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An Institutional Perspective on Assessing Real Options Values in Telecommunications Cost Models

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Abstract – Under section 251(c) of the Telecommunications Act of 1996, Congress imposed a duty on incumbent local exchange companies (ILECs) to provide unbundled network elements (UNEs) on a nondiscriminatory basis at just and reasonable rates. This statutory obligation can be viewed as granting an option to competitive local exchange companies to "wait to invest" in their own facilities, but its quantification for inclusion in UNE prices would be controversial. This paper shows that, from an institutional perspective, there is a sound analytical basis for guiding public policy decisions on this issue. More specifically, given the U.S. constitutional framework, which constrains government regulation, the consequences of overestimation as opposed to underestimation of ILECs' costs are dramatically different. As shown, given the uncertainty of the "true" option value, a regulatory policy based on a cost methodology that tends to overestimate rather than underestimate the option value is more consistent with Congressional policy favoring regulatory intervention that encourages the deployment of an advanced telecommunications infrastructure. Therefore, for purposes of determining prices for UNEs, policymakers should err on the side of overestimating the option value.

In response to the desire – arising from both technological developments and political forces – to increase reliance on competitive forces, Congress passed the Telecommunications Act of 1996. The new Act provides a revised framework for regulating the telecommunications industry. An important feature of this framework is the imposition of certain statutory obligations on incumbent local exchange companies (ILECs) governing their relationship with other telecommunications carriers (referred to here as competitive local exchange providers, or CLECs) that want to utilize ILEC facilities. Among these obligations is the duty under section 251(c) to provide unbundled network elements (UNEs) on a nondiscriminatory basis at just and reasonable rates.

During the conference on The New Investment Theory of Real Options and Its Implications for the Cost Models in Telecommunications, held on October 2, 1998 at Columbia University, many of the presentations were devoted to the issue of whether the ILEC's obligation to provide UNEs constitutes the grant of an option to CLECs. For example, Jerry Hausman stressed that the nature of the option granted to CLECs consists of the option to invest in their own facilities or to wait by purchasing access to ILECs' facilities. Under such circumstances in a world of uncertainty, there is a "reward to waiting" given to CLECs. Therefore, according to the investment theory of real options, the sunk costs of the ILECs should include a markup factor to reflect the full costs of their investment. In turn, the costs upon which the regulator relies in approving prices to be charged by ILECs for access to UNEs should include such a markup factor. Hausman claimed that as it is currently calculated, the total element long-run incremental cost (TELRIC) model used by the Federal Communications Commission (FCC) does not include the relevant markup factor. The solution, he suggested, is either: 1) to have CLECs enter into long-term contracts with ILECs that cover the life of the UNE investment, in which case there is no option and thus no need for a markup; or 2) to have agreements between CLECs and ILECs with a duration shorter than the life of the UNE, in which case there is an option and the TELRIC cost standard should be modified to include an appropriate markup factor.

There were numerous responses to such claims of an option. Interestingly, virtually all presenters agreed that a CLEC's ability to wait to invest is an option whose value should be included in the cost model utilized for determining UNE prices. However, there was disagreement as to the size of that value and the extent to which current cost methodology already reflects the option value. For example, William Lehr disagreed with Hausman's assessment that current prices based on TELRIC do not include the necessary markup factor to reflect the option value, claiming that Hausman has overstated the degree to which prices need to be adjusted. Nicholas Economides questioned the degree of uncertainty faced by ILECs regarding local loop investment and therefore, the significance of the level of the option value. And, the eminent William Baumol agreed that, under those circumstances where the ILEC obligation to invest is operative, TELRIC costs need to be modified to reflect the value of the "waiting to invest" option provided to CLECs.

A review of the various positions and insights of these accomplished economists makes it clear that agreement on the quantification of option values to CLECs will not be easy. Such difficulty will then, of course, pose consternation for policymakers. In light of the lack of agreement among industry players and experts, on what basis should regulators ultimately determine UNE prices? From an

overall public policy perspective, is it preferable for regulators to overestimate or underestimate the option value to be included in UNE prices?

The purpose of this paper is to show that, from an institutional perspective, there is a sound analytical basis for guiding the public policy decisions of regulators on this issue. More specifically, given the constitutional framework within which government regulation in the United States operates, the consequences of overestimating and underestimating ILECs costs are dramatically different. As will be shown, given uncertainty over the "true" option value, the consequences of a regulatory policy that adopts a cost methodology tending to overestimate rather than underestimate the option value is more consistent with Congressional policy favoring regulatory intervention that encourages the deployment of an advanced telecommunications infrastructure. Therefore, policymakers should err on the side of overestimating the option value.

1. INVESTMENT DECISIONS IN THE UNITED STATES FROM AN INSTITUTIONAL PERSPECTIVE

An industry's economic performance and private investment decisions are influenced by the institutional endowment of a nation (North, 1990). This endowment comprises five elements: 1) the nation's legislative and executive institutions, 2) its judicial institutions, 3) the customs and informal, but broadly accepted, norms that constrain the actions of individuals or institutions, 4) the character of contending social interests within a society and the balance among them, including ideology, and 5) the administrative capabilities of the nation (Levy & Spiller, 1996).

The special characteristics of telecommunications investments – economies of scale and scope, high asset specificity and non-redeployability, and a broad range of domestic users – make them highly vulnerable to expropriation by government. For this reason, a regulatory regime must provide sufficient constraints on arbitrary government power in order to be compatible with sustained private investment in telecommunications infrastructure. Levy and Spiller (1996) show that a wide range of regulatory regimes are suitable, as long as three complementary mechanisms restraining arbitrary administrative action are in place: 1) substantive restraints on the discretion of the regulator, 2) informal or formal constraints on changing the regulatory system, and 3) institutions that enforce the above formal, substantive or procedural constraints. In particular, they note that utility regulation is likely to be more credible and regulatory problems less severe when a nation's political system restrains executive and legislative discretion, and provides a strong

judiciary to limit administrative discretion. The constraints on executive and legislative discretion include separation of powers among the branches of government, a written constitution limiting legislative and executive power, a legislative branch with multiple chambers, and checks and balances between legislative and executive powers. A strong judiciary frequently includes a body of administrative law, a tradition of upholding contracts and property rights, and an historical ability to act independently from other government branches.

The U.S. Constitution is an important element of the institutional endowment of the United States. It defines the structure of the federal government, enumerates the powers of the federal and state governments, and provides express limitations on government action. As Cherry and Wildman (1998) describe, the U.S. Constitution was designed to constrain the potential abuse of government power and creates a structure of government that provides the critical mechanisms identified by Levy and Spiller for achieving sustainable investment from the private telecommunications sector. Constitutional constraints are of two types: 1) indirect limitations on government power through structural design, and 2) direct limitations on government power, such as the Bill of Rights, which are judicially enforceable guarantees.

There are several aspects of structural design under the Constitution that constitute indirect limitations on government power. For example, the Constitution separates the power of the federal government into three branches - legislative, executive and judicial - with checks and balances among them. It also expressly enumerates certain powers to the federal government, while placing residual powers in state governments. Finally, the judiciary is established as an independent branch of government with authority to enforce constitutional constraints, through judicial review, on the actions of other branches of the federal government as well as state governments.

As for direct limitations on government power, the one most relevant here is the Takings Clause found in the Fifth Amendment of the Constitution. It applies directly to the federal government, providing in relevant part: "nor shall private property be taken for public use, without just compensation." It has also been held applicable to state governments by virtue of the Due Process Clause of the Fourteenth Amendment (*Missouri Pacific Ry. v. Nebraska*, 1896), which provides that "no person shall be . . . deprived of life, liberty or property, without due process of law"

Initially illegal takings were found only in the context of physical invasion of property, such as the exercise of eminent domain power. However, since *Pennsylvania*

Coal Co. v. Mahon (1922), unconstitutional regulatory takings have also been found with regard to government's exercise of its police power. This is because the purpose of the Takings Clause is "to bar Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole" (*Armstrong v. United States*, 1960, p. 49). Therefore, even if government exercises its power for the purpose of improving social welfare or efficiency, however defined, the Takings Clause limits the exercise of that power due to its effect on individuals. Depending upon the circumstances, an individual's remedy for an illegal taking is either compensation or invalidation of the government action.

In the public utility context, regulatory takings have been found when government regulation, such as rules related to utility ratemaking, constitutes a confiscation of a private utility's assets (*Pierce*, 1989; *Madden* 1989). This is because government regulation must provide the private utility and its investors with a reasonable opportunity to recover the costs of the business, including returns on investments comparable to those of enterprises with comparable risks (*FPC v. Hope Natural Gas Co.*, 1944, p. 603).

Cherry and Wildman (1998) explain that both direct and indirect limitations on government power serve purposes other than efficiency goals in two respects. First, the indirect limitations on structural design create multiple governmental bodies that are required to interact in a manner which, from a transaction cost perspective, is inefficient. Thus, indirect limitations create organizational (or structural) inefficiency by purposefully fragmenting government power in order to protect individuals from the effects of majoritarianism. Second, the judicially enforceable direct limitations on power prohibit the exercise of government power when it has certain effects on private parties - notwithstanding otherwise laudable goals of efficiency or efficacy - because the Constitution recognizes the "higher value" of protecting the rights of the citizenry. The following is a clear expression by the U.S. Supreme Court as to these limitations on the pursuit of efficiency goals:

The establishment of prompt efficacious procedures to achieve legitimate state ends is a proper state interest worthy of cognizance in constitutional adjudication. But the Constitution recognizes higher values than speed and efficiency. Indeed, one might fairly say of the Bill of Rights in general, and the Due Process Clause in particular, that they were designed to protect the fragile values of a vulnerable citizenry from the overbearing concern for efficiency and efficacy that may characterize praiseworthy government officials no less, and perhaps more, than mediocre ones. (*Stanley v. Illinois* (1972), p. 656; footnote omitted, emphasis added)

In this regard, it bears emphasizing that the Bill of Rights includes the Takings Clause. Thus, under the U.S. Constitution, government is constrained in its pursuit of efficiency goals, whether the goal is to make government operate more efficiently or to improve societal efficiency.

These limitations on the government pursuit of efficiency goals, however, do not mean that the enforcement of constitutional rights is devoid of any efficiency properties. The economic theory of the regulatory contract emphasizes the need for government to make credible commitments so that private parties will continue to contract with it in the future (Goldberg, 1976 & 1980; Sidak & Spulber, 1996). In order to procure investment in the public utility context, such credible commitments may include the need to maintain entry barriers or to compensate incumbents for unrecovered past (yet prudent) investments, thereby forgoing some of the gains from subsequent entry or competition. This means that some inefficiencies, particularly those in the short run, may need to be tolerated in order to promote desirable long-term investment. Without appropriate incentives for such long-term investment, society will likely lose the benefits of dynamic efficiency. It is precisely this role that the institutional endowment of a nation plays in providing an environment conducive to credible commitments by government which, from the institutional perspective, reveals that regulatory decisions designed to achieve short-run efficiency outcomes may actually undermine beneficial long-term investment in utility infrastructures (Cherry & Wildman, 1998).

Given this background as to the constitutional limitations on government pursuit of efficiency goals and the possibility that credible commitments may require society to bear some inefficiencies in order to achieve long-term investment, we now have the context within which to evaluate the respective consequences of a regulatory decision that overestimates, as opposed to underestimates, the option value associated with the CLECs' opportunity to purchase UNEs under section 251(c). The analysis below shows that, under the Constitution, the difference in the consequences among these regulatory decisions arises from the juxtaposition of the constitutional rights of the ILECs to the statutory rights of the CLECs and consumers.

2. THE CONSEQUENCES OF OVERESTIMATION VERSUS UNDERESTIMATION OF THE OPTION VALUE TO CLECS

As previously discussed, the CLECs have a statutory right under section 251(c) of the Telecommunications Act of 1996 to purchase UNEs from ILECs on a nondiscriminatory basis at just and reasonable rates. Consumers also have the statutory

right under the Act to purchase telecommunications services from telecommunications carriers upon reasonable request at just and reasonable rates and without unjust discrimination (sections 201, 202).¹

Meanwhile, ILECs' private property is protected from confiscation under the Takings Clause. In this regard, it is not so much the methodology upon which government regulation is based that matters, but what the end result of implementing the regulation is on the carrier (*FPC v. Hope Natural Gas Co.*, 1944). Thus, if the end result of government regulation is that the ILEC is not given a reasonable opportunity to recover the costs of its business, then there is an illegal regulatory taking.

The significance of ILECs' constitutional rights under the Takings Clause is that they override the statutory rights of other parties, whether CLECs or consumers. This is because statutory rights, by definition, arise only from the legislative actions of government, which, in turn, are constrained by constitutional limitations. Such limitations include the direct limitations under the Bill of Rights, such as the Takings Clause. Therefore, if government actions to implement or enforce the statutory rights of the CLECs or consumers violate the ILEC's constitutional rights, then such actions are invalid.

Thus, in evaluating the consequences of regulators' decisions related to the option value of CLECs regarding UNE prices, it will be essential to determine when such decisions may constitute illegal takings of ILEC property. In this regard, it should be noted that takings can be classified into two groups, only one of which encompasses the real options problem.

One type of taking may occur when past investment becomes stranded due to changes in regulatory policy. This is a confiscation problem created by the transition from one set of regulatory rules to another. The second type of taking may occur when compliance with regulatory rules (whether in isolation or in combination) on a prospective basis makes costs unrecoverable. For example, if regulation requires a firm to invest and does not provide a reasonable opportunity for the firm to recover such investment, then the end result may constitute confiscation. It is the latter form of taking that applies to the real options scenario discussed here. In particular, ILECs are required to provide adequate facilities to consumers and to sell UNEs to CLECs under the Act. Yet ILECs may not be given a reasonable opportunity to recover those costs because regulators constrain the prices that can be charged to consumers, and restrict the level of UNE prices charged to CLECs by utilizing a costing methodology that may underestimate the option value granted to the CLECs.² The following analysis of the consequences of overestimating or underestimating the option value associated with ILEC provision of UNEs con-

siders the possibility of an unconstitutional taking of property under this second type of taking.

3. OVERESTIMATION OF THE OPTION VALUE

Assume that the regulator utilizes a costing methodology for setting or approving UNE prices which, due to the means by which it quantifies the value of the CLEC's option to wait to invest, tends to overestimate the costs of providing UNEs by ILECs. There are several consequences that are likely to ensue from such an approach.

First, given that the ILEC's costs will tend to be overestimated, there is unlikely to be an underrecovery of costs by ILECs associated with providing UNEs. For this reason, there should be no ILEC claim of confiscation under the Takings Clause.³ Furthermore, this tendency to overestimate the ILEC's costs would provide assurance to the ILECs that, at least with regard to government intervention on UNE prices, they will be given the opportunity to recover their costs. Such assurance provides a credible commitment by government to enable the ILECs to recover their costs, thereby creating an environment conducive to continuing long-term investment by ILECs in telecommunications infrastructure.

Second, the tendency to overestimate ILEC costs will also affect CLEC behavior. With respect to allocative efficiency, the overestimation of ILEC costs would lead to inefficiently high prices for UNEs. In the short run, this will deter CLECs from purchasing UNEs and slow their entry into the local exchange market on this basis. But, CLECs would then have the incentive to invest in their own facilities. This would likely lead to an increase in facilities-based competition; although, to the extent that CLEC facilities are more costly than the ILEC's "true" costs, such competition would be inefficient. To the degree that such inefficiencies do occur, there would be some loss in social welfare to consumers.

4. UNDERESTIMATION OF THE OPTION VALUE

Now assume that the regulator utilizes a costing methodology for setting or approving UNE prices that, due to the means by which it quantifies the value of the CLEC's option to wait to invest, tends to underestimate the costs of providing UNEs by ILECs. A number of important consequences are likely to arise from this situation.

First, given that the ILECs' costs will tend to be underestimated, there is likely to be an underrecovery of costs by ILECs associated with the provision of UNEs. For this reason, the greater the underestimation of the costs, the greater the likelihood that the ILECs will file claims of confiscation under the Takings Clause.⁴ These takings claims will create significant litigation costs, not only for ILECs but also for regulators to defend their decisions and for other parties with an interest in the litigation, as well as increased uncertainty for investors in telecommunications companies pending the outcome of the litigation. Furthermore, this tendency to underestimate the ILECs' costs would undermine the assurance by government that, over time, ILECs will be given the opportunity to recover their costs. Such lack of assurance seriously impairs government's ability to make credible commitments, thereby creating an environment that is not conducive to continuing long-term investment by ILECs in telecommunications infrastructure.

Second, the tendency to underestimate ILEC costs will also affect CLEC behavior. Unlike the overestimation scenario, the underestimation of ILEC costs would lead to inefficiently low prices for UNEs. As a result, CLECs will be deterred from investing in their own facilities. To the extent that the costs of CLEC facilities are less than the ILEC's "true" costs, such failure to invest would be inefficient, with a corresponding loss in social welfare to consumers.

5. COMPARING OVERESTIMATION AND UNDERESTIMATION OF THE OPTION VALUE

The alternatives available to regulators can now be understood by comparing the consequences of overestimation and underestimation of the option value to CLECs. With overestimation, the benefits are a reduced likelihood of takings claims as well as more credible commitments by government to support long-term ILEC investment. The costs include possible overinvestment by CLECs in facilities-based competition with its corresponding loss in social welfare. On the other hand, underestimation of the option value increases the likelihood of takings claims and their associated costs, undermines credible commitments by government that are needed to support long-term ILEC investment, and encourages underinvestment in facilities-based local exchange competition.

Thus, regulators essentially have the choice of creating an institutional environment that 1) is conducive to supporting long-term investment by ILECs at the cost of some overinvestment in facilities-based competition by CLECs, or 2) discourages both long-term investment by ILECs and investment in local exchange facilities by CLECs, while encouraging takings claim litigation. The former arises

from the regulator's use of a cost methodology that tends to overestimate the value of the CLEC's option to wait, whereas the latter arises from use of a cost methodology that tends to underestimate the option value.

Therefore, the greater the value that a nation places on the availability of and investment in telecommunications infrastructure, the more preferable is the institutional environment (of the first type) created by the overestimation scenario. Congress demonstrated its desire to encourage the deployment of advanced telecommunications infrastructure in numerous provisions of the Telecommunications Act of 1996. For example, section 706 requires the FCC and each state commission to encourage the deployment of advanced telecommunications capability to all Americans "by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment." In addition, section 254 requires the FCC and state commissions to implement universal service policy consistent with the principle, among others, to provide access to advanced telecommunications and information services in all regions of the nation, including all public and non-profit elementary and secondary school classrooms, health care providers serving rural areas, and libraries.

With regard to the implementation of cost methodology, the institutional environment created by a tendency to overestimate rather than underestimate ILEC costs is more consistent with these Congressional statutory mandates. Thus, if regulators are uncertain as to the value of the option granted to CLECs under section 251, as a matter of public policy they should err on the side of overestimating rather than underestimating the option value. The inefficiencies from CLEC overinvestment in local exchange facilities that are likely to arise under such a regulatory policy are the cost that society may need to bear to promote desirable long-term investment.

6. CONCLUSION

The Telecommunications Act of 1996 provides a revised framework for regulating the telecommunications industry. This framework is based on increased reliance on competition to promote the deployment of an advanced telecommunications infrastructure to all Americans. As part of this framework, Congress has provided CLECs with a statutory right under section 251(c) to purchase UNEs from ILECs on a nondiscriminatory basis at just and reasonable rates.

By employing the new investment theory of real options, economists have identified this statutory right as an option "to wait" with regard to investment decisions. The prices of UNEs that ILECs charge to CLECs should reflect the value of this option; however, there is disagreement as to how to quantify this value and whether current costing methodology already sufficiently accounts for this value. Given that industry participants are unlikely to agree on the appropriate level of the option value, regulators will be required to decide how to reflect the option value in the costing methodology for UNEs.

In making this decision, regulators must be mindful of the fact that the institutional endowment of a nation greatly affects the incentives of private parties to invest in telecommunications infrastructure. In this regard, it is essential that the institutional (political, social, and legal) environment provide sufficient constraints on arbitrary government action so as to create credible commitments by government consistent with long-term private investment decisions.

In the United States, an important element of the institutional endowment is the federal Constitution. The Constitution consists of both direct and indirect limitations on government power. Indirect limitations place constraints on government power through structural design, such as separation of powers and various checks and balances among the branches of government, which purposefully introduce organizational inefficiencies. Direct limitations are express, judicially enforceable prohibitions on government action, such as the Takings Clause. Both forms of limitations constrain government power in order to protect the interests of individuals, notwithstanding the underlying goals, such as efficiency, of government policies.

Given the institutional endowment based on the U.S. Constitution, a regulatory policy that adopts a costing methodology which tends to overestimate, as opposed to underestimate, the option value conveyed under section 251(c) has very different consequences. The differences arise, in large part, from the fact that an ILEC's constitutional right to seek protection from the confiscation of its property under the Takings Clause supersedes the statutory right of CLECs to purchase UNEs as well as the statutory right of consumers to purchase telecommunications services upon reasonable request at just and reasonable rates without unjust discrimination.

Because Congress has clearly articulated a policy in favor of encouraging the deployment of advanced telecommunications infrastructure throughout the nation, a regulatory policy based on adopting a cost methodology that errs on the side of overestimating, rather than underestimating, the value of the CLEC option "to

wait" is preferable. This is because a regulatory policy based on a tendency to overestimate is more likely to create an institutional environment conducive to infrastructure investment by both ILECs and CLECs as well as avoid the costs of litigation incurred by ILECs' pursuit of takings claims. The inefficiencies associated with potential overinvestment by CLECs in their own local exchange facilities under such a policy is the cost society may need - and, given Congress' statement of policy, should - bear in order to promote the deployment of advanced telecommunications capabilities in the nation's telecommunications infrastructure.

NOTES

- ¹ There is also a requirement that the rates be affordable under section 254(b)(1) on universal service.
- ² It is under this second type of taking that William Baumol agreed that the price of UNEs should increase to reflect the option value to CLECs.
- ³ This is true assuming that the combination of all the federal and state regulatory rules - such as for UNE pricing, consumer prices, and universal service obligations - provide the ILEC with a reasonable opportunity to recover its total costs. At least for the purposes of the discussion here, a confiscation claim would not arise solely due to inadequate recognition of the CLEC's option value.
- ⁴ Of course, the likelihood of a takings claim will increase if the combination of other federal and state regulatory rules, such as those restricting end-user prices or estimating universal service costs or contributions of carriers, do not provide the ILEC with a reasonable opportunity to recover its total costs.

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