

Prospects and Limits of Comparative Research in Communications Policy-Making

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1. Introduction

In the fast-paced information and communication industries, policy-makers often confront new issues, for which no or only limited historical precedents exist within the jurisdiction. Thus, the effects of policy measures often cannot be assessed using historical data and past experience. Moreover, relevant information is typically distributed asymmetrically and policy-makers cannot evaluate a priori which stakeholder presents a more convincing scenario. Furthermore, in the presence of uncertainty, stakeholders will rely on “myths, dogmas, ideologies and ‘half-baked’ theories” (Denzau and North 1994) to round up support for their position. Lastly, policy measures interact with markets in complex ways raising the risk that important but indirect effects of policies are overlooked. Given these conditions, the nature of the policy problem is often poorly understood and the effects of alternative courses of action are difficult to predict. Moreover, due to the inherent limitations of a polity, not all relevant alternatives may be considered during the deliberation. After policies were adopted, it may be thorny to separate their effect from the consequences of collateral changes in external conditions. Comparative research could provide a means to overcome these constraints. For example, if policies were adopted earlier in another jurisdiction, this could provide important insights as to the effects of a measure. Likewise, the effects of policy measures could be assessed with more accuracy if observations from other jurisdictions were available so that statistical methods could be used capable of separating the effects of policy changes from other developments that would have occurred anyway.

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Comparative information is therefore increasingly used in assessing and shaping policy. For example, the OECD, the ITU, and the FCC regularly draw conclusions from comparative information. However, the use of comparative information is still in a fairly nascent stage and crude uses dominate. Very often, simple comparisons between nations are used, for example, the prices for mobile service. Almost as often, bivariate relations, such as the link between market liberalization and the evolution of service prices in different nations, are used to assess or legitimize policy choices. With the increasing use of comparative information policy models in a nation have also become more influenced by developments in other countries. National policy-makers not only study but often imitate or emulate reforms in other countries (Schneider 2002). One major transmission channel is internationally operating consultancies that transfer models between countries. This trend is reinforced by international treaties, such as WTO agreements, which intend to establish what are considered “best practices” but are often models developed in other nations, among the signatories. Such policy transfers often happen without examination of whether the measures will have comparable effects in a different institutional environment, an assumption that is often crucially flawed.

Whereas international comparisons can enrich the understanding of public policies and cross-fertilization may improve models developed at the national level, these approaches suffer from serious shortcomings if they do not control for the different institutional frameworks and other relevant characteristics of the jurisdictions that are compared. However, this is not a problem that can be overcome easily. Although statistical methods to address the issues have become more powerful, theoretical and empirical models that link the institutional context with performance variables are not well developed. Where multi-variate models are employed, they often use dummy variables to capture the influence of institutional arrangements on outcomes. Furthermore, as information and communications policy increasingly works with measures (e.g., unbundling) that influence performance only indirectly, it is not straightforward to model the influence of policy variables on outcomes, as an increasing number of intervening factors need to be taken into account. Frequently, observations that come after a policy revision are simply

attributed to this change without a clear specification of the transmission path from policy instrument to outcome.

This paper reviews the state of comparative policy research and how it could be used more effectively to improve public policy decisions. It also attempts to discuss the limits of comparative research and of cross-national policy transferability. The next section examines the structure of the decision problem faced by policy-makers. Section three discusses the nexus between institutions and public policy and the challenges for comparative research emanating from differences in institutional conditions. The role of comparative research and its contribution to better policy are addressed in section four. Using the example of broadband communications, section five discusses steps to improve comparative communications research and enhance its relevance for public policy. Questions for further research are addressed in the conclusions.

2. The structure of the policy problem

Information and communication policy actions fall into two broad, complementary categories: measures that affect the legal and regulatory framework (the “order”) of the industry and measures that more narrowly influence the processes unfolding in the industry. Both types of measures attempt to influence the information and communications system in order to achieve certain objectives. To design such measures, objectives need to be defined and a model of the system that should be influenced needs to be specified. During the past fifty years, the views as to how this dual process works have changed fundamentally, a history that shall be reviewed briefly. The focus is on the role of government, which historically was seen as the main conduit of public policy.

For a long time, a division was made between “positive” and “normative” analyses of the role of government. The more recent literature has recognized that this delineation is more blurred than previously assumed (Stevenson, 2002). Both bodies of literature have significantly contributed to the shaping of government and governance structures. The traditional public interest literature saw the role of government in the correction of

market failures and, to a lesser degree, in providing remedies for market outcomes that were considered unfair. This was clearly expressed by Musgrave (1959) who differentiated between allocation, distribution, and stabilization goals of government. In the area of allocation, the government was to be concerned with the provision of public goods and services, the correction of externalities, and natural monopoly. Moreover, intervention into the provision of merit goods (i.e., goods and services that are beneficial to society but for which private preferences are distorted) was seen by some as an important task. In the realm of distribution the government was concerned with achieving a more just distribution of income and wealth through taxes and transfers. Stabilization policy had to maintain high levels of employment and price stability. U.S. policies towards infrastructures were primarily designed to achieve allocation and to a limited extent distribution goals. In the European context, a legitimate need was also seen for policies in support of stabilization goals. Policy models in the Bergson-Samuelson or Tinbergen-Theill tradition assumed that an optimal policy instrument could be determined once policy goals (a welfare function) were specified by agents in the political system. The public interest theory of the government assumed that, given technological and resource constraints, optimal policies could be designed, and executed. Public policy analysis and implementation was essentially seen as a technical and control engineering problem (Dixit 1996, p.4).

In the field of public utility regulation this optimistic view of government intervention was soon challenged. One line of research pointed out the difficulties of designing efficient policies. Lipsey and Lancaster (1956) introduced one line of argument by showing that policies designed to remedy market failure were much more complicated than previously assumed. Their general theory of the second best stated that if the first best conditions were violated in one area (e.g., by allowing a natural monopoly to price at average cost instead of marginal cost), appropriately tailored deviations from first-best solutions were required in other areas as well. Beginning in the 1960s, information economics and related disciplines such as the theory of agency started to add significant insights to the design of regulatory regimes and of public policy in general. Contributions to this line of research emphasized that the information necessary to design policies is

typically incomplete and asymmetrically distributed among stakeholders. Regulation like other forms of public policy can be seen as a multiple principal agent relationship. For example, legislators can be considered the agent of the (principal) citizens. The legislature, in turn, is the principal of the agent regulatory agency, which is the principal of the regulated firm. Moreover, in many of these agency relationships, multiple principals try to influence an agent (“common agency”). In these relations there are fundamental problems in specifying incentives and ascertaining appropriate levels of commitment. Common problems include adverse selection and moral hazard issues (Laffont and Tirole 1993). In the first case an agent has more information about relevant data than the regulatory agency prior to the definition of a regulatory policy. Thus, a regulator runs the risk of adopting a policy that is favoring the regulated company. In the case of moral hazard the regulator has difficulty verifying the effort of an agent and thus inefficiencies may go unnoticed. Under these conditions, the problem of regulation becomes much more complicated, as incentive-schemes will have to be designed that alleviate adverse selection and moral hazard issues. Typically, this means that a degree of cost and risk sharing between the firm and its customers will have to be established.

A more damaging attack on the feasibility of public policy in the public interest and on public policy in general was launched on the one hand from within the regulatory profession but also from several schools of economic thought. Already in the 1940s Horace Gray had lamented the capture of regulatory institutions by special interests. At a more formal level, the economic theory of regulation, promoted by members of the Chicago School of economics, proposed to model regulation as a market relation in which regulatory agencies supply and special interest groups demand protection (Stigler 1971, Peltzman 1976). As the benefits of regulatory measures often benefit a well defined group (e.g., infrastructure service providers) but the costs are spread over a large number of people (e.g., residential customers) the theory predicts that regulators will be “captured” by special interest groups. Members of the Virginia School of constitutional economics raised another argument in support of the inefficiency introduced by regulation. Buchanan and Tullock (1962) modeled regulation as a process of rent seeking in which not even special interest groups will benefit from rents as they are dissipated in

the process of lobbying regulators and thus wasted from a welfare point of view. Whereas these contributions have highlighted some of the weaknesses of the public interest theory of regulation they too have their limits. Most political and regulatory decisions include not only well-organized and unorganized stakeholders but multiple groups. Becker (1976) has expanded the Chicago theory to allow for coalitions of stakeholders. Furthermore, it has been criticized that it is misleading to characterize political and regulatory arenas as a market exchange (Udehn 1996). Most importantly, the special interest theories have difficulty explaining some of the more recent deregulatory initiatives. Probably the most devastating attack came from rational choice theorists, in particular Robert E. Lucas, who claimed that individual agents would anticipate public policy and adjust their actions accordingly, essentially leaving policy impotent. As only unanticipated measures would have any real effects, no systematic policy would be possible. While the Lucas critique is extreme and does not withstand critical scrutiny, it has, together with the other approaches, contributed to a re-thinking of government and public policy, which became seen as an actor endogenous to the prevailing system rather than as an external agent as in the Tinbergen-Theill paradigm.

Probably the transaction cost policy model (TCP) (Dixit 1996) offers the most comprehensive approach viewing government as an endogenous actor. Building on the work of Williamson (1985) and North (1990a), TCP integrates the aforementioned informational issues with problems emanating from the definition and execution of contracts. Public policies towards infrastructure industries, and in particular regulation, can be seen as an incomplete contract. Each specification of regulatory rules constitutes a contract with different consequences for the behavior of the regulated firms, for example, by shaping their investment decisions. TCP acknowledges the fact that stakeholders in the policy process have incomplete information, typically asymmetrically distributed, about the state of the world. As a consequence, not only may actors behave strategically, it is also possible that actors for an extended time period rely on a wrong model of reality if the information feedback is weak or inconclusive North (1990b). Moreover, actors suffer from the problem of bounded rationality that is they can often not comprehend the full implications of a policy act or a modification of the policy rules. Individual actors

will often act opportunistically and may try to defect from contracts. For example, future regulators may not feel bound by the promise to allow cost recovery of investment into plant. Or a firm may attempt to renege on its promise to grant open access to its facilities once it is entrenched in a market. Of course, opportunism raises complex issues of commitment, enforcement of contracts and time consistency in general (Levy and Spiller 1996). Last but not least, actors base their choices on different attitudes and values and thus may favor different policies in case of trade-offs between policy objectives.

From these characteristics a very different view emerges of the policy process and the ability of policy to find optimal solutions. In contrast to the technical optimization approach to public policy, TCP emphasizes that policies rarely maximize anything. Due to the widespread phenomenon of common agency, transaction cost issues are generally more difficult to solve than in commercial interactions. Policies will generally evolve slowly and in a complex interplay between different stakeholders. Brock (1994) has characterized regulatory policies in telecommunications as a stock of rules. This stock is gradually modified by revisions of statutes, revisions of administrative rules, as well as regulatory and court decisions. Each player can participate in the process but based on quite different resources and information about the relevant issues. Furthermore, acts of individual players are dependent on acts of other players and coalitions of players. As a result, the interests of different stakeholders will generally influence policies and the outcome will reflect their relative influence and strength. Moreover, given the incomplete nature of information about the state of the world, policies will generally emerge in a process of competition of interests and ideas. Visions of a future often fill voids of substantive knowledge often resulting in policy proposals designed on the basis of ideological concepts, such as the notion of an “information society”. Lastly, major policy changes are likely to be rare events and contingent on the existence of a very favorable set of circumstances. The latter aspect of policy was emphasized by Kingdon (1995).

While it is rare that in democratic and open polities a small group can capture policy-making for an extended time period coalitions may be able to delay policy change for a long time. However, it is likely that grossly inefficient policy arrangements will

eventually attract policy entrepreneurs who seek to gain political capital from unveiling them. Given incomplete information about alternative courses of action, this may lead to the paradox that existing institutional arrangements, whose effects are better known, get overly discredited whereas new options receive inflated credibility. For example, after decades of monopoly organization of infrastructure industries, abundant information is available as to the weaknesses of the status quo. Little is known, on the other hand, about alternative sector organization models. However, as political entrepreneurs promote such alternatives, and perhaps information about experiments elsewhere becomes known, existing arrangements may gradually give way to new arrangements. Because past and current events influence policy trajectories, forms of path dependence and contingencies influence the course of public policy. One possible outcome is policy cycles with occasional institutional switching.

3. Institutions and policy

One result from the shift in emphasis discussed in the previous section is the now widely shared view that “institutions matter” (Williamson 2000). Public policy is enabled and constrained by institutions. This means that the responses to a specific problem may be different in countries with divergent institutional endowments. It also means that a specific policy solution may have different effects, depending on the institutional environment in which it is undertaken. Therefore, comparative research needs to understand and model this mediating effect of institutions if its goal is to provide policy advice. But how exactly do institutions matter and how do they interact with information and communications policy? It may be helpful to begin with a brief review of the meaning of “institution”.

The term “institution” is used in several ways and a specific choice will be influenced by the problem at hand. Probably the most widely shared interpretation is the one proposed by North (1990a) of institutions as “humanly devised rules of the game.” Such rules can be formal or informal, they can be designed (in the sense that they are deliberately established by a political body or voluntarily agreed by a group) or they can emerge from

repeated interaction. North distinguishes “institutions” from “organizations,” which are seen as players constrained by institutions who also act to modify existing institutions if this is in their advantage. Other authors do not draw this separation but consider organizations as one form of an institution (Greif 1999). In as far as organizations are characterized by their own “rules of the game” this inclusive approach could make sense. Organizations could be considered as micro-institutions that are nested in broader societal institutions.

Aoki (2001) proposes an analytically very appealing notion of institution rooted in the theory of repeated and evolutionary games. In this view, institutions are seen as equilibrium strategies of the players in a game of repeated interaction. At an intuitive level, institutions are seen as a self-sustaining system of shared beliefs that guides actions of players in social interaction. These beliefs represent a salient way by which a game is repeatedly played, i.e. rules of the game. The content of the beliefs is a summary representation (i.e. compressed information) of equilibrium of the game. In other words, it is a summary representation of actions that are mutually consistent. This definition allows viewing institutions as outcomes of repeated interaction that have proven to be mutually consistent. As multiple equilibria exist, there is no presumption that institutions are necessarily efficient. However, as summary representations of a complex decision-making environment, they facilitate coordination and agreement among actors. They constrain and enable individual players’ strategies and are enforced if the outcomes of these strategies are indeed mutually compatible. On the other hand, forces to modify institutions are unleashed if actions are consistently incompatible or competing belief systems are successful in replacing existing summary representations of the situation. Aoki (2001) emphasizes that not all formal rules of the game may be considered institutions, as only those who actually shape behavior deserve that label. Thus laws (formal rules in the meaning of North) that are continuously ignored should not be considered institutions, as they are not binding for individual choices.

<Insert Figure 1 about here>

Williamson (2000) offers a layered model that allows treating different types of institutions in an integrated fashion (see figure 1). In this model, higher levels impose constraints on the levels immediately below and lower levels provide feedback to higher levels. Institutional arrangements at these levels change according to different cycles. At the level of social embeddedness, where informal institutions, customs, traditions, norms and religion are situated, change can take very long periods of time, even hundreds or thousands of years. The next lower level defines the institutional environment and encompasses the formal rules of the game, including the specification of property rights and the organization of political institutions. Change on this level may take ten to one hundred years. One level down are the governance structures of a society (the “play of the game”), most importantly contractual arrangements. Aligning governance structures with the transactions is one important task at that level and can take one to ten years. Finally, at the lowest level continuous decisions regarding resource allocation and employment are being made.

We will define a specific set of institutional arrangements at these four interrelated levels as the “institutional matrix” of a society (or of an industry). In this interdependent system, policy is to a large degree but not fully endogenous. It is endogenous in several ways. The institutional matrix typically specifies meta-rules that define how the existing rules of the game can be modified. Policy is also endogenous as its feasible options are constrained by the existing institutional matrix. As a process, policy can be seen as a deliberate attempt to alter the features of the institutional matrix. Policy initiatives can be triggered by many factors. It may make sense if information emerges that the existing arrangements are inefficient. Policy may be driven by political entrepreneurs who with summary representations of a perceived problem and/or solutions that deviate from the prevalent consensus. Policy actions may also be motivated by individuals or groups that could gain from a modification of the existing institutional matrix. Not all outcomes of the political process successfully alter the institutional matrix. For example, a regulation that is contested in court or ignored is an outcome of policy but, as mentioned above, should not be regarded an institution in the meaning of Aoki (2001). Policy measures are also constrained by the time necessary to adjust components of the institutional matrix

and behavior shaped by these institutions. Policy will primarily be able to affect formal rules but not necessarily informal rules. The slow pace of change of informal institutions may jeopardize policies. Even where formal rules can be changed relatively quickly, it may therefore take a long time before such changes can be implemented.

In this framework, it becomes transparent that policy faces several obstacles: informational constraints, institutional constraints, and systemic constraints.

Informational constraints exist because of incomplete knowledge about the working of the system that policy intends to influence. Although there are means to overcome this constraint, it is costly to generate the information. As a result, policy will often resemble “real-time experiments” in which chances are taken that certain measures have the desired effects. Institutional constraints refer to the factors that determine political feasibility conditions, such as majority requirements to achieve approval of formal rule changes. Systemic constraints exist because the political subsystem is interdependent with other subsystems, such as the economic or legal subsystems, whose constraints need to be met simultaneously. These sets of constraints differ between countries.

Like the overall institutional arrangements in a society, the institutional matrix of information and communications policy is quite complex. Among other aspects it includes:

<Insert Table 1 about here>

In order to derive meaningful conclusions, any comparative analysis of policy needs to understand how the features and attributes of the institutional matrix affect the observations. This effect of the institutional matrix is likely not straightforward but complex. These issues will be addressed in the next section.

4. Prospects and limits of comparative research

Comparative research is conducted for several reasons, including a better understanding of policies in other countries, a comparison of developments in different countries to gain insights into policy models that work and those that fail, and to benchmark policies in one country against peers. In all cases it is necessary to control for unique factors that are present in each country under consideration, and to understand effects of the overall institutional environment in which policy unfolds. Moreover, it is necessary to understand how the policy variables, typically affecting components of the institutional matrix, relate to the outcomes that can be observed. Several approaches are used that deal with these challenges in different ways: simple comparisons between countries, case studies, and quantitative methods.

Despite their severe shortcomings, simple comparisons between countries are very popular in policy assessments. Reports by international organizations, such as the OECD and the ITU, are filled with univariate and bivariate tabulations of performance indicators. The assumptions upon which the analyses are conditioned usually are not made transparent. In most cases, a fundamental underlying assumption is homogeneity of the process generating the observations. For example, the fact that a market segment is liberalized is assumed to have comparable implications in each of the countries under consideration. Given our discussion on institutional diversity and the complex ways in which institutional arrangements interact with other variables, this is often a very strong and questionable assumption. As more sophisticated analyses demonstrate, many of the bi-variate relations are spurious and disappear as soon as other explanatory variables enter the analysis. Comparison data are widely used in advocating certain policies and in claiming the success or failure of past policy experiments. They are also used to benchmark individual countries as is done with the “Jipp-curve”, which relates GDP/capita with telephone penetration. The only defense for such comparison data is that they can provide a first feel for the data structure and that they can be generated easily. However, except in very limited circumstances, they cannot withstand more critical scrutiny.

Case studies have long tradition and there are numerous examples in information and communications policy. They usually can analyze the institutional environment, the policy process and the outcomes in quite some detail. Depending on the selection of similar or different countries and policies, four types of case studies can be found. One approach is to study cases in two or more countries with similar contextual conditions and similar policies. Such a research design could allow studying the interaction of policy and context and facilitate an understanding of the effects of policies.

Alternatively, the effects of different policies in otherwise similar countries or the effects of similar policies in different countries could be investigated. This research design facilitates detecting the effects of differences in either policy or context. Lastly, case studies could be drawn from different countries and reflect different policies. In this case, it is relatively difficult to derive clear conclusions although such studies could nevertheless be helpful. As case studies are only feasible if the number of observations is low, they can only link independent and dependent variables in qualitative, argumentative ways. Nevertheless, they are commonly used to draw policy conclusions for other circumstances, although the institutional conditions under which they hold are often neglected. Thus, case studies work with analogies, are used as metaphors, or are blended with additional information (such as an ideological vision) when serving as the base for recommendations.

Some of the most significant promises to put comparative research on a more solid footing come from quantitative and hybrid methods, however. Such models can use cross-sectional, longitudinal, or panel data sets, which combine both aspects. Panel data, because they allow modeling of patterns across countries and within countries, are particularly apt to facilitate the comparative understanding of policy-making. At least in principle, these models allow tracing the effects of policies while controlling for the broader institutional environment. These models assume that a systematic process together with a stochastic element causes the variations in the dependent variable. Depending on how the stochastic component is specified fixed or random models can be distinguished. Fixed effects models assume that each country in the data set is shaped by

a unique set of conditions but they do not attempt to disaggregate them and thus do not provide a detailed explanation for it. Random models attempt to decompose this error term further. Panel data models allow the use of lagged variables and can therefore be used to study inter-temporal processes and causation in ways that traditional econometric models cannot (Markus 1979, Finkel 1995).

Not surprisingly, during the past few years they have become used widely. In a panel study of the effects of privatization and competition on network expansion and efficiency, Ros (1999) found that in high-income nations private ownership was correlated with significantly wider diffusion of telephone service, faster growth in the number of access lines per capita, and higher labor productivity. However, Ros did not find any influence of private ownership in countries with a gross domestic product per capita below US\$10,000. Boylaud and Nicoletti (2001) combined cluster analysis and panel data to examine telecommunications markets in the OECD. They found that privatization had weakly enhanced efficiency, but that competition had a more decisive influence. In a study of 31 privatized telecommunications firms in 25 countries, Bortolotti, D'Souza, Fantini and Megginson (2002) observed significant increases in post-privatization performance, and that a significant part of the gains was attributable to regulatory change and the introduction of competition. Wallsten (2001) found for a group of 30 African and South American nations that competition was the main source of efficiency improvements. Privatization alone yielded only limited benefits; however, privatization combined with regulation was positively correlated with better performance. Li and Xu (2002) detected that efficiency improvements were highest when privatization and competition were combined. Gutierrez and Berg (2000), Levy and Spiller (1996) and Henisz (2002) emphasize the importance of regulatory commitment and a stable institutional framework for investment as preconditions for good performance. The general tenor emerging from these studies is that the configuration of property rights, competition and regulation is crucial.

However, at present the power of panel data models exceeds our ability to model the relations between changes in the components of the institutional matrix and outcomes.

Policy measures and institutional arrangements are typically approximated with simple 0-1 dummy variables. Thus, competition is assumed to be either absent or present, ownership is either public or private, and specific policy measures such as unbundling are either adopted or not. While this approach may be able to capture the influence of these policies, it only insufficiently captures the ways policy choices affect outcomes. Unless one adheres to Friedman's view that the model structure does not matter as long as it forecasts reasonably well, this is an unsatisfactory state of affairs. Even if these problems can be overcome, panel data models are based on certain methodological assumptions that may reduce their ability to unravel the detailed patterns of relations between variables. Most importantly, panel data models tacitly assume that causation is linear and that each variable independently may be sufficient to explain the observed phenomenon. Moreover, they assume (linear) additive, homogenous causation that is that one process drives observations across the entire data set. Therefore, quantitative methods have difficulty unveiling complex patterns of causation, in which several variables interact.¹

This problem can be overcome with methods of diversity analysis as developed by Charles Ragin (2000). He re-conceptualizes relations between dependent and independent variables in set-theoretic terms. This allows a systematic exploration of whether independent variables or configurations of independent variables constitute necessary and/or sufficient conditions for a phenomenon. A policy is a necessary condition for an outcome if it is always present in cases that have achieved a certain outcome (e.g., high levels of broadband diffusion). However, there are observations in which the policy is present but the policy goal has not been achieved (e.g., countries with competition in broadband markets that nevertheless have low penetration). A policy is sufficient, if its presence always leads to the desired outcome. That is, whenever a policy is present, the outcome is present as well. Often in social processes, individual variables may neither be necessary or sufficient but configurations of variables might be.

¹ To a limited degree, quantitative models can introduce interaction terms between independent variables. However, this approach does not permit a systematic exploration of the causal structure of the underlying process.

Ragin (2000) has developed his method for crisp sets as well as fuzzy sets of variables. In principle, the fuzzy set approach allows modeling institutional arrangements more fully than the dummy variable method. Unfortunately, this advantage is achieved at the expense of estimating specific parameters for the strength of the relation. Fuzzy set analysis does test the statistical significance of relations, it can only calculate a confidence level at which a factor or a configuration of factors contributes to an outcome. For example, it is possible to state that a configuration of factors “almost always” will lead to a certain outcome but no specific elasticity can be determined. In this sense, fuzzy set qualitative comparative analysis (fs/QCA) and traditional econometric analysis are complementary methods. However, in many cases the insights derived from fs/QCA will be more powerful. The next section illustrates this point using the case of broadband diffusion.

5. The example of broadband diffusion

In a recent paper, Bauer, Kim and Wildman (2003) employed cross-sectional quantitative analysis to examine the pattern of broadband diffusion among the OECD countries. Although they are aware of the limits of cross-sectional models with small numbers of observations, data constraints coerce them to use such a design. A reduced form equation is specified based on equations for the demand for broadband, supply of broadband, and an equilibrium condition. Data for 2001 is then used to derive parameter estimates (see table 2). The results indicate a statistically significant effect of preparedness and of cost conditions (approximated by the population density). In some specifications, the price for broadband and substitute services turns out to be statistically significant. Policy variables do not lead to significant parameter estimates. The parameter estimates for the price variables and the population density variable are very small. Overall, the parameter estimates are not very robust and somewhat sensitive to the specification of the model. It is possible that these results could be improved with an enlarged data set and alternative specifications of dependent and independent variables. Based on the available data, the conclusion is tempting that policy measures such as unbundling or public subsidies do not contribute to the visible cross-national patterns but that indirect instruments that

enhance preparedness could be effective tools. Neither income nor price seems to have a strong effect on the cross-national pattern of diffusion.

<Insert Table 2 about here>

The employed method does not facilitate detecting patterns in the data that may point towards more complex forms of causation. However, a view at some bivariate plots shows that the data points exhibit peculiar relations (see figures 2a-2c). These graphs illustrate that the relation between the variables is not linear with a random component but of a different kind. In fact, all three relations exhibit a triangular pattern.² In the case of GDP/capita and broadband penetration, the surprising fact is revealed that in countries with lower GDP/capita, broadband penetration can be high or low but that in richer countries it tends to be low. Likewise, the relation between price and broadband penetration is such that broadband penetration can be high or low when the price is low but it is never high when the price is high. In this sense, a low price may be considered a necessary but not a sufficient condition for high broadband penetration, a fact that is not revealed in OLS regression analysis. A similar pattern is visible between preparedness and broadband penetration. In this case high values of preparedness can coincide with low or high values for broadband penetration but low levels of preparedness always coincide with low levels. Again, a high level of preparedness can be considered a necessary but not a sufficient condition for a high level of broadband diffusion.

<Insert Figures 2a-2c about here>

Such bivariate views cannot easily detect which configurations of factors contribute to observations. The tools developed by Ragin (2000) allow analyzing these questions both for the case of crisp sets and fuzzy sets. At the time of writing, the data set used for OLS estimation is analyzed using the fs/OCA algorithm. Whereas the final results are not yet available, it is apparent that no single set of sufficient conditions exists that result in high

² In econometrics, such patterns may violate model assumptions (in this case, the assumption that the data structure does not show heteroskedasticity).

broadband penetration. Different configurations can yield such an outcome. However, countries that have adopted measures contributing to high preparedness, a more open and competitive framework, and conditions that put downward pressure on broadband prices seem more likely than others to exhibit high broadband penetration. In this sense, the insights from the diversity analysis are different from those gained from cross-sectional econometric analysis and they allow deeper insights into the feasibility and likely effects of policy.

Diversity analysis is not a full substitute for econometric studies. As it relies on Boolean logic in determining probabilistic thresholds for conditions to be necessary or sufficient, it does not allow the calculation of parameter that indicate the strength of a relation between policies and outcomes. However, it does relax the strong assumption of econometric work that the same process generates observations across all the observations and that each individual variable is capable of achieving an outcome (i.e., a sufficient cause). These features hold great promise for further comparative work in the area of information and communication policy.

6. Conclusions

This paper reviewed different approaches and philosophies of comparative research. Early comparative work consisted mostly of in-depth case studies and was essentially limited to qualitative insights. More recent comparative research often utilizes econometric methods (e.g., panel data approaches) to determine effects of policy quantitatively. In principle, either approach could help improve policies. Nevertheless, comparative research often faces considerable obstacles. Firstly, in a typical comparative design, factors other than the interesting policy instrument vary as well, necessitating the use of control variables. As comparative research often has to work with small numbers of observations, there are limits to such an approach. Secondly, econometric techniques are usually based on simplifying assumptions, for example that the relevant variables are additive or multiplicative causes of a phenomenon. However, in practice policy variables occur in “configurations” and causality is complex. Different configurations may lead to

similar outcomes, a problem that eludes traditional econometric methods. Thirdly, most econometric research represents institutional arrangements and attributes of sector organization (e.g., ownership, legal rules, or competition) with dichotomous dummy variables, which is utterly inadequate to capture the granularity of arrangements and transmission channels of policy.

The paper discusses strategies to overcome these challenges and compares the explanatory power of different methods to the analysis of different sector performance (measured using prices, choice options, and the introduction and diffusion of new services) observable between the EU and the U.S. We find that econometric approaches are better suited to evaluating the strengths of relations between policy variables and objectives (and thus can help calibrate policies) but they are poor guides in selecting a “best” policy approach. On the other hand, the statistical methods of diversity-oriented research as proposed by Ragin (2000) are very successful in identifying necessary and sufficient policy instruments but do not yield direct insights as to the strength of the link between policy instruments and goals. Therefore, the paper concludes that the most promising avenue is a hybrid approach, combining case study work, diversity-based methods, and traditional quantitative methods using more carefully specified measures for legal and institutional variables.

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Table 1
Attributes of the institutional matrix

Dimension	Attributes
Sector governance	<ul style="list-style-type: none"> ▪ Government control ▪ Regulation (who, how, what instruments) ▪ Legislation ▪ Courts
Ownership arrangements of service providers	<ul style="list-style-type: none"> ▪ Public ▪ Private ▪ Hybrid (alliances, joint ventures, public-private collaboration)
Market design	<ul style="list-style-type: none"> ▪ Market entry conditions (open, regulated, closed) ▪ Number of licensees
Relations between stakeholders	<ul style="list-style-type: none"> ▪ Rights and obligations of service providers (interconnection, unbundling) ▪ Rights and obligations of consumers
Provisions to pursue social goals	<ul style="list-style-type: none"> ▪ Universal service ▪ Support for know-how of using IT
Intellectual property rights	<ul style="list-style-type: none"> ▪ Forms (patents, copyright) ▪ Duration ▪ Limitations (fair use)
Spectrum management	<ul style="list-style-type: none"> ▪ Government control ▪ Private ownership ▪ Open access

Table 2

Broadband diffusion: OLS results

(dependent variable broadband penetration in 2001, t-statistic in italics)

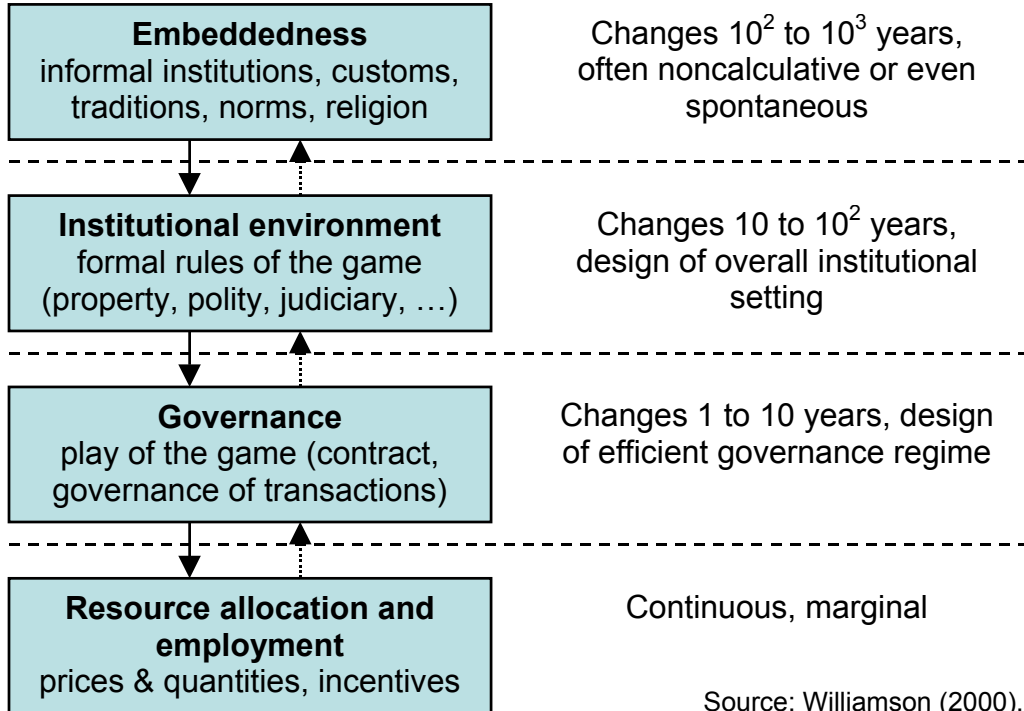
	Model 1	Model 2	Model 3	Model 4	Model 5
PBB	-0.00078 <i>-0.038</i>	0.00685 <i>0.306</i>		-0.01003 <i>-0.535</i>	** <i>-0.03472</i> <i>-1.973</i>
PDIAL	-0.07429 <i>-1.374</i>		-0.07866 <i>-1.631</i>	** <i>-0.11642</i> <i>-2.755</i>	** <i>-0.10734</i> <i>-2.304</i>
INC	-.000013 <i>-1.274</i>	** <i>-0.00024</i> <i>-2.725</i>	-0.00011 <i>-1.344</i>		
POPD	*0.00889 <i>1.991</i>	0.00602 <i>1.349</i>	**0.00907 <i>2.139</i>	**0.01078 <i>2.583</i>	**0.01197 <i>2.610</i>
PREP	**0.27442 <i>2.453</i>	***0.34614 <i>3.083</i>	***0.25607 <i>0.004</i>	**0.15735 <i>2.480</i>	
DG1		2.02116 <i>1.277</i>			
DG2		-0.46877 <i>-0.271</i>			
DG3		dropped			
COMP	-1.42584 <i>0.624</i>	-5.12968 <i>-1.484</i>			
CONSTANT	-6.97270 <i>-1.170</i>	-9.29829 <i>-1.652</i>	-7.38333 <i>-1.997</i>	-2.70161 <i>-0.617</i>	***6.91722 <i>3.076</i>
Prob>F	***0.0075	**0.0163	***0.0012	***0.0062	**0.0104
R ²	0.5527	0.5722	0.5471	0.5162	0.3809
Adj. R ²	0.4185	0.4059	0.4648	0.4282	0.3002

Note: * ... significant at 90% level; ** ... significant at 95% level; *** ... significant at 99% level.

Source: Bauer, Kim and Wildman (2003)

Figure 1

Williamson's layer model of institutional arrangements



Source: Williamson (2000).

Figure 2c: Preparedness and broadband diffusion

