado lugar a un nuevo vector desagregado de intervenciones públicas en este sector. Dado que en la regulación ahora participan distintos niveles de gobierno, el análisis económico del federalismo puede aportar ideas a este nuevo

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escenario. Las herramientas de este área de investigación son utilizadas en este trabajo para analizar la política común de telecomunicaciones de la Unión Europea (en comparación con la historia de las regulaciones federal y estatal en los Estados Unidos), así como también el papel de los poderes locales y regionales en la promoción de las redes de nueva generación. Las políticas no especializadas y descentralizadas internalizan las externalidades que se producen en la interacción de políticas públicas, mientras que las autoridades especializadas y centralizadas internalizan los efectos desbordamiento entre territorios. Alguna evidencia empírica preliminar señala que la descentralización de las políticas dentro de los Estados miembros no perjudica a las inversiones en banda ancha en la UE.

Palabras clave: federalismo, regulación, telecomunicaciones.

Clasificación JEL: H77, K23, L50, L94, L96, L97.

1. Introducción

Decisions about the optimal allocation of responsibilities on telecommunications in the vertical chain of government face an old dilemma between scale economies and network externalities, on the one hand, and management of rights of way, on the other. Whereas the optimal scale of a telecommunications network can be very large, its deployment naturally needs the involvement of local powers.

In addition to this old dilemma, in the last two or three decades the liberalization of telecommunications and technological change have unbundled a vector of public interventions in this industry. Different elements of this vector (competition policy, regulation of residual monopolies, public investment) have different geographic scope. Prior to these phenomena, all public intervention took place over many decades through the national regulation or public ownership of vertically integrated monopolies. Now different government levels interact. In this article, the implications of this interaction are analyzed. To do it, the relevant literature is summarized; also, the evolution of jurisdictional allocation in the EU and the US and the particular case of Internet broadband policies are addressed. It will be seen that the effects of different policy allocations and the criteria to choose among them have to do, among other issues such as «laboratory federalism,» with different types of externalities.

In particular, it is argued below that there is a trade-off between the different spillovers internalized by each level of government: centralization internalizes territorial spillovers, and decentralization better internalizes policy spillovers. As a result, an empirical prediction is that the impact of decentralization on network extension is ambiguous. Preliminary evidence shown in Section 4 does not solve this ambiguity but provides weak results in favour of some role for local and regional powers.

The issue of the optimal degree and form of decentralization of public intervention must be addressed coinciding with liberalization and technological change in telecommunications. However, the debate about the optimal degree of centralization in telecommunications policies precedes the advent of liberalization. There is a well documented historical trend by which the regulation of utilities moved up in the vertical chain of government, starting at the beginning of the XXth

century from the local to the state level in the US¹ and other jurisdictions². However, significant intervention still persists at the local level, as illustrated by the role of municipal powers in broadband promotion. Decentralized powers are under significant pressure to intervene in regulated network industries, at least for three reasons (see Troesken, 1996):

- (i) the physical deployment of networks depends on the rights of way for which local powers are often naturally responsible;
- (ii) regulatory policies are locally salient, and
- (iii) interest groups find it relatively easy at the local level to organize to influence these policies in a variety of directions.

Liberalization certainly adds a further layer of complexity relative to monopoly regulation. As some authors have characterized the liberalization process in network industries as a «long and winding road»³, no minor ingredient of such conditions is the relationship between the different government levels. If anything, the introduction of competition increases institutional diversity (see Moore, 2002).

A consequence of complexity is that the organization of government may not always coincide with market boundaries or with the boundaries of firms. As Woroch (1990) argues, «when multiple regulators are unavoidable, boundaries between them should divide areas and services that exhibit low cross-elasticities of demand and supply. Such «bright lines» have become less attainable with recent developments in telephony.» And «how governments divide up the industrial landscape may be vastly different from how business choose to organize.»

The relationship between regulation and investment is another key aspect of the debate. For example some commentators argue that too much regulatory diversity discourages investment because it introduces costs related to red tape and uncertainty⁴. But others argue that decentralization introduces a variety of veto points which stop the predatory tendencies of government and restricts the information and authority available to central powers, thereby contributing to reinforce commitment (not to expropriate investments).

However, decentralization as an attempt to reduce the role of state intervention (as advocated in the Reagan era in the US) may have the problem of reducing the scope for good as well as for bad policies: as is well known in the literature on reform in developing countries, the further veto points contributed by decentralization favour the status quo. This may be good if the status quo implies preserving the value of good investments, but it may be bad if the status quo implies

¹ See TROESKEN (1996), HAUSMAN and NEUFELD (1991, 1999, 2004), NEUFELD (2008).

² Although in most other jurisdictions, the move to the national-state level involved the creation of state owned and (mostly, although not universally, especially in electricity) national vertically integrated firms.

³ ARMSTRONG and SAPPINGTON (2006).

⁴ On the compliance costs of overlapping or duplicated regulation, see mentions to it by KOVACIC (2007) and SPECTOR (2007).

stopping a potentially welfare increasing market expansion or liberalization process. Both the new political economy of federalism and the experience of US electricity suggest that decentralization (at the state or member state level) is better at providing commitment for investment than at accommodating market reforms.

As it has been argued above, the arguments of the telecommunications policy vector are not controlled by a single body any longer. The need for vertical and horizontal cooperation then arises, but cooperation may be inhibited by distributional concerns (Baron, 1985). For example, industrial policies that interact with broadband markets are not always decided at the same jurisdictional level as regulatory decisions on market power.

For example, different authorities may control behavioural and structural regulation (which are clearly interdependent), as illustrated in Gilbert and Riordan (1995) or Perry (1984). According to Joskow (2009) the federal electricity regulator in the US has been constrained to use behavioural instruments to control market power in wholesale markets when it would have been optimal to use structural instruments, for which it does not have jurisdiction. The starting point of deregulation is characterized by geographical fragmentation and typically member states in the EU, as states in the US, are free riders in the path to competition: they would benefit from more integrated and competitive markets in the long run, but do not want to lose the lever they have on territorial incumbents to both maintain or promote national champions and use regulated cash flow to promote a number of local objectives.

The degree and nature of the involvement of each level of government are of great importance to telecommunications firms, which have intensely lobbied for the approval of the third package with the argument that increased regulatory harmonization and market integration will reduce the costs of European wide operators.

This paper first explores in Section 2 how the literature on federalism can contribute to the reform of the telecommunications industry. Next, in Section 3, it analyzes the architecture of telecommunications regulation in the European Union as compared to the US. Section 4 addresses the interaction between the degree of decentralization and the performance of broadband Internet access. Finally, Section 5 presents some concluding remarks.

2. Telecommunications and the economics of federalism

The main arguments used in the literature on the economics of federalism⁵ are applicable to network industries in general and to telecommunications in particular, as argued by Trillas (2008b). The Tiebout (1956) argument that jurisdictional competition may under strong conditions select optimal differentiated policies under factor mobility was strengthened and applied to commitment for private investment

⁵ As summarized for example in OATES (1999). This author has developed the theory behind the subsidiarity argument, by which central powers should carry the burden of the proof in case of doubt, because local powers are expected to have a tailoring and information advantage.

TABLE 1
SUMMARY OF ARGUMENTS

	Favours Central Regulation	Favours Local Regulation	Ambiguous
First Generation	<ul style="list-style-type: none"> – <i>Externalities and scale</i> – Coordination – Race to the bottom – Beggar thy neighbour 	<ul style="list-style-type: none"> – Laboratory federalism – <i>Tailoring</i> – Regulatory Competition 	<ul style="list-style-type: none"> – <i>Market definition</i> – Special districts
Second Generation	<ul style="list-style-type: none"> – Quasi-rents – Compliance costs – Regulatory capacity 	<ul style="list-style-type: none"> – Market preserving federalism – Political participation 	<ul style="list-style-type: none"> – Accountability – Capture – Commitment

NOTE: In italics, arguments related to structural market conditions. First and second generation refer to arguments before and after the introduction of contract theory in economics.

by the market preserving theory of Weingast and his co-authors⁶. Treisman (2007, p. 97) mentions casual evidence that public utilities infrastructure and local airports have been used by local authorities to compete for mobile capital.

Table 1 organizes the literature along three dimensions. First generation arguments were those made before the irruption of contract theory. Those arguments in italics have to do with the structural conditions of markets, which have the virtue of providing a clearer guide than other sorts of arguments. It can also be seen from the table that more recent arguments have delivered more ambiguous conclusions. Accountability, capture⁷ and commitment are important issues to take into account in specific settings, but in general both theory and empirical evidence show that they do not settle the issue of centralization versus decentralization (see Trillas, 2008b).

Yilmaz *et al.*, (2002) report statistical evidence that US states use regulation and policies to encourage telecommunications investment which has a significant impact on the attraction of mobile factors. Indeed, it is precisely telecommunications technologies that make business more mobile than in the past. An increase in the telecommunications investment levels in all states has even a small but negative externality on the economic growth of any single state due to loss of mobile factors to other states. Regulatory competition may also unleash undesirable phenomena such as a «race to the bottom» or «beggar thy neighbour» policies, for example in telecommunications high termination rates for calls originated in other countries or states. Laboratory federalism (letting local powers perform experiments in the face of uncertainty) and tailoring arguments can also be used to defend a role for local powers, although high inter-jurisdictional externalities, coordination and scale economies (at the product or administrative level) would tilt the balance in favour of central powers.

⁶ See for example QIAN and WEINGAST (1997).

⁷ See BARDHAN and MOOKHERJEE (1999, 2006).

Some scholars⁸ argue that liberalization requires a centralization of regulatory authority at the central, federal level, to overcome the resistance of local regulators that put incumbent or other interests above the goal of market efficiency. This would be compatible with a withdrawal of federal regulation at a later stage when the progress of liberalization is deemed sufficient (one wonders why these scholars have trust in the disappearance of the federal regulator but not the disappearance of the national/local one). However, the control of rights of way and political sensitivity at the positive level make national or regional/local participation to some extent unavoidable. Different jurisdictions will control different parts of the multi-dimensional policy vector that affects liberalizing sectors. Optimal modularity (fine-tuned unbundling of firms and regulatory responsibilities) decisions are often difficult to make or enforce in complementary and rapidly changing markets. This makes vertical cooperation a necessary attribute of a sound regulatory system (as suggested by Nuechterlein and Weiser, 2007), and that type of cooperation has been a key feature of EU telecommunications in the recent past.

Although geographic market definition in the sense used by competition policy could in theory be used as a criterion to choose the optimal regulatory jurisdiction, the fact is that often the boundaries of markets do not coincide with the boundaries of political jurisdictions. Under some specific conditions, it is worth going beyond traditional political boundaries and organize regulation through special districts⁹, such as PJM or the NordPool wholesale market organizations in the case of electricity. But the fixed administrative costs of creating a new institution can be high (see Subsection 4.2 below on the fixed administrative costs of regulation).

Inman and Rubinfeld (1997) argue that the allocation of policies should not only depend on efficiency criteria, but also on the objective of promoting political participation. This would justify local policies that do not necessarily promote economic efficiency if they are approved under desirable levels of participation and transparency. Troesken (1996) and Neufeld (2008) argue that a key factor in moving regulation from the local to the state level was the inability of local powers to commit to acceptable rates of return for private investors. Nonnenmacher (2001) however argues that in the diffusion of the state regulation of the telegraph industry a cycle characterized by promotion followed by regulation was more important than quasi-rents considerations.

The argument that centralization is the only way in liberalizing telecommunications markets is strongly made by Hoffinger (2003), Hahn *et al.* (2003), Lehr and Kiessling (1998), and Sun and Pelkmans (1995). Following these authors, federal regulation in telecommunications should be strengthened and should focus on those aspects that amount to clear externalities, for example:

⁸ JOSKOW (2009), LEHR and KIESSLING (1999), SUN and PELKMANS (1995), HAHN *et al.*, (2003), HOFFINGER (2003).

⁹ On the virtues of special districts, see EICHENBERGER and FREY (2006) and CASELLA and FREY (1992). Other examples are schools or water districts in the US.

- i) «beggar thy neighbour» policies in roaming wholesale termination charges (but keeping a balance that avoids, in Europe for example, precluding European-wide commercial initiatives by companies to reduce retail roaming rates);
- ii) any policies that cause what Sun and Pelkmans (1995) call the «frontier effect»¹⁰, namely the fact that equally costly products or services are more expensive when they cross a jurisdictional border than when they take place inside the borders of a member state; more generally, legal barriers to entry should be eliminated, and only structural barriers to entry should prevail in the long run, which implies helping to integrate those markets that are only stopped by legal separate jurisdictions;
- iii) protectionist terms of access or licensing policies that entrench the position of national incumbents or are equivalent to state aid in the promotion of the international competitiveness of national incumbents. Credible entrants are typically foreign incumbents and the temptation to embark into subtle ways to promote the national ones are often hard to stop under conventional checks against state aid.

Without taking such a strong view, other scholars add telecommunications into lists of industries that should be regulated at the national as opposed to regional or local level (Aubert and Laffont, 2002, and Smith, 2000). But see Nuechterlein and Weiser (2007) for the view that an input from all levels may be needed in modern telecommunications markets (central powers may be overwhelmed by local problems or lack the necessary information). Brennan (2003), analyzing disputes over local authorities in the US imposing open access conditions on cable companies' mergers, argues that local authorities should be left free to choose on local markets, even if they decide erroneously, along the lines of Inman and Rubinfeld (1997). His only caveat follows the arguments of Troesken (1996), in the sense that there is a risk that local powers hold up private operators, and stresses that this is especially so when these operators may be earning rents at the national level. In this case, the local hold up risk imposes a negative externality on the rest of the country. Brennan (2003) however stresses that in local access issues the relevant markets are local, not national: «The issue at hand is not agreeing to a standard Internet protocol, but one of the structure of the local ISP market. Local officials presumably are both closer to the affected consumers and more knowledgeable regarding relevant market conditions than is the federal government. To the extent that the policy is based on alleviating problems created by monopolies in relevant markets, the policy choice and the risk of error should be a local prerogative, unless a wrong local choice will substantially reduce the value of Internet access elsewhere in the country.»

The network in one jurisdiction may have higher value to consumers when the neighbouring jurisdiction has a better network. These spillovers are of two types:

¹⁰ See the quote at the beginning of the paper.

- *Direct externalities*: individuals of country A benefit if a good network in the neighbouring country B allows them to contact more people, firms or organizations in this country.
- *Indirect externalities*: individuals of country A benefit if a good network in the neighbouring country B creates incentives for the development of enhanced applications which require a large market.

Humplick and Estache (1995) look at the impact of different measures of decentralization on the performance of road investment, electricity and water¹¹, without clear cut results. In the case of electricity they use a dummy variable for spatial decentralization for a cross section of countries, without giving many details on how this variable is computed (*e.g.*, does it mean that all relevant legislation and tariffs are at sub-central levels). Beyond this, there is no more systematic empirical work to my knowledge on the impact of the jurisdictional allocation of regulation in network industries.

The definition of the relevant market in telecommunications is similar to what is done in other industries, and it depends on the degree of substitutability between products and between the same product sold in different places. But some scholars¹² highlight the specific risk in telecommunications that, with too narrow product definitions, the fast technological and demand convergence process is not duly taken into account. This would imply that often some concentration levels are being diagnosed, which are false if one takes a broader relevant product market definition. This broader market definition would tend to diminish the importance of opportunities to practice horizontal or vertical product differentiation. Market power can artificially arise if markets are defined too narrowly. The trend in geographic markets is however the opposite: it is precisely due to technological reasons that some territories can accept higher concentration levels than others, and therefore the geographic definition could yield smaller markets than those that have been deemed relevant in the past.

Public intervention in telecommunications is mostly justified by market power concerns and the presence of territorial externalities. This implies that not all socially desirable projects are commercially viable, although the exact location of the region of socially desirable and commercially unfeasible projects is hard to identify.

Alongside direct and indirect externalities mentioned above, there are also externalities due to the social welfare or the economic growth generated by the development of businesses allowed by enhanced telecommunications networks, by some medical and educational applications, etc. Nevertheless, the location of this enhanced welfare is uncertain.

¹¹ In the case of electricity, performance is measured in terms of system losses, customers served per employee, generation capacity factor, rate of return on investment, and employees per Gigawatt-hour produced.

¹² See GUAL (2007).

Direct and indirect externalities are territorial spillovers because they are associated to the notion that the larger the network, the better. The third type of externalities just mentioned is not necessarily related to territorial spillovers, but may benefit from coordination with policies in other fields (such as health or education). Hence, externalities of this type may be called «policy externalities». This distinction will play an important role in Section 4.

The role of governments in promoting some projects in telecommunications and the goals of universal service policies can be justified with this lens, although equity concerns, or merit goods considerations may also play a role.

To conclude this section, two possible policies are mentioned that have been thought in the recent past to reduce the cost of deployment of telecommunications networks in general and broadband new generation networks in particular. These two policies are network sharing and geographic differentiation of regulation, and both suggest a role for local powers in the context of a coordinated strategy with other jurisdictions. Network sharing is a quintessential instance in which government, through a thoughtful policy of expediting access to public and private rights of way and ducts, can assist private parties in overcoming a collective action problem. Geographic differentiation consist of dividing a jurisdiction in competitive and non competitive areas, and promote facilities based competition only in those areas that are more competitive. One country that has seemed to take seriously into account geographic differentiation thus far is Canada (see Trillas, 2008a). Important practical concerns with it are the difficulties of establishing the correct boundaries between regions. There is a trade-off between practicality and granularity. In the Canadian approach, as a first step, metropolitan areas are separated from the rest of the country and regulation and other policies are confined to the non metropolitan areas. Then it is expected that local and regional authorities have a larger role in these non metropolitan areas. OECD (2010) contains several other examples of geographically differentiated regulation in France, Australia and other jurisdictions.

3. Telecommunications regulatory architecture in the EU and the US

European Union

The reform of network industries in Europe tries to liberalize and at the same time fix the right location of policy in the vertical structure of government. Industry reform changes the boundaries between markets and regulation, and also the boundaries between regulatory jurisdictions. EU regulatory frameworks set out objectives and rules for national regulators and governments, whilst granting them flexibility in certain areas to apply the rules in the light of national conditions.

For decades, the telecommunications markets in Europe were mostly based on publicly owned vertically integrated national monopolies. The telecommunications sector was not a concern for the European authorities until the 1980s, where a Green Paper expressed concern over the lack of competition in these markets and the

potential role that a better functioning telecommunications sector could play in enhancing the economic dynamism of the region. The European Commission led the liberalization wave of the nineties, which was accompanied by (to different degrees) privatization of national incumbents¹³. With a similar timing as in electricity, the first two packages of directives tried to progressively introduce competition in national markets and at the same time increase the role of the European Commission in overseeing these markets in a piece-meal way (Seabright, 1998). The first Telecommunications package set a timetable for the liberalization of national markets, including provisions for open access and the removal of cross-subsidies. The second package included a detailed procedure for the analysis of each of the 18 identified markets in the sector. According to this procedure, the national regulatory authorities had to analyze these markets¹⁴ and determine (under the agreement of the European Commission) whether there was significant market power in each of these markets. If it was determined that market power was significant, the national authority had discretion to introduce ex ante regulatory remedies. Under the second package, nothing prevented the member states from adopting different remedies to similar problems.

The first two packages combined implied more harmonization (clearly useful for technical standards) than market integration. Gual and Jodar (2007) provide a useful summary of the results achieved under the current system.

Partial harmonization was promoted under the argument that regulatory inconsistencies are a major entry barrier for companies that want to operate in several countries. A reasonable framework was set for vertical cooperation between EU authorities and national authorities, with yardstick regulatory competition (benchmark reports), balancing harmonization to reduce entry barriers (and to prevent uneven competition) with knowledge of local conditions: what is called «host country rule within limits» (Gual, 2007; according to this author however «results have been fairly limited so far»). Many of the harmonization rules have gone in the direction of opening the local loop and promoting the «ladder of investment theory,» to ensure that national rules did not protect local incumbents.

The third package approved in 2009 includes the following new features:

- Fewer markets are presumed to need ex ante regulation (with focus on wholesale markets), but an EC role is introduced in the determination of remedies when market analysis determines the existence of significant market power.
- Creation of a European Market Authority. This is a body of national regulatory authorities called precisely Body of European Regulators for Electronic

¹³ Privatization has never been required by EU directives. Indeed, the Treaty of Rome would forbid any such EU legislative obligation.

¹⁴ National authorities must also determine the geographic market definition, but routinely decide in almost all cases that markets are national.

Communications (BEREC). It has an advisory role, focused on transnational markets, harmonisation and cross-border disputes.

- Focus on spectrum liberalization and other potential European-wide service markets.

According to Seabright (1998), it is not straightforward to separate those regulatory issues that involve significant cross-border externalities because of economies of scope between types of service (*e.g.*, local and long distance calls). The result is that the EU assumes powers piecemeal, as member states are willing to concede them, and on the basis of a generalized dissatisfaction with progress towards some (usually vaguely specified) notion of an ideal single market rather than a coherent application of the rules of subsidiarity.

The specific technological requirements of telecommunications, plus the possibility of significant network externalities, have led some to argue that centralization at the EU level is the only way to regulate this sector reasonably efficiently. Whatever the truth of this argument, similar piecemeal processes in other sectors in the past have sometimes led to assignments of power to the EU that look hard to justify according to any such principles (such as in the Common Agricultural Policy).

It is difficult to argue that the central policy should be the only game in town due to generic network externalities, because, at least for voice telephony markets, universal service has been achieved. In those markets where the full population is not covered, such as broadband, it is hard to argue that network externalities in the sense of extending the service will be better served by European agencies than by well targeted local initiatives.

The product markets that national and European authorities must in practice jointly analyze would benefit from undergoing a more sophisticated analysis of geographic market definition, which should take into account not only the current legal conditions, but also the optimal legal conditions that should leave in place only those barriers that are due to technology and consumer preferences (in a similar way to the literature on optimal currency areas in monetary policy, but applied to all product markets, because different product markets may have different optimal geographic sizes).

The division between local and central is less precise because of changing and converging technologies. In telecommunications, those segments that are typically supra-national are competitive in nature, and so should be the object of less intrusive and ex-ante regulation. It is somehow paradoxical that as liberalization progresses, the supra-national regulatory authorities take more responsibility on the ex-ante regulation of less competitive segments that are usually structurally local, and that also are progressively being opened up to competition. Besides the possible inconsistencies from the point of view of the economics of federalism, the ex ante regulatory rules to enforce local regulation (which contrast with an orientation towards facilities based competition in the US) may be targeted at preventing

regulatory inconsistencies across countries which could act as a barrier to entry and to cross-border investment and competition. Commission interventions on mobile roaming and other cross-border charges, show that the particular features of the harmonisation being imposed is perhaps enforcing a 'managed competition' outcome with possible adverse consequences for longer run innovation and competition.

In this context, it may be interesting to ask what are the consequences for future investments in telecommunications, and in next generation broadband in particular, of reinforcing a European regulatory authority. It could be thought that, as the decision to create the European Central Bank fixed with a single decision the problem of geographic market integration in monetary policy and the problem of strategic delegation, something similar could be done in telecommunications. However, neither the legal status of the new body of European regulators is as strong as the one of the European Central Bank, nor its responsibilities are as important. The European Commission and the national governments can still be considered the main regulators, and in practice the new regulatory body has mostly an advisory role. Whereas the horizontal cooperation between national regulators is necessary, the marginal benefit of an independent body beyond the regulatory role of the European Commission (a multi-partisan and multi-country executive body) is questionable. If the largest efficiency gains must come from market integration and the resistance to this integration is mainly political, perhaps the Commission should focus on trying politically to overcome such resistance - as it has done to overcome the national resistance to competition policy through the political leadership of Commissioners Brittan, Monti and Kroes, for example. Bernstein (1955) suggested a long time ago that one of the disadvantages of independent regulators is their built-in isolation from the political process, which incapacitates them from leading necessary but resisted reforms.

The final result of the third package is far from achieving the market integration level of the US, where after a process of industry consolidation a limited number of firms compete nationally in TV, fixed and mobile telephony and broadband Internet access. We now turn to the US experience.

United States

Starting with New York and Wisconsin in 1907, state Public Utility Commissions (PUCs) regulated telephone services before any federal intervention. Federal regulation of the telephone industry began in 1913 with the so called Kingsbury commitment, an agreement by the AT&T and the federal government that the industry would be a regulated monopoly, initially regulated by the Interstate Commerce Commission and after 1934 by the Federal Communications Commission (FCC). For the half century between the 1934 Telecommunications Act and the divestiture of ATT in the 1980s, there was a neat and basically non

problematic separation of jurisdiction between the states (intrastate tariffs) and FCC (interstate tariffs). Controversies increased in telecommunications with the introduction of competition first in long distance and in the nineties in local competition, especially as they affected common costs and access to infrastructure. In general, the FCC over this process pushed for deregulation and competition, while the states resisted the process or tried to micro-manage it to avoid losing the redistribution powers of the old regulatory system. A merger wave has accompanied the whole reform of the last years: the Bell regional companies have consolidated and vertically re-integrated. The Federal Communications Commission gained new powers relative to states jurisdiction as a result of the 1996 Telecommunications Act, which left many aspects to be filled. Specifically, it was the agency in charge of authorizing the local companies entry in long distance, and it fixed the criteria for wholesale prices of local telephony, which were finally fixed by the states following these criteria. In wireless telecommunications, prior to 1993, states had the power to regulate prices and terms of service. The potential for competition was limited because the Federal Communications Commission had assigned radio spectrum for cellular communications to just two providers in each locality, one of which was the old Bell operating company. It was a clear example of federal structural regulation and state behavioral regulation. But under the umbrella of an Omnibus Budget Reconciliation Act of 1993, Washington preempted state authority over rate and entry regulation in mobile telephony. The addition of more spectrum allocated through federally organized auctions along with technological improvements facilitated the assembly of six national service networks (some of which subsequently consolidated through mergers, but still leaving most US citizens with a choice of more than three cellular networks). Washington did leave states some authority to regulate mobile phone service under the general rubric of consumer protection. Some states have controversially used this authority, for example California in its Telecommunications Bill of Rights, which limits phone service providers' discretion in a wide range of activities, with the focus on disclosure of contract terms and redress in cases in which customers are not satisfied with service. Hahn *et al.*, (2003) argue that the potential costs for the operators of these requirements imply that they «skate dangerously close to affecting wireless rates and terms -an area not covered by state regulation.» They also make an interesting use of the arguments of externalities and capital mobility against decentralized intervention:

«The mobile communications industry, in ironic contrast to the people who use it, is not mobile. Providers of national service have a considerable stake in a strong presence in every state. Thus, while a state regulatory climate may affect the pace of local investment, one cannot depend on wireless communications providers facing onerous state rules to vote with their feet.»

It is not clear the extent to which the states lost regulatory jurisdiction as a result of the 1996 Telecommunications Act. Local retail telephone rates, intrastate long-distance rates, carrier connection rates, and even high-speed business rates are still highly regulated in most states. There is a long list of issues on which the states still have jurisdiction according to the Act, although one important piece of state regulation was preempted by the Act: the decision on local entry in telecommunications. Local powers (municipalities and counties) also kept jurisdiction on franchise conditions for Cable firms, although they had already lost the responsibility of setting prices. Brennan (2003) argues that they should keep, through these franchise conditions, the ability to decide on open access for Internet Service Providers on the grounds that the involved markets are local and there are no relevant spillovers on the decision that one local jurisdiction takes. He adds the caveats that the decisions on open access or otherwise should be made separate from trying to use franchises to interfere with merger decisions, in order to avoid the hold up problem of a locality trying to capture the efficiency rents from a large, potentially national merger; and that the decisions on open access should not be used to ask the operators for in-kind compensations such as free institutional channels or other initiatives that have an impact on fiscal issues.

The telecommunications companies started to provide video services competing with cable in the 2000s, and asked the FCC and Congress to pass national rules exempting them from local franchise conditions¹⁵, on the argument that it would be too costly to negotiate with thousands of local authorities when there are scale economies in setting a programming platform and launching service at the national level. Some states such as Texas in 2005 gave these companies the relief that they were seeking at the national level.

Nuechterlein and Weiser (2007) interpret the evolution of telecommunications in the US after the 1996 Telecommunications Act as a (largely failed) exercise in cooperative federalism between the FCC and the states¹⁶. In the 1996 Act, the FCC reserved for itself the right to validate the check list of conditions for the local incumbents to have their quarantines ended; the FCC created a federal universal service fund to cope with the unsustainability of cross-subsidies as a result of competition in selected segments (cherry-picking). Interestingly, they characterize two distinct periods in terms of the relationship between the FCC and the states:

- 1) Since the 1934 Communications Act until the Telecommunications Act of 1996, the system can be characterized as one mainly of dual jurisdiction: the FCC in charge of interstate issues, the states in charge of intrastate issues. This

¹⁵ NUECHTERLEIN and WEISER (2007, p. xxiii): «Since the dawn of cable television several decades ago, the states and thousands of local governments have played a critical role in deciding the terms on which cable companies can use public rights of way to provide multi-channel video services to end users.»

¹⁶ See also DIXON and WEISER (2006).

did not exclude some areas of cooperative federalism, as in the Joint Board that decided somehow arbitrarily that the proportion of joint costs that should be allocated to long distance interstate calls should be exactly 25%.

- 2) After 1996, the FCC and the states engaged more strongly in cooperative federalism in deciding the terms under which local telecommunications entrants should share the infrastructure of incumbents: the FCC would fix the rules under which these infrastructures would be used, and the states would implement these rules deciding the exact level of access charges. However, the dual jurisdiction model was kept in retail prices, by maintaining the jurisdiction of state commissions to fix local retail prices. Soon after the Act, the Supreme Court asserted the FCC jurisdiction in unbundling policies in the Iowa Utilities Board case, but after that a number of judicial decisions have much narrowed down the scope of unbundling requirements and the jurisdiction about them both by the FCC and the states.

According to NRRI (<http://nrri.org>), the research institute of public utility commissions, state utility commissions currently have a reduced role in telecommunications. In a call for research projects in their web page, they argue that «The portion of the industry subject to their jurisdiction has declined, as has their legal authority in many states. Whereas the regulator of 1980 needed skills to conduct cost-of-service cases, today those skills are much less relevant. More relevant skills today may be the ability to test for market power or to identify dated regulations that are doing more harm than good. The state commissioner's job is made more difficult because the FCC in many cases fails to give clear guidance. In some areas the FCC claims jurisdiction, but its follow through is not thorough. This leaves states uncertain of whether to involve themselves in problems that concern their local constituents but that may exceed state jurisdiction.» Weiser (2001 and 2003) defends a role for the states in supplementing FCC efforts or minimum standards, in a similar way as environmental regulation established since the 1970s, based on arguments of local tailoring and experimentation; he argues that the role in arbitrating disputes gives the states «a key role in superintending» the federal regulatory program, and at the same time reorients the mission of regulators and courts from one of protecting end-users to one of arbitrating disputes among rival providers, and, in particular, overseeing access to and pricing of bottleneck facilities; he also argues that the states role should be constrained, beyond the floors established by the FCC and federal legislation, in the sense that they should implement federal and not other objectives; he mentions the Erie and Chevron doctrines, after two landmark judicial cases, according to which regulatory uniformity should be of less concern relative to experimentation and tailoring, and the Courts should defer to regulatory agencies following arguments of expertise in determining the rules in regulated industries, to defend a role for state regulatory agencies in cooperation with federal agencies. Weiser (2001) calls the 1996 Act as «perhaps the most ambitious cooperative federalism venture to date.» However, the

FCC failed to provide a clear vision of what should the content of the relationship between state and federal regulation be.

Over the process of implementation of the 1996 Act, the entrants argued mostly for state discretion on unbundling decisions, which is consistent with the view that states favoured extensive unbundling of incumbents' network elements. However, at least in some occasions they also argued against state discretion on access pricing, probably reflecting the wide variation in local loop and other network elements prices that were set by the states. The FCC accepted a role for experimentation in the unbundling or not of local sub-loops, before mandating a federal requirement to unbundle them, in an example that an initial flexibility may recede when the federal level learns and establishes that one approach is clearly superior. According to Teske (2004) the model of local competition promoted by the Act was itself based on the model of local competition experimented by the state of New York some years earlier. Hoffinger (2003) explains that one of the entrants in local telephony, the AT&T, was initially against a strong role for the states in unbundling decisions, but changed its position after a new Chairman of the FCC (Michael Powell) signaled his position against too much unbundling.

Nuechterlein and Weiser (2007), argue that with the advent of cellular telephony or VOIP telephony, the regulatory role of the states will be very reduced, but will still exist at least to monitor the reliability of emergency services (number 911 in the US) and the efficacy of universal service programs. However, to the extent that physical networks will still cross local territories, local powers will probably also either claim a role, or be asked to provide a role, for example in providing information for geographically differentiate markets in broadband and to solve a collective action problem so that operators can share the use of rights of way and other physical infrastructure.

4. Determinants of broadband penetration: the role of local and regional activism

4.1. Public support to broadband deployment

With the diffusion of Internet, technological change has made possible the construction of new generation networks that allow broadband access at very high speeds. The commercial viability of these networks is not homogeneous, and there are concerns that local communities will fall behind in the race to enjoy the benefits from the new networks, in terms of business or personal communication, entertainment, education or health. The intervention of local and regional powers to try to accelerate the adoption of the new telecommunications networks has become widespread. There are studies describing initiatives from the US (Gillett *et al.*, 2004). Nucciarelli *et al.* (2010) examine a number of cases of municipal activism in Netherlands and Italy, highlighting the interaction of government and operators in

Public Private Partnerships (PPPs). Ganuza and Viacens (2010) analyze the case of Spanish regional initiatives and Catalonia's in particular, as an example of an initiative that has been allowed by the European Commission, given that it is competitively neutral and open to partnerships with the public sector.

Kolko (2010), shows that broadband deployment has a positive impact on local employment levels (although causality is difficult to establish), but a clear impact on wage rates and employment rates cannot be established. Reports from regulatory agencies such as ARCEP (2008, 2010) in France, or OFCOM (2007) in the United Kingdom have acknowledged the activism of local and regional powers and established conditions under which these should be welcome.

As explained in Section 2, both theory and empirical evidence suggest that there are two broad types of public intervention in broadband Internet access markets: those related to market power (regulation and antitrust or competition policy), and those related to positive externalities (consumer network externalities or impact on overall economic growth). In the United States the first type of intervention is carried out by the Federal Communications Commission (FCC) and by the states; while in the European Union by the European Commission and the National Regulatory Authorities (NRAs) of the member states. The third package of European directives on telecommunications currently under discussion proposes the creation of some sort of Pan-European telecommunications regulator. Policies related to the promotion of broadband¹⁷ through different combinations of subsidies and public investment («industrial policies») are mainly carried out at decentralized levels both in the US¹⁸ and in Europe. This is in contrast with countries that have achieved very high levels of broadband deployment, such as South Korea and Japan, which have promoted for many years strong national policies to promote broadband penetration (see Trillas 2008a).

Goolsbee (2002, 2006) points out that the high proportion of fixed costs relative to total costs in firms providing broadband access implies that policies that subsidize or reduce taxes for these operators are a key component of the relevant policy vector. In the absence of these policies many territories could be left without access for a long period of time, with important welfare losses in terms of consumer surplus and other social benefits. Goolsbee and Guryan (2006), however, document that the efficacy of subsidy programs to promote Internet access in the schools is not accompanied by a better student performance. As the study of Kolko (2010) mentioned above, this illustrates the difficulties of quantitatively establishing the relationship between investment and welfare.

Sand-Zantman *et al.*, (2010), present a theoretical analysis of the interaction between a national regulator, a national incumbent and a local power that can compete with the incumbent using subsidies. The analysis focuses on when and

¹⁷ SURIÑAC *et al.* (2006) summarize the potential benefits of broadband promotion in a number of fields.

¹⁸ At least, until President Obama introduced the promotion of broadband in his 2009 fiscal stimulus package.

under which conditions the local authority should be allowed to invest. With no territorial externalities and no information problems, the local authority should be allowed to invest. Externalities can arise for cost or for demand reasons. Under cost externalities, the incumbent reduces average costs by investing in several jurisdictions, something that the central authority should take into account when deciding to allow or not local public investment. Demand externalities can be positive or negative. They are negative if a very good network in one region causes factors to migrate from a neighbouring region, and positive if a good network enhances the value of the neighboring region's network due to network externalities. In these cases, whether to authorize local public investment and under which conditions depends on the parameters of the model. When both the regulator and the incumbent are uncertain of the costs of the local authority, then in some cases the incumbent invests when the local authority also invests. To compensate the incumbent for the risk of losing the fixed costs, the regulator must set very high access prices, which is better to avoid by banning any risk of duplication.

Gómez-Barroso and Feijóo (2010), describe the evolution of the telecommunications industry in terms of the diverse market failures that have characterized it over time. For many decades, the main market failure that justified public intervention in the industry was market power, and the stable government architecture that addressed it fit with a stable technology and industry structure. With the advent of the Internet and cellular telephony, though, other sources of dissatisfaction with market outcomes, such as network externalities, impact on economic development, merit goods considerations or equity concerns, also characterize the industry. This increasing complexity also raises uncertainty and learning problems, triggering the need for a more administratively complex reaction from the public sector. Regional and local initiatives better fit into the new category of public interventions described in Gómez-Barroso and Feijóo (2010) because they internalize policy externalities better than specialized central powers, and precisely their lack of specialization makes them good at dealing with multi-dimensional policies (Dixit, 2002). These initiatives also fit with the notion of industrial policy espoused by Rodrik (2007), who argues that under conditions of policy and technological uncertainty, a partnership between government and firms allow them to learn about the successful projects. This partnership in learning is compatible with costly mistakes, but these mistakes may under some conditions be a necessary by-product of a generally fruitful strategy. Hauge *et al.* (2008) compare the initiatives of local powers in the US with the entry of competitive local exchange companies (CLECS) and they conclude that the former are of a different nature from the latter and are not incompatible with them.

4.2. Policy externalities, objectives and instruments

The fact that central powers are specialized in policy interventions that deal with market power, but that local powers decide on market power and on other issues simultaneously can be endogenized with a version of the Mulligan and Shleifer

(2005) model of the political costs and benefits of specialized regulation. Using a simplified version of this model, $f(t) = (t + 1)^{-2}$ is the likelihood (based on a Pareto distribution with shape parameter one) that a dispute is of type t (for example, the complaint by a customer that a utility's prices are too high), with higher t meaning less frequent disputes, and hence higher t implying less likelihood that a dispute is of type t . Then $D(t) = bNf(t)$ is the total value (the «demand») of specialized regulation for this type of disputes, where N is the total population potentially affected by this type of disputes and b is the marginal value in the political market of specifically regulating these disputes. Similarly, $S(t) = \rho + \xi Nf(t)$ is the political market cost function of specific regulation, where ρ is a fixed cost and ξ is a marginal cost of regulating a dispute. A necessary condition for specific regulation being desirable is $b > \xi$. Then there is a threshold value $t = T^*$ such that $D(t) = S(t)$. This threshold value is $T^* = \sqrt{\frac{N(b-\xi)}{\rho}} - 1$, and it is higher the higher the number of affected citizens relative to the fixed costs of regulation. We assume henceforth that local powers are such that $t > T^*$ and that central powers are such that $t \leq T^*$. This means that disputes between consumers and producers in network industries are not worth of specific regulation in small jurisdictions and, hence, decisions concerning these disputes are taken in fora where other policy issues are taken into account at the same time.

As a consequence of the fixed costs of regulatory specialization, local powers will have a more objectives than instruments (Tinbergen, 1952). From a static point of view, this causes an inefficiency, as not all of the objectives will be fulfilled. Incentives will be weaker as policy makers will have a variety of tasks and objectives (Dixit, 2002). However, from a dynamic point of view these weaker incentives *ex post* may yield stronger incentives for effort or investment *ex ante* (Martimort, 1996).

This kind of «other» objectives that sometimes are expressed in vague terms give high discretion to local policy makers, for example in the objective to protect the «public interest» of state regulatory agencies that review mergers in the US.

The result is that central powers not always facilitate better commitment, and that the other objectives of decentralized powers may act as a commitment device in the presence of sunk investments. Although the argument has been made in a monopoly setting, it is also clearly applicable in a context of access-based competition¹⁹, where the network investment is carried out by the incumbent firm (see Trillas, 2008a) and the main regulatory instrument is the access price that entrants pay to the incumbent. If a more inter-temporal perspective is taken, clearly the fact that the other objectives of the local governments may change from time to time due to the global policy environment introduces a difference source of volatility that may be

¹⁹ This is the model of competition prevalent in the European Union. The incumbent is a vertically integrated firm that operates in the wholesale market (as a regulated monopoly) and in the deregulated retail market. And the entrants compete with the incumbent at the retail level using the incumbent's infrastructure.

absent at the central level because of the more focused objective function at this level. This would increase the costs of investment reducing the relative attractiveness of the local regime.

More specifically, if the regulatory policy is the control of rights of way (this was the policy instrument that inaugurated regulation at the local level in the nineteenth century), then it is easy to see that the local powers will face a variety of (possibly conflicting) objectives. For example, network competition may be facilitated if different operators share the use of rights of way and other infrastructures cooperatively. Then there is a trade-off between the negative externalities (and other negative impacts on social welfare when competition is too costly) produced by too much digging when the rights of way are not shared, and municipal revenues which are maximized when different operators need different permits to dig the streets. Local powers may help alleviate the collective action problem of the joint use of physical infrastructures. But they also have incentives to promote non-cooperation, to extract more rents from the operators. Which objective dominates remains an empirical question.

Many sub-central jurisdictions (states, counties, municipalities) undertake initiatives to promote broadband access. In some cases this is challenged by national regulatory or antitrust authorities in Europe, but not in the US, where the state-action doctrine tends to prevail (see Inman and Rubinfeld, 1997). Another important difference is that the EU has state aid control rules in place, whereas such rules do not exist in the US.

Treisman (2007), argues that when public investment (financed with taxes) in infrastructure is a complement to private mobile capital, decentralized jurisdictions may compete to attract capital by investing in infrastructure, and this may result in a higher level of infrastructure provided the initial conditions in the local jurisdictions are sufficiently homogeneous. Decentralization also makes it possible to use existing institutions (so that fixed administrative costs do not have to be duplicated) to differentiate regulation by geographic markets with different potential for platform based competition.

Of course, the final level of investment does not only depend on direct government intervention but also on behavioural and structural regulation. In particular, it depends on whether service based or facilities based competition is encouraged, and, in the case of service based competition, on the level and other features of access pricing. In Europe in particular, the strategy has been to encourage what has been called the investment ladder, by which entrants are allowed to enter initially at low access charges, to be encouraged subsequently to progressively build their own infrastructure.

4.3. The impact of decentralization on broadband

Based on the discussion in the preceding subsections, an a priori plausible hypothesis is that broadband penetration Y (as a proxy for investment) is explained

by centralization (C), variables that depend on regulatory decisions (R), and other control variables (V):

$$Y = F(C, R, V) + \varepsilon$$

Montolio and Trillas (2010), estimate this equation for a panel of EU countries and Table 2 reproduces the results (their original paper explores the potential endogeneity of some regressors, with qualitatively identical results).

The dependent variable Y is a measure of broadband penetration, that is, the percentage of population with a broadband connection. Data to construct this variable has been obtained from Point Topic Ltd. Global Broadband Statistics.

Two proxies are used to account for the effect of centralization/decentralization on broadband penetration. The first variable is *CENTRAL_REV* and is calculated as the share of total central government revenue with respect to total general (including central, state and local) government revenue. Data is obtained from the OECD National Accounts (Vol. IV-General Government Accounts). The second variable used is *ROWI* that is a dichotomous variable taking the value of 1 when rights of way and digging permits over public land are granted by a single central authority and 0 when rights of way are granted by local authorities. Data for this variable comes from the EC Benchmark Reports.

Treisman (2007), among others, argues that it is important to use the relevant notion of decentralization in specific contexts. In particular, it is important to distinguish between administrative centralization and political centralization. In the first case, as captured by our variable on central revenues, it is the volume of public funds administered at the central versus the local levels what is measured, regardless of whether local funds are administered or not by elected local policy makers. In the second case, it is the degree to which policy making is carried out by democratically and locally elected policy makers. Some countries may have administrative decentralization without political decentralization. Similarly, some countries may be very decentralized both in terms of taxation and expenditures and politically, but be very centralized in terms of regulatory policies²⁰. However, following Inman (2008) political decentralization may be correlated with administrative decentralization because politically elected local bodies are a commitment device for administrative decentralization and policy differentiation. And Treisman (2006) confirms this by finding that political federalism is positively correlated with the proportion of decentralized over total country revenues or expenditures.

In our exercise, to the extent that public intervention in telecoms markets is characterized by a multidimensional vector of policies, administrative centralization as captured by the proportion of central revenues may be a proxy for the overall degree of centralization of the relevant policies. However, to the extent that we focus

²⁰ In Spain, public spending is quite decentralized and there are local and regional strong democratically elected authorities, but the regulation of airports, electricity, telecommunications and (most of) railways and ports is central.

on specific elements of this vector, the location of the control of local rights of way is the appropriate measure of centralization for this specific element.

Table 2 presents the results for the EU countries. In this case the centralization of this type of policy (rights of way and digging permits) has a negative (as opposed to positive in Distaso *et al.*, 2006) but non significant impact on broadband penetration. It seems that the ability of local powers to solve the collective action problem of the joint use of physical infrastructures, and the concern for negative externalities and social welfare, has not a lower weight than any short run concern for maximizing confiscatory revenues. A conventional measure of overall centralization has a negative impact on penetration, although this impact is only significant in some of the regressions.

TABLE 2
FIXED EFFECTS PANEL ESTIMATIONS FOR EU COUNTRIES

<i>Variables</i>	Model 1	Model 2	Model 3	Model 4
<i>Constant</i>	-73.923	-134.20	-82.923	-74.944
<i>Demographics</i>	(-3.87)***	(-6.42)**	(-3.70)**	(-3.87)**
GDPpc	0.0006	0.0004	0.0004	0.0003
	(7.45)***	(4.28)***	(5.11)***	(4.06)***
Density	444.51	767.33	505.42	478.94
	(3.18)***	(5.12)***	(3.34)***	(3.30)***
<i>Competition</i>				
HH-inter	--	--	-2.382	-2.972
			(-1.80)*	(-2.54)**
<i>Unbund regulation</i>				
Full unbund	--	--	--	2.649
				(4.84)***
<i>Centralization</i>				
%Cent revenue	-22.862	--	-12.397	-4.963
	(-3.27)***		(-1.71)**	(0.433)
Row1		-1.755	--	--
		(-1.40)		
<i>N</i>	150	120	117	109
<i>Countries</i>	19	15	19	18
<i>R² within</i>	0.6648	0.6983	0.6884	0.7593

NOTE: As regulatory variables (*R*) two type of variables are used. First, measures of the market concentration. *HH-INTER* accounts for the degree of concentration across platforms (inter-platform competition) and is calculated using the standard Herfindhal index. Data to construct Herfindhal indices has been obtained from Point Topic Ltd. Global Broadband Statistics. Second, we also use as proxies for regulatory policies measures accounting for unbundling regulation: *FULL_UNBUND* is a dichotomous variable taking 1 when full unbundling is mandate (0 otherwise), obtained from the OECD (2003) Developments in local Loop Unbundling. As control (demographic) variables we use *GDP PER CAPITA* in purchasing power parity terms (under the assumption that broadband is a normal good) from the International Monetary Fund (robustness checks have been performed with GDP per capita from the AMECO database from EUROSTAT). Population *DENSITY* (under the assumption that more dense countries have a lower deployment cost) is obtained as population per squared kilometre (from IMF databases).

5. Concluding remarks

- Decisions about the optimal allocation of public responsibilities on telecommunications in the vertical chain of government face an old dilemma between scale economies and network externalities, on the one hand, and management of rights of way, on the other. Whereas the optimal scale of a telecommunications network can be very large, its deployment naturally needs the involvement of local powers.

- The liberalization of telecommunications and technological change have unbundled a vector of public interventions in this industry. Different elements of this vector (competition policy, regulation of residual monopolies, public investment) have different geographic scope. Prior to these phenomena, all public intervention took place over many decades through the national regulation or public ownership of vertically integrated monopolies. Now different government levels interact. The need for vertical and horizontal policy cooperation (mentioned in the seminal contribution by Baron, 1985) then arises in network industries. Administrative costs and distributional concerns, however, make inter-jurisdictional cooperation difficult.

- There is a trade-off between the different spillovers internalized by each level of government: centralization internalizes territorial spillovers, and decentralization better internalizes policy spillovers, due to the fixed costs of regulatory specialization causing a mismatch between objectives and instruments. As a result, an empirical prediction is that the impact of decentralization on network extension is ambiguous. Preliminary evidence does not solve this ambiguity but provides weak results in favour of some role for local and regional powers.

- Harmonization has made more progress in the European Union in telecommunications than in other industries such as electricity, although the potentially competitive nature of all telecommunications markets and the need for flexibility due to rapidly changing technology make regulatory harmonization in telecoms less necessary than in these other markets. One could be tempted to argue that since some telecommunications markets are more and more inter-jurisdictional (as a matter of fact, more and more global) in nature, due to technology, regulation and policy intervention should also cease to be local, regional or even national. However, long distance communications or backbone Internet networks are also potentially competitive in nature, much more than local communications. Regulation in telecommunications is more and more relegated to local access and the bottlenecks are local. Notice the difference with electricity markets, where long distance transmission is a natural monopoly that must be regulated at the highest possible level.

- Deregulation in the US and Europe has required federal (central) initiatives

because entrenched monopolies are sub-federal, but this does not necessarily imply that any remaining policy intervention should be at the central level. Even in a competitive telecommunications sector with more integrated markets, the scope for national or regional/local policies will not disappear. The arguments developed in this paper suggest that the case for national and sub-national (instead of central or federal) public action in the EU is strongest when:

- i) policy intervention is about a good or market that is geographically local in nature, with few or non-significant spillovers (*e.g.* local access), or when sound regulatory decision-making requires considerable knowledge of local conditions (*e.g.* on policies towards areas not served by rural broadband);
- ii) regulatory controversies are so numerous or time consuming as to be beyond the resources at the EU Federal level, or member state financial participation would advance a costly federal objective.
- iii) state or regional/local enforcement of existing federal or state standards produces better results for retail or wholesale consumers. For instance, lower government levels are often the first point of contact for consumer complaints, and typically offer quicker and more effective responses to such complaints.
- iv) local powers may participate in efforts to achieve regulatory geographic differentiation, including in some areas the possibility of direct competitively neutral investments, perhaps in partnership with the private sector. Differentiated regulation and geographically tailored policies may be needed, for the reasons that have been given for a long time by the literature on fiscal federalism: mainly to take into account differences in collective preferences, costs and consumer demand, and to promote policy experimentation in the face of uncertainty. There is often a need to respond to new problems where a single federal policy would be premature. Some territories may undertake experimentation with regulatory or competitive strategies that have not achieved a general consensus, such as functional vertical separation or others. This uncertainty may be due to technological or demand unknowns or to experts disagreeing on what is the best policy option. For example, in broadband markets, scholars hold different opinions²¹ on what is the best way to promote competition, either through facilities based vertically integrated rivalry, or through a «ladder of investment» by which entrants are initially helped by regulators to use the infrastructure of the incumbent, and are progressively encouraged to build their own infrastructure.
- v) local powers may help alleviate the collective action problem of managing the rights of way and physical infrastructures common to competing networks.

²¹ See TRILLAS (2008a) for a summary of this controversy.

- All of these suggest a continuing role for regional and local policies, even if overall EU frameworks are likely to be set centrally. The trend in Europe has been until recently to strengthen the regulatory role of the European Commission, and to create national (member state) independent regulatory agencies, without much consideration for the need to accommodate some role of local or regional powers and to take into account the coordination between regulation and other policies. Europe seems to be trying to internalize network externalities through progressively more centralized regulation, whereas in the US geographical externalities are being internalized through large national (thus, in the US, continental) firms²² that compete in a variety of product and geographic markets.

- Decentralization (at the state or member state level) is better at providing commitment for investment than at accommodating market reforms. But decentralization and the creation of a common internal market are clearly compatible. The largest and most successful internal market in historical terms (the US) is substantially decentralized. The federal level should focus on policing well functioning and integrated markets, but it should delegate (in a framework of vertical cooperation when necessary) most residual behavioural regulation to lower level governments. Applying this perspective, the EU should focus its own scarce central resources and political capital in an increased effort towards market integration. Although compliance costs and the entrenchment of national incumbents are important arguments to take into account in reaching some effective level of harmonization, the subsidiarity principle of the Maastricht Treaty suggest that unless there are significant externalities and scale economies, regulation should be performed at the lowest levels. Further, these externalities and scale economies should not be taken as given for all time, but should be restricted to those that result from structural market conditions. Hence, the focus for EU policy in this area should be on removing all legal barriers that at the moment prevent the existence of markets with the optimal geographic scope.

- The on-going debate in Europe should consider more seriously some forms of cooperation that are well supported by theory and experience as shown in the relevant literature. This includes:

- *Regulatory specialization*: Taking into account the fixed costs of regulation (Mulligan and Shleifer, 2005), some national regulators could, for instance, specialize in spectrum issues and others in network interconnections. Similarly, other authorities could delegate at least the analysis prior to decisions to these more specialized bodies.

²² The role of firms as subeconomies where some externalities are internalized is addressed in HOLMSTROM (1999).

- *Temporary regulatory experimentation*: Delegation to regional and local levels could, for example, be very useful in developing next generation networks in broadband, where even the best experts often disagree on the optimal balance between facilities based and access based competition.
- *Cooperative solutions (or clarification of its illegitimacy in some cases) for the «other objectives» that often pervade local or national decision making*: Some degree of delegation within a central perspective could be helpful in resolving the sometimes major policy difficulties that arise in, for example, attitudes to ‘national champion companies’, universal service definitions, etc.
- *Local input in geographic differentiation or in solving collective action problems of the joint use of physical infrastructures*: for example also in the deployment of next generation broadband networks.

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