Supranational Infrastructure regulation: Institutional Opportunities and Challenges

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Supranational Infrastructure Regulation: Institutional Opportunities and Challenges[1]

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Abstract

As regions around the world are considering increased integration of key energy, transport or other infrastructure networks, issues build in the design of the supranational national regulation needed in that context are increasingly well recognized. Solutions are however slow to emerge. This paper reviews the challenges and discusses the directions suggested by theory to address these challenges. It highlight the potentially counterproductive effects of common standard policy recommendations discussed at the political level. The paper also identifies key research areas as the review of match between theory and evidence suggest that we still have to address significant gaps in our collective understanding of the impediments to desirable integration efforts.

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I. Introduction

In recent years, international trade and competition has increasingly spread to regulated infrastructure sectors such as electricity and telecommunications. At the same time, there has been a rise in demand for supranational infrastructure projects such as international highways and telecommunication cables. Both issues challenge the standard framework of national regulation, and hence increasingly supranational regulation has been looked to as the solution.

However, the move to supranational regulation is not a straightforward one, and represents a major change in the institutional context within which regulatory policy is carried out. Whilst changing to this new regulatory framework may offer a variety of opportunities, there are also several new challenges that will arise. In this paper, we review the theoretical literature to analyze the interaction between supranational regulation and the key institutional limitations that restrict regulatory policy. The aim is to summarize what can be learnt from the existing theoretical literature on regulation, and identify where there is need for further work

To begin the review, we briefly consider the background behind supranational regulation in Section II. We then describe the nature of the national institutional weaknesses of concern in Section III. In particular, we focus on four institutional limitations highlighted in Estache and Wren-Lewis (2009), Estache and Wren-Lewis (2010) as causing problems for infrastructure regulation: limited regulatory capacity, limited accountability, limited commitment and limited fiscal efficiency. Having outlined the problems that these weaknesses create, Section IV then surveys the various ways in which supranational regulation may mitigate these problems. Section V considers the challenges for supranational regulation that these institutional limitations present, as well as the ways in which it may worsen them. Finally, Section VI concludes and suggests avenues for future research.

II. Supranational regulation

The improved awareness of the importance of supranational infrastructure regulation has been driven by three main factors. First, globalization and technical process have created an increasing desire for trade and international competition involving regulated infrastructure sectors. Second, the creation of supranational infrastructure projects demands suitable supranational agreements to manage them. Third, even in cases where regulatory issues remain largely domestic, there has been an increasing recognition of the benefits of regulating at the supranational level.

The impact of increasing international trade can be seen across all infrastructure sectors. Most international trade uses transportation infrastructure, and hence the quality and operation of infrastructure in one country has spillover effects for countries trading with

or through that country. Here, for example, supranational regulation can be useful in ensuring common frameworks at transit points and coordinating across national networks. In electricity, international trade has increased as countries benefit from a diversity of fuel types, natural comparative advantage and economies of scale. Power pools and other international systems require supranational regulation to limit abuse of market power and coordinate transmission (Tangeras, 2012). In telecoms, the technological development has increased the number of international calls across mobile networks and trade across communication networks. An example of the need for supranational regulation here is the fact that the optimal policy domestically is to set high termination charges for incoming international calls in order to tax foreigners. Since an equilibrium where all countries set such tariffs is clearly Pareto inefficient, some sort of supranational coordination is required. Finally, trade in water remains more limited, but is increasingly on the agenda as climate change and population growth place extra pressure on resources. Clearly management of water resources is a supranational issue since upstream use of rivers affects use downstream.

The rise of supranational infrastructure projects leads to a natural demand for supranational regulation. These projects include transnational highways, international electricity grids and communications cables. Regulating such projects with national regulators alone requires a large amount of coordination, and may risk duplication and over-competition. There is therefore a natural tendency to a create regulatory bodies on the same scale as the infrastructures they are regulating.

As outlined by Kessides, Noll, and Benjamin (2010), supranational regulation can take several forms. At one extreme, which they label as `centralized harmonization', a supranational regulatory agency has the ability to make policy decisions that are binding on the member states. At the other extreme, which they describe as `decentralized harmonization', the regulatory agency has no power to effect policy, but can carry out other useful roles such as undertaking benchmarking and facilitating information exchange and training. In between, a `centralized policy/national implementation' framework gives a supranational agency the power to make binding policy, but it is then left to individual countries to decide how exactly this should be implemented. An alternative way to divide responsibilities is under `separated jurisdiction', where a supranational regulator is in charge of issues that are chiefly international, whilst domestic regulation is still the charge of national governments. Obviously combinations of these various forms exist in practice and may be optimal.

Of course, supranational regulation is likely to differ substantially from national regulation. Since supporting supranational structures are generally weaker than national governments, it is likely to coordinate with national governments. We are likely to move further away from the single principal-agent problem at the base of national regulation to a multiple-principal multiple-agent set-up, with a supranational regulator acting alongside national governments regulating a number of firms.

In Sections IV and V, we discuss the opportunities and challenges that supranational regulation presents in a general way – that is, we do not restrict ourselves to considering a particular form of supranational regulation. Clearly, some arguments will apply to a greater or lesser extent to certain forms – we are likely to be less worried about the accountability of a supranational regulator that just facilitates coordination than one that has overall responsibility for the sector.

III. Institutional weaknesses

The theory of economic regulation has advanced significantly over the last quarter-century.[2] In particular, by focusing on problems of asymmetric information, it has greatly aided our understanding of the optimal design of incentive contracts. Simultaneously, economists have developed a greater understanding of the importance of institutions across a range of settings.[3] For the purposes of this article we use a broad definition of institutions, which we take to be the "rules of the game" that structure players' behavior, as well as the organizations that implement these rules.[4][5]

As outlined in Estache and Wren-Lewis (2009), we argue that the key aspects of institutional failure affecting regulation can be grouped into four broad limitations: limited regulatory capacity, limited commitment, limited accountability and limited fiscal efficiency. Before considering the relationship between these weaknesses and supranational regulation, let us briefly outline each of these limitations and the problems they generally entail.

Limited regulatory capacity. Regulators are frequently short of resources, usually because of a shortage of government revenue and sometimes because funding is deliberately withheld by the government as a means of undermining the agency. The lack of resources prevents regulators from employing suitably skilled staff, a task that is made even harder by the scarcity of highly educated professionals and the widespread requirement to use civil service pay scales.[6] Beyond the regulator itself, an underdeveloped auditing system

[2] For reviews of the economic theory of infrastructure regulation see, for example, Laffont and Tirole (1993), Armstrong, Cowan, and Vickers (1994), Newbery (2000), Vogelsang (2002), and Armstrong and Sappington (2007).

[3] See, for example, Williamson (2000), Acemoglu, Johnson, and Robinson (2004), Dixit (2004), and Rodrik, Subramanian, and Trebbi (2004).

[4] This is thus slightly broader than the definition of North (1990), since he separates institutions from organizations, and is closer to that of Greif (2001) who defines them as "a system of social factors - such as rules, beliefs, norms and organizations - that guide, enable and constrain the actions of individuals". For other definitions of institutions, see Williamson (2000) and Acemoglu, Johnson, and Robinson (2004).

[5] Clearly one way to deal with institutional limitations is to change the institutions themselves. However we do not consider broad institutional change here since this generally comes about slowly and due to factors outside of regulation. See Acemoglu and Robinson (2008) for an explanation as to why institutions are persistent, and North (1990), Williamson (2000), and Greif and Laitin (2004) for theories of how they change.

[6] See Domah, Pollitt, and Stern (2002) for evidence of capacity constraints. The Africa Forum for Utility Regulation (2002) and Kirkpatrick, Parker, and Zhang (2005) both undertake surveys of regulatory agencies in

and inexperienced judiciary place further limits on implementation. Overall, perhaps the greatest way in which limited regulatory capacity constrains regulation is through preventing the regulator from obtaining reliable information from the firm Estache and Wren-Lewis (2009). Furthermore, the limited cognition of the regulator may combine with the transaction costs involved in writing contracts to produce greater contractual incompleteness.

Limited accountability. Institutions that are designed to serve on behalf of the government or the people, including regulatory agencies, may in fact not be answerable to their principals, and hence are free to carry out their own objectives.[7] Where accountability is lax, collusion between the government and various interest groups, including regulated firms, is more likely to occur. Indeed, there is abundant evidence of corruption in both the privatization process and in regulation, particularly in developing countries.[8] Limited accountability is fundamentally linked to the information flows between actors since it is through misuse of this information that much of the potential for collusion occurs

Limited commitment. Fear of future renegotiation is a serious impediment to attracting private sector participation. Large-scale investment, which is desperately needed in many LDCs, may not take place if governments cannot promise to allow investors to make a sufficient return. Investment in utilities is particularly vulnerable to government noncommitment because governments are always very involved in their operation and the investment is long-lived and non-transferable. Furthermore, if governments cannot commit to enforcing contracts, then many of the gains that could be reaped at the initial tendering point will be lost in future renegotiations.

Limited fiscal efficiency. There is a clear concern that public institutions in developing countries are unable to collect adequate revenue to allow direct subsidies when the ability of consumers to pay for services is limited. In infrastructure, this limitation is apparent in the slow progress that state-owned enterprises have made in increasing access to networks.[9] When both fiscal surpluses and the ability to pay of the majority of users are limited (as is often the case in Sub-Saharan Africa, for instance) the speed at which investment can be financed is much slower than when governments can finance any resource gap.[10] Unfortunately, governments and regulators are in a catch-22 situation. The scale of network expansion required to widen access to services, and the inability of many citizens to pay

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LDCs. The findings of the former concluded that a third of surveyed agencies are bound to paying government set salaries and two thirds of surveyed agencies require government approval of their budget.

[7] For instance, Stern and Holder (1999) show in a survey of Asian regulators that very few are transparent or accountable.

[8] For example, see Bjorvatn and Søreide (2005) and Ghosh Banerjee, Oetzel, and Ranganathan (2006) for evidence of corruption in private sector involvement.

[9] Clarke and Wallsten (2003) give evidence of the limited success of state-subsidized network expansion, and suggest that mistargetting is a major problem.

[10] In terms of consumers' ability to pay, Komives, Foster, Halpern, and Wodon (2005) find about 20% of Latin American households and 70% of households in Africa or Asia would have to pay more than 5% of their income for water or electricity services if tariffs were set at cost recovery levels.

tariffs at a level that will ensure cost-recovery, mean that private or public enterprises are unlikely to be financially autonomous.[11] However, the limited fiscal efficiency of the poorest countries is such that governments will not be able to finance high levels of subsidies. Moreover, the difficulty in the government providing subsidies underlines the need to consider the distributive effect of regulatory policy. This applies in not only a normative sense, but also a positive one, since many reforms have been undermined by the lack of political support amongst groups that lose out as a result of reforms.

As outlined in Estache and Wren-Lewis (2009), Estache and Wren-Lewis (2010), these institutional weaknesses result in a number of regulatory problems. In the following section, we consider the extent to which supranational regulation may provide opportunities to mitigate these national institutional weaknesses.

IV. Opportunities of supranational regulation

A. Improving regulatory capacity

In debates over national regulatory structure, the point has frequently been made that there are `economies of scale' in regulatory expertise. Generally therefore, a lack of skilled human resources is likely to push towards the creation of fewer regulatory agencies. By pooling resources, a regulator is more likely to be able to afford the professionals required to process the information it receives and experts will be able to share their knowledge more easily. At the national level, this has manifest itself in the tendency for advisors to recommend multisectoral agencies in developing countries and national rather than decentralized regulation in technically demanding sectors such as telecommunications and electricity.

This argument can clearly be extended to considering supranational regulation (see Kessides, Noll, and Benjamin, 2010, for example). At the extreme, we might consider that in regions where there are very few qualified professionals, these might be best deployed in a single agency in the same way that we would prefer national regulation to decentralized regulation. Whilst undertaking all regulation at the regional level is likely to be unrealistic, a regional regulator may be the best place to assign the most technically complex tasks. Another mechanism may be to simply use regional bodies as a means to develop informal or formal networks amongst national regulators to share experiences. An example of such a process is the African Forum for Utility Regulation.

As detailed in the previous section, a significant problem resulting from limited regulatory capacity is a difficulty in obtaining information from the regulated firm(s). In this sense, a supranational regulator may help in coordinating this information across countries, possibly through a formal benchmarking process. This may create an informal sort of yardstick competition, whereby national regulators can consider the performance in light of

[11] Trujillo, Martin, Estache, and Campos (2003) find that the fiscal benefits of privatization decrease over time, and argue that it is because the need for public investment is gradually realized.

the information they have received from other countries. This use of correlation between information across countries can hence be used to mitigate regulatory capacity whether national firms compete directly or otherwise.[12]

B. Improving accountability

The relationship between decentralisation and broader issues of corruption and accountability has received a significant amount of attention in the literature (see, for example, Bardhan and Mookherjee (2000), Bardhan (2002)). One argument put forward by the literature on federalism is that centralized regulation diminishes the lobbying power of local firms. This may be because firms find coordinating on capture more difficult in a less concentrated market (see, for example, Olson (1965)). Furthermore, Boehm and Olaya (2006) argue that regulation at the local level is likely to lead to more frequent interactions, encouraging capture. It is easy to extend this logic to the case of supranational regulation and argue that national firms will find capturing a regional regulator more difficult than capturing national regulators. Indeed, Kessides, Noll, and Benjamin (2010) argue that "as the locus of regulatory decision-making moves from the nation to the regional, both the number of competing interest groups and the likelihood that they will neutralize each other can increase substantially." They also put forward the idea that moving regulatory reform to the regional level increases makes it part of a larger package of reform, which in turn encourages the participation of other interest groups. These arguments therefore suggest that supranational regulators may improve accountability by taking on tasks that are susceptible to capture by national interest groups.

One task that the regulation literature highlights as vulnerable to capture is the retrieval of information on firms' performance. Since this is often at the base of how much the firm is allowed to charge or how much it is subsidized, firms have a strong incentive to bribe regulators into keeping this information hidden. Laffont and Martimort (1999) show that this risk can be mitigated if information is collected by more than one agency, since each regulator may ignore the externality it imposes on the others by revealing this information. This relies on the assumption that each supervisor is aware of the signal that the other receives but they cannot collude amongst themselves.[13] In this model, capture remains a problem if only one of the supervisors receives information from the firm, but is removed as a threat when both supervisors receive information. This is because, if both regulators receive informative signals, each will anticipate that the other will reveal it, and hence any collusion would be ineffective. Estache and Martimort (2000) argue additionally that, if different supervisors are instead not aware of the information the other receives, separation is still likely to reduce capture. Since each supervisor is now only partially informed, their ability to extract bribes from the firm is reduced.

[12] Laffont and N'Guessan (1999) for example model competition as an increase in ξ, while Laffont and Pouyet (2004) consider there likely to be informational externalities between regions.

[13] See Laffont and Meleu (1997) for an analysis of the case where regulatory agents can collude between themselves.

The upshot of this argument is that a supranational regulator may improve accountability by duplicating the information retrieval currently undertaken only by national regulators. This holds even if we believe that the supranational regulator is at as much risk of being captured as the national one. Of course, this assumes that the supranational regulator's source of information is somewhat independent from that of the national regulators, a duplication which may be challenging in the face of limited regulatory capacity.

If the supranational regulator is restricted to only obtaining information from national regulators, then it may improve accountability through a different mechanism. By demanding that national regulators produce information, the supranational regulator can act as a further stimulus for transparency. For example, in the EU, there is no regional electricity regulator, yet the commission produces a benchmark of the performance of national regulators (see Green, Lorenzoni, Perez, and Pollitt (2006) for details of this process). In this way, national regulators may be made more accountable if citizens and governments can compare the performance of their regulator with that of other countries.

A more direct form of competition between national agencies may occur if the regionalization of infrastructure results in different national agencies regulating the same firm. In this case, national regulators that wish to exercise discretion due to private agendas may be limited in their ability by this competition (see, for example, the model of Laffont and Pouyet (2004)).

Finally, Ganuza and Hauk (2004) show that supranational regulation may reduce corruption for a different reason. In their model, national agencies are given discretion in their decisions so that they can favour domestic firms over foreign ones. Since a supranational agency is not interested in such favoritisms, it typically will receive less discretion and hence less opportunity to be corrupt.

C. Improving commitment

The setting up of supranational regulatory structures opens the opportunity for improving commitment in three main ways. First, it offers the opportunity to create an authority with priorities that are less likely to go against prior commitments. Second, for areas of policy where its consent is necessary, it creates an extra veto point which makes reneging on commitments more difficult. Third, if renegotiation is to occur, it offers a natural body to act as an arbiter in any disputes. Let us now explore each of these mechanisms in turn.

As noted in Estache and Wren-Lewis (2009), a solution to problems of commitment that is commonly advised by practitioners is to increase the independence of the regulator.[14] One possible reason that independent regulation may increase commitment is that then the regulator may hold a different objective function from the government. If the regulator is biased towards the firm and is given control over regulatory policy, then this works in a

[14] According to Estache (2008), by 2004 two-thirds of LDCs had introduced some form of independent regulatory agency in telecoms sector, 54% in electricity, and 23% in water.

similar way to the `conservative central banker' idea used in monetary policy.[15] We can apply exactly the same logic to the creation of a supranational regulatory agency. Indeed, one might even consider the possibility of choosing the regulator's objective in such a way more reasonable with a supranational body, since they are perhaps less likely to be career civil servants and instead industry professionals who have greater concerns for their professional reputation.

Regardless of its objective function, the creation of a supranational regulator may help to provide an extra veto point in the system of regulation. Levy and Spiller (1994, 1996) argue that the ability of a system to commit to time inconsistent regulatory policies depends on the number of independent actors required to change a decision. Generally, a separation of powers improves commitment because future renegotiation is more costly when there are many non-cooperating principals that have to agree to a renegotiation.[16] Empirically this idea is verified by the existence of checks and balances having a positive effect on utility investment in LDCs.[17] As argued by Kessides, Noll, and Benjamin (2010), "internationalization of regulation creates institutions that can be changed only by mutual agreement among several nations so that political change in one nation is insufficient to cause a radical change in regulatory governance unless a new government is willing to sacrifice all of the other benefits that arise from regional economic cooperation".

Even if a supranational agency does not have the potential to veto a potential renegotiation, it may still be able to improve commitment through acting as an arbiter. Its position as an international actor who is likely to be relatively well informed places it in a good position to be involved in any disputes between countries or firms. The literature on incomplete contracts suggests that efficiency may be retained even when commitment is not possible if the parties can at least fix ex ante their respective bargaining powers and default positions for future renegotiations.[18] In regulatory contracts, this may be best done through an arbitration process. Bargaining power could, for example, be determined by setting up an expert panel with an appropriate bias at the regional level.[19]

Finally, firms are likely to worry less about issues of political risk in an environment where infrastructure is integrated. Treating an individual country's risk as exogenous, a firm that is operating in several countries will essentially hold a more diversified portfolio, and will therefore be less exposed to the risk of renegotiation in any individual country. Moreover, countries may be less willing to renege on commitments if this will potentially disrupt services in neighboring countries. In this way, the regionalization of infrastructure

[15] See Rogoff (1985) for the idea applied to central banks and Evans, Levine, and Trillas (2008) for an adaptation to regulation.

[16] Olsen and Torsvik (1993) and Martimort (1999) give models showing that opportunistic renegotiation is decreased when there are several regulators.

[17] Using cross-country panels, Bergara, Henisz, and Spiller (1998), Henisz and Zelner (2001), and Gutiérrez (2003) find investment in electricity and telecoms suffers when there are fewer checks and balances.

[18] See, for example, Aghion, Dewatripont, and Rey (1994).

[19] Estache and Quesada (2001) show how the government may wish to balance renegotiation bargaining powers to improve welfare.

may help to transform the bargain from being between one country and one firm to being between one country and the firm with many powerful friends! Lastly, in the case of electricity, if firms are able to export then they are in a much better bargaining position when it comes to dealing with their domestic regulator, since this improves their outside option.

D. Improving fiscal efficiency

One of the main aims of processes such as the integration of electricity markets is to take advantage of economies of scale. In this way, a direct output of such projects should be a mitigation of fiscal constraints for governments, since they can undertake more efficient investment in infrastructure. This is particularly the case for regional public goods that are aggregated under a `best-shot' technology, such as ports, airport hubs or major telecommunications cables (see Sandler, 2004, for a definition of various types of aggregator). Coordination between countries here may reduce the potentially inefficient duplication of such infrastructure that would occur if countries acted independently.

In a similar way, the integration of regional infrastructure regionalization may rebalance investments such that countries invest more efficiently through comparative advantage. Electricity integration, for example, may enable investment in electricity generation to be focused in those countries that have the greatest returns. This then frees up fiscal space in other countries to invest in domestic transmission and distribution networks.

Finally, the creation of supranational regulation may create opportunities for new funding instruments that may direct extra financing into the infrastructure sector. Though donors have taken time to adapt to funding regional rather than national projects, they are increasingly seeing funding regional public goods as part of their remit. In the long term, donors are likely to see several advantages in lending to a regional organization which, as outlined above, may not be subject to the similar problems of capacity, commitment and accountability that plague national institutions. Indeed, as regional organizations become more developed, the advantages outlined above may help to encourage further private financing. This potential combination of extra donor resources and private finance would then potential help to improve fiscal efficiency.

V. Challenges of supranational regulation

The section above has outlined the various opportunities that supranational regulation presents for mitigating weaknesses in national institutions. However, it is clear that these supranational regulators themselves may suffer problems as a result of weaknesses in national institutions. This section therefore outlines the many challenges that must be confronted when building supranational regulation in a context of institutional weakness.

A. Limited regulatory capacity

As we have previously discussed, many national regulators do not have sufficient capacity to extract information from the monopoly they regulate and use such information efficiently. In the previous section, we mentioned that international competition amongst regulated firms might help to relieve some of these informational constraints. However, the introduction of international competition adds new layers of complexity to the task of regulation. For instance, the regulator may be involved in reducing market power and setting access prices, which are far from straightforward issues. Indeed, experience in developing countries suggests that the regulation of partially competitive sectors may be as demanding on regulators as monopoly regulation.[20]

In a sector such as electricity or telecoms, the existence of market power can significantly undermine the benefits of competition. For instance, Bunn and Zachmann (2010) show that international interconnection of electricity networks may reduce consumer welfare if a dominant domestic firm can use the interconnection to exercise its market power. Theoretically, the regulator may be able to counter such market power through using access prices to subsidize firms that have relatively little market power (Laffont, 2005). However, the complexity involved in calculating market power is high, and hence allowing such subsidies when capacity is low may give the regulator too much discretion that may then be misused.

A further worry of creating supranational regulatory agencies is that it may spread the little regulatory capacity that exists in the region even more thinly. This emphasizes the danger of using the logic outlined in the previous section that draws parallels from the decentralization/centralization debate. Clearly replacing national regulators with a single central regulator would take advantage of the increasing returns to scale in expertise, but such replacement is likely to be impossible in a context where national sovereignty is at stake. National governments are likely to be unwilling to significantly trim their national regulatory agencies, and hence increases in regulatory capacity at the supranational level may entail decreases in national regulatory capacity.

One reason that national regulation is likely to remain important even with a relatively powerful supranational regulator is that information is typically collected at a national or more local level. Transferring regulatory capacity to supranational regulators may therefore interfere with this information gathering process. Even with superior regulatory capacity, supranational regulatory agencies are likely to find it more difficult to extract information on national firms if they are less familiar with the national context. If national regulators remain responsible for producing information but delegate some decision making to the supranational regulator, this may decrease their incentive to retrieve reliable information (Cremer, Estache and Seabright, 1994). Since information flows are so

[20] This point is emphasized in Kessides (2005). Domah, Pollitt, and Stern (2002) study electricity regulators in LDCs and find that competition does not appear to make regulation any less complex.

crucial in the regulatory process, such incentives need to be considered when capacity is limited.

One manner in which actors have attempted to tackle the challenge of limited regulatory capacity at the supranational level is to finance technical assistance programs and encourage the use of consultants. This is the case, for example, for the regulator of the West African Power Pool, which has been financed by international donors. However, the use of donors and technical assistance poses risks. Stern (2000) and Bertolini (2004) emphasise the dangers to in-house capacity if contracting out is used as a substitute whilst Tremolet, Shukla, and Venton (2004) argue that if consultants do more technical work, then it is easier for politicians to influence regulators since it reduces the asymmetry of information between the regulator and the government. Moreover, the international donors that finance supranational technical assistance many not always have incentives that align perfectly with those countries in the region. In particular, they may favour decisions that aid international companies operating in the region or be overly keen in implementing frameworks that have operated in significantly different regions. A similar issue arises if the supranational regulator is predominately financed by an individual country in the region, since the temptation may be then to bias regulatory decisions towards that country. In this sense, though we might see supranational regulation as a `best-shot' type of regional public good, it is probably best funded in a more dispersed way.

B. Limited accountability

Within the national context, much stress has been placed on making regulatory agencies more accountable in order to reduce the risk of capture. One solution that has been proposed is to involve multiple principals with conflicting aims in order to counter the ability of any individual principal to capture the regulator. An example advocated by practitioners is to include both the executive and the legislative branches in the regulator's appointment and to involve actors such as the judiciary in any appeals process.[21] As discussed in the previous section, the multiplicity of national executives with conflicting aims may limit capture at the supranational level. However, a lack of effective supranational legislature or judiciary may present risks on those occasions when differences between national executives do not provide sufficient accountability. This risk is likely to be particularly great when a minority of countries has a large sway over the decisions of the supranational regulator, as is likely to be the case when countries sizes are very heterogeneous. Indeed, Tangeras () shows that national regulation may dominate supranational regulation in the case of electricity transmission if the centralized regulator is biased towards a particular country. Furthermore, models such as that of Seabright (1996) argue that governments are more accountable at local levels since national governments do not face electoral pressure for policy in a particular locality. Similarly, we may worry that any

[21] Dal Bó (2006) finds evidence of regulatory behavior depending on their appointment method. For other models describing the risks and benefits of multiple principals see, for example, Martimort (1996).

supranational body will be relatively unresponsive to the concerns of any particular country, reducing accountability.

As well as worrying about the accountability of any supranational regulator, the transfer of power to the supranational level may worsen problems of limited accountability within national regulators. In particular, if it is unclear who is responsible for particular regulatory decisions, then it is harder for citizens to exert pressure at the appropriate level Cremer, Estache and Seabright (1994). The risk is that governments or regulatory agencies can blame performance failures on supranational policy and in so doing decrease the accountability of national bodies. It is therefore very important that the division of powers between national and supranational regulators is as clear and simple as possible.

A further way in which regionalization may reduce national regulatory accountability is through encouraging the protection of national champions. In this setting, it may be in the interest of a national regulator to collude with the national firm by hiding information from a supranational regulator or pushing for decisions that favour the national firm over consumers. This is because the national government has an incentive to increase the market share of domestic firms since they provide jobs and tax revenue – an incentive that is likely to be even stronger if institutional limitations already encourage capture.[22] For instance, Nigeria threatened to cut off electricity trade with Niger (which would have been detrimental to both countries) in order to promote the interests of the national Nigerian electricity company. In the EU, Glachant and Lévêque (2009) discuss how promotion of the interests of national champions has limited the extent of regionalization. In this way international competition between firms may worsen problems of national regulatory accountability since regulation may then be used as a tool to promote the interests of national firms.

Finally, when the accountability of regulatory agencies is severely limited, regulation may be used as a way to extract bribes or favors from the firm. Creating an extra layer of regulation at the regional level may therefore risk creating a `double mark-up', whereby distortions occur because of corruption at two levels (see Shleifer and Vishny, 1993).

C. Limited commitment

Since optimal regulatory policy is often time inconsistent, commitment needs to be achieved through institutions that constrain actors from behaving opportunistically. As argued by Levy and Spiller (1996), the optimal institutional setup to do this is likely to be different across countries. For example, Levy and Spiller (1996) detail that in many countries the creation of an independent regulator in telecoms aided commitment through providing an actor that could over-rule the short-term desires of the executive. However, in Jamaica, the switch from a detailed operating license regime to one with an independent regulator in the 1960s was probably the cause of a following large decline in investment. This is because

[22] Such problems are tackled in the context of decentralization in the models of Besfamille (2004) and Bardhan and Mookherjee (2006).

the operators feared the regulator would misuse its discretion in a way that was not possible when the relatively specific license was enforced by the judiciary.[23] Overall, the conclusion drawn is that a regulatory process that increases commitment must be compatible with the country's institutional structure. An independent regulatory agency will work less well in a country where there is little tradition of bureaucratic autonomy. Here, if the legislator is fairly independent of the executive, specific legislation may instead increase commitment.

Such optimal heterogeneity across countries in the optimal institutional setup is likely to pose problems when we move to the supranational level. As discussed in the literature on federalism, centralization is likely to result in more homogeneity across localities (Oates, 1999). This can be seen in the case of regionalization of infrastructure, where often supranational institutions encourage a particular market structure or regulatory system (see, for example, Green, Lorenzoni, Perez, and Pollitt, 2006, who discuss the standardized regulatory structure that the EU desires of its member states). If supranational bodies encourage uniformity in national regulatory structures then this is likely to worsen problems of limited commitment in those countries where such a structure is unsuitable. This effect may therefore undermine the potentially positive effects of regionalization on commitment previously discussed.

Even if countries are fairly homogenous, the move to supranational regulation is likely to cause changes that may require contracts (explicit or implicit) to be renegotiated. Opening up such negotiation may threaten previous commitments that have been made, and prove an opportunity for either the government or the firm to take advantage (depending on who has greatest bargaining power). For example, if international competition is to be introduced, this will almost certainly require a renegotiation of price caps or subsidies. It is therefore crucial when thinking about moving to a supranational framework that policy makers bear in mind that the optimal form of regionalization is unlikely to be that which would be chosen were all participating countries starting from scratch.

The creation of supranational agencies may also worsen commitment problems if they had previously been solved through mechanisms that are not replicated at the supranational level. For example, an independent regulatory agency may improve commitment through having a sufficiently pro-industry bias, perhaps as the result of domestic lobbying or the revolving door.[24] Alternatively, as argued by Trillas (2010), more local regulators may use regulatory policy to achieve other objectives that as a side effect increases commitment. For example, if national regulators are concerned about the profits of national firms because shareholders are based domestically, then this may give them an incentive to reward investment that a supranational regulator does not have.

[23] This example comes from Levy and Spiller (1994, p.232).

[24] See Che (1995), Salant (1995) and Evans, Levine, and Trillas (2008) for models in this category. Victor and Heller (2007) argue that in practice limited commitment has led to the rise of `dual firms' that mitigate a lack of commitment by keeping close ties to the public sector.

There are therefore several reasons why regionalization of infrastructure and its regulation may worsen problems of limited commitment. Moreover, problems of limited commitment may significantly impact upon the success of supranational regulation. As Estevadeordal, Frantz, and Nguyen (2004) point out, regional goods require countries to commit to providing them simultaneously. If countries' ability to commit is limited, there may be a temptation at a later point to free ride.[25] If countries cannot commit to financing and supporting supranational regulation in the future, this is likely to undermine a supranational regulators ability to carry out long term reforms.

Limited commitment will also have implications for international trade in infrastructure. For example, Wren-Lewis (2011) shows that, when long-term commitment to trade is not possible, countries will under-invest in sectors that make them dependent on trade, e.g. potential electricity exporters will under-invest in generation whilst potential importers under-invest in distribution. This occurs because the bilateral nature of such trade exposes countries to a hold-up problem if they are dependent on trade with the other country.

D. Limited fiscal efficiency

Given the limited fiscal efficiency of many countries, financing supranational projects is likely to be difficult. Indeed, as found by Ferroni (2001), a major challenge for financing regional public good capacity is the fact that regional loans themselves are uncommon. Donors and private financiers may be reluctant to lend to newly created regional bodies, whilst individual countries may be reluctant to take loans on their books if they feel the project's success depends on the actions of other countries. Such financing is likely to be complicated since spillovers mean that the countries incurring the costs are not necessarily the sole to benefit. For example Lopez, Monzan, Ortega, and Mancebo Quintana (2009) found that while Spain's average rail service accessibility improved by 34 percent as a result of rail network extensions, France and Portugal also saw accessibility improvements in the order of 20 percent. When the country in which the investment needs to take place is fiscally constrained, international transfers will be necessary. However, limited fiscal efficiency is likely to mean making such transfers upfront will be difficult, and hence there is a need to design financial instruments carefully for each project.

As argued in Gasmi, Laffont, and Sharkey (2000), fiscal inefficiency in a country may imply that it is optimal to use cross-subsidies in order to redistribute and expand access. However, the creation of international competition may make this more difficult. In many developing countries, traditional cross-subsidies that took place within a monopoly have been disrupted by the introduction of competition in the more profitable parts of the sector. Whilst the claim made by some policy makers that competition limits redistribution is probably not true, it does however add complications to schemes typically used in LDCs for

[25] This will be particularly problematic for public goods that use a summation aggregator - see Sandler (2006) for a discussion of the various types of aggregator.

this purpose, such as price restrictions and universal service obligations.[26] International competition may therefore prompt a significant redistributive effect which fiscally inefficient governments may find difficult to counter.

International competition may also encourage governments to promote national champions, as discussed in Section III.C. A direct result may be that countries subsidize (or under-tax) domestic firms in order for them to gain competitive advantage. As shown by Auriol and Biancini (2009), when fiscal inefficiency is high, this may mean international competition overall decreases welfare. Supranational regulation may find it difficult to prevent such behavior since there are many legitimate reasons for governments to subsidize and tax differently firms in infrastructure sectors.

Another product of regionalization, international trade, is also likely to have distributive effects. At least in the short term, exporting countries will experience a rise in the price of the exported good. Though nationally this will generally be offset by the income received in exchange, this income is unlikely to be channeled directly to all those agents suffering higher prices. Redistribution should of course be possible, but limited fiscal efficiency may make this extremely difficult. Since infrastructure services such as electricity and water are frequently very politically sensitive, managing such redistribution is likely to be critical in order for reforms to be successful.

VI. Conclusions

Recent literature has emphasized the policy advantages of moving regulation to a supranational level (see, for example, Kessides, Noll, and Benjamin, 2010). In this article, we have shown that moving to supranational regulation may additionally represent an opportunity to improve upon many of the institutional limitations that can effect regulation. However, we have also outlined where institutional limitations are likely to challenge the move to supranational regulation, and where such a move may further the institutional problems already present with national regulation.

In writing this article, it has been notable that very few of the theoretical papers drawn upon are designed specifically with supranational regulation in mind. Instead, we have attempted to draw insights from work focusing on decentralization or multiple regulators within a given country. This article therefore represents a first step towards building a comprehensive understanding of the economic institutional issues involved in moving to supranational regulation.

There are several areas however where there is a need for a more explicit modeling of supranational regulation. One area in need of attention is to link the large literature on trade and regional integration with that on infrastructure regulation. Theoretical work on economic integration has taught us much about how the costs and benefits of economic

[26] See Section 3.4 of Estache and Wren-Lewis (2009) for a review of the various implications of competition on cross-subsidies.

integration are shared between and within countries. However, this has typically been in a context where prices and quantities are market determined, and there is a need to incorporate aspects of cross-subsidies, universal service obligations and other regulatory tools into this framework.

This article has underlined the fact that theoretically supranational regulation may either increase or decrease accountability and/or commitment. There is therefore a need for further empirical work on this issue through, mainly perhaps through the use of detailed case-studies of major reforms across the world. As this article has emphasized, the effect of supranational regulation is likely to vary according to the institutional context, and hence there is a need to further understand how this interaction plays out in practice.

References

Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2004. "Institutions as the fundamental cause of long-run growth," in *Handbook of economic growth*, ed. Philippe Aghion and Steven Durlauf. New York, NY: North-Holland.

Acemoglu, Daron and James A. Robinson. 2008. "Persistence of power, elites, and institutions." *The American Economic Review*, 98: 267-93.

Aghion, Philippe, Mathias Dewatripont, and Patrick Rey. 1994. "Renegotiation design with unverifiable information." *Econometrica*, 62(2): 257-82.

Armstrong, Mark, Simon Cowan, and John Vickers. 1994. *Regulatory reform: Economic analysis and British experience*: MIT Press.

Armstrong, Mark and David E. M. Sappington. 2007. "Recent developments in the theory of regulation," in *Handbook of industrial organization*, ed. Mark Armstrong and Robert Porter: North Holland.

Auriol, Emmanuelle and Sara Biancini. 2009. "Economic integration and investment incentives in regulated industries." CEPR Discussion Paper no. 7296. London, Centre for Economic Policy Research.

Bardhan, Pranab K. 2002. "Decentralization of governance and development." *The Journal of Economic Perspectives*, 16: 185-205.

Bardhan, Pranab K. and Dilip Mookherjee. 2000. "Capture and governance at local and national levels." *The American Economic Review*, 90(2, Papers and Proceedings of the One Hundred Twelfth Annual Meeting of the American Economic Association): 135-39.

Bardhan, Pranab K. and Dilip Mookherjee. 2006. "Decentralisation and accountability in infrastructure delivery in developing countries." *The Economic Journal*, 116(508): 101-27.

Bergara, Mario E., Witold J. Henisz, and Pablo T. Spiller. 1998. "Political institutions and electric utility investment: A cross-national analysis." *California Management Review*, 40: 3-35.

Besfamille, Martin. 2004. "Local public works and intergovernmental transfers under asymmetric information." *Journal of Public Economics*, 88(1-2): 353-75.

Bjorvatn, Kjetil and Tina Søreide. 2005. "Corruption and privatization." *European Journal of Political Economy*, 21(4): 903-14.

Boehm, Frederic and Juanita Olaya. 2006. "Corruption in public contracting auctions: The role of transparency in bidding processes." *Annals of Public and Cooperative Economics*, 77(4): 431-52.

Bunn, Derek and Georg Zachmann. 2010. "Inefficient arbitrage in inter-regional electricity transmission." *Journal of Regulatory Economics*, 37(3): 243-65.

Che, Yeon-Koo. 1995. "Revolving doors and the optimal tolerance for agency collusion." *The RAND Journal of Economics*, 26(3): 378-97.

Clarke, George R. G. and Scott J. Wallsten. 2003. "Universal(ly bad) service - providing infrastructure services to rural and poor urban consumers," in *Infrastructure for poor people: Public policy for private provision*, ed. Penelope J. Brook and Timothy C. Irwin, 21-76. Washington DC: World Bank.

Cremer, Jaques, Antonio Estache and Paul Seabright. 1994. "The decentralization of public services : Lessons from the theory of the firm." World Bank Policy Research Working Paper 2705. Washington DC: World Bank.

Dal Bó, Ernesto. 2006. "Regulatory capture: A review." *Oxford Review of Economic Policy*, 22(2): 203-25.

Dixit, Avinash K. 2004. *Lawlessness and economics: Alternative modes of governance*. Princeton; Oxford: Princeton University Press.

Domah, Preetum, Michael G. Pollitt, and Jon Stern. 2002. "Modelling the costs of electricity regulation: Evidence of human resource constraints in developing countries." Cambridge Working Paper in Economics 0229.

Estache, Antonio and Liam Wren-Lewis. 2010. "On the theory and evidence on regulation of network industries in developing countries," in *The Oxford Handbook of Regulation*, ed. Robert Baldwin, Martin Cave and Martin Lodge. Oxford: Oxford University Press.

Estache, Antonio. 2008. "Infrastructure and development: A survey of recent and upcoming issues," in *Annual world bank conference on development economics: Rethinking infrastructure for development*, ed. François Bourguignon and Boris Pleskovic. Washington DC: World Bank.

Estache, Antonio and David Martimort. 2000. "Transactions costs, politics, regulatory institutions, and regulatory outcomes," in *Regulatory policy in Latin America: Post-privatization realities*, ed. Luigi Manzetti, 49-82. Coral Gables: North-South Center Press.

Estache, Antonio and Lucia Quesada. 2001. "Concession contract renegotiations: Some efficiency versus equity dilemmas." World Bank Policy Research Working Paper 2705. Washington DC: World Bank.

Estache, Antonio and Liam Wren-Lewis. 2009. "Toward a theory of regulation for developing countries: Following Jean-Jacques Laffont's lead." *Journal of Economic Literature*, 47: 729-70.

Estevadeordal, A., B. Frantz, and T. R. Nguyen. 2004. *Regional public goods: From theory to practice*: Washington, DC: Inter-American Development Bank

Evans, Joanne, Paul Levine, and Francesc Trillas. 2008. "Lobbies, delegation and the under-investment problem in regulation." *International Journal of Industrial Organization*, 26(1): 17-40.

Ferroni, Marco A. 2001. *Regional public goods in official development assistance*. Buenos Aires ; Washington, D.C.: Inter-American Development Bank, Integration and Regional Programs Dept., Institute for the Integration of Latin America and the Caribbean.

Gasmi, Farid, Jean-Jacques Laffont, and William W. Sharkey. 2000. "Competition, universal service and telecommunications policy in developing countries." *Information Economics and Policy*, 12(3): 221-48.

Ghosh Banerjee, Sudeshna, Jennifer M. Oetzel, and Rupa Ranganathan. 2006. "Private provision of infrastructure in emerging markets: Do institutions matter?" *Development Policy Review*, 24(2): 175-202.

Glachant, Jean-Michel and François Lévêque. 2009. *Electricity reform in Europe: Towards a single energy market*. Cheltenham, UK Northampton, MA: Edward Elgar.

Green, R., A. Lorenzoni, Y. Perez, and M. Pollitt. 2006. "Benchmarking electricity liberalisation in Europe." Cambridge Working Papers in Economics 0629, Faculty of Economics, University of Cambridge.

Greif, Avner. 2001. "The fundamental problem of exchange: A research agenda in historical institutional analysis." *European Review of Economic History*, 4(03): 251-84.

Greif, Avner and David D. Laitin. 2004. "A theory of endogenous institutional change." *American Political Science Review*, 98(04): 633-52.

Ganuza, Juan-Jose and Esther Hauk. 2004. "Economic integration and corruption." *International Journal of Industrial Organization*, 22(10): 1463-84.

Gutiérrez, Luis H. 2003. "Regulatory governance in the latin american telecommunications sector." *Utilities Policy*, 11(4): 225-40.

Henisz, Witold J. and Bennet A. Zelner. 2001. "The institutional environment for telecommunications investment." *Journal of Economics and Management Strategy*, 10: 123-47.

Kessides, I. N., R. G. Noll, and N. C. Benjamin. 2010. "Regionalizing infrastructure reform in developing countries." *World Economics,* 11(3): 79-108

Kirkpatrick, Colin, David Parker, and Yin-Fang Zhang. 2005. "Price and profit regulation in developing and transition economies: A survey of the regulators." *Public Money and Management*, 25(2): 99-105.

Komives, Kristin, Vivien Foster, Jonathan Halpern, and Quentin Wodon. 2005. *Water, electricity, and the poor: Who benefits from utility subsidies?* Washington, DC: World Bank.

Laffont, Jean-Jacques. 2005. *Regulation and development*. Cambridge: Cambridge University Press.

Laffont, Jean-Jacques and David Martimort. 1999. "Separation of regulators against collusive behavior." *The RAND Journal of Economics*, 30(2): 232-62.

Laffont, Jean-Jacques and Mathieu Meleu. 1997. "Reciprocal supervision, collusion and organizational design." *The Scandinavian Journal of Economics*, 99(4): 519-40.

Laffont, Jean-Jacques and Tchétché N'Guessan. 1999. "Competition and corruption in an agency relationship." *Journal of Development Economics*, 60: 271-95.

Laffont, Jean-Jacques and Jerome Pouyet. 2004. "The subsidiarity bias in regulation." *Journal of Public Economics*, 88(1-2): 255-83.

Laffont, Jean-Jacques and Jean Tirole. 1993. *A theory of incentives in procurement and regulation*. Cambridge, Mass ; London: MIT Press.

Levy, Brian and Pablo T. Spiller. 1996. *Regulations, institutions, and commitment: Comparative studies of telecommunications*. Cambridge: Cambridge University Press.

Lopez, Elena, Andres Monzan, Emilio Ortega, and Santiago Mancebo Quintana. 2009. "Assessment of cross-border spillover effects of national transport infrastructure plans: An accessibility approach." *Transport Reviews: A Transnational Transdisciplinary Journal*, 29(4): 515 - 36.

Martimort, David. 1996. "The multiprincipal nature of government." *European Economic Review*, 40(3-5): 673-85.

Martimort, David. 1999. "Renegotiation design with multiple regulators." *Journal of Economic Theory*, 88(2): 261-93.

Newbery, David M. G. 2000. *Privatization, restructuring, and regulation of network utilities*. Cambridge, MA; London: MIT Press.

North, Douglass Cecil. 1990. *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press.

Oates, Wallace E. 1999. "An essay on fiscal federalism." *Journal of Economic Literature*, 37(3): 1120-49.

Olsen, Trond E. and Gaute Torsvik. 1993. "The ratchet effect in common agency: Implications for regulation and privatization." *Journal of Law, Economics and Organization*, 9(1): 136-58.

Olson, Mancur. 1965. *The logic of collective action: Public goods and the theory of groups*. Cambridge, Mass: Harvard University Press.

Rodrik, Dani, Arvind Subramanian, and Francesco Trebbi. 2004. "Institutions rule: The primacy of institutions over geography and integration in economic development." *Journal of Economic Growth*, 9(2): 131-65.

Rogoff, Kenneth. 1985. "The optimal degree of commitment to an intermediate monetary target." *The Quarterly Journal of Economics*, 100(4): 1169-89.

Salant, David J. 1995. "Behind the revolving door: A new view of public utility regulation." *The RAND Journal of Economics*, 26(3): 362-77.

Sandler, T. 2004. "Demand and institutions for regional public goods," in *Regional public goods: From theory to practice*, 11.

Sandler, Todd. 2006. "Regional public goods and international organizations." *The Review of International Organizations*, 1(1): 5-25.

Seabright, Paul. 1996. "Accountability and decentralisation in government: An incomplete contracts model." *European Economic Review*, 40(1): 61-89.

Shleifer, Andrei and Robert W. Vishny. 1993. "Corruption." *The Quarterly Journal of Economics*, 108(3): 599-617.

Stern, Jon and Stuart Holder. 1999. "Regulatory governance: Criteria for assessing the performance of regulatory systems: An application to infrastructure industries in the developing countries of asia." *Utilities Policy*, 8(1): 33-50.

Tangeras, Thomas P. 2012. "Optimal transmission regulation of an integrated energy market." *Energy Economics*.

Trillas, Francesc. 2010. "Electricity and telecoms reforms in the eu: Insights from the economics of federalism." *Utilities Policy*, 18(2): 66-76.

Trujillo, Lourdes, Noelia Martin, Antonio Estache, and Javier Campos. 2003. "Macroeconomics effects of private sector participation in infrastructure," in *The limits of stabilization: Infrastructure, public defecits, and growth in Latin America*, ed. William Easterly and Luis Servén. Washington: World Bank.

Victor, David G. and Thomas C. Heller. 2007. *The political economy of power sector reform: The experiences of five major developing countries*. Cambridge: Cambridge University Press.

Vogelsang, Ingo. 2002. "Incentive regulation and competition in public utility markets: A 20-year perspective." *Journal of Regulatory Economics*, 22(1): 5-27.

Williamson, Oliver E. 2000. "The new institutional economics: Taking stock, looking ahead." *Journal of Economic Literature*, 38(3): 595-613.

Wren-Lewis, Liam. 2011. "Hold-up problems in international electricity trade." Mimeo . https://sites.google.com/site/liamwrenlewis/publications/holdupforwebsite.pdf?attredirects=0