Comments

Alexander Galetovic: Internet diffusion is a hot topic in Latin America. Presidents, policymakers, and politicians are eager to speak about their plans and schemes to put their countries ahead in this strategic race and eliminate the digital divide. Ambitious targets are set and spectacular penetration rates promised. The sobering conclusion of Estache, Manacorda, and Valletti is that a lot of work remains to be done. Despite impressive advances in telecommunications indicators in the 1990s, penetration rates are still far from those in developed countries, and the gap is unlikely to close anytime soon. Not surprisingly, the authors trace the cause of the gap to differences in per capita income and, to a lesser extent, income inequality. But they also argue that part of the blame lies with defective regulation, particularly access rules. Their main conclusion is that substantially improving regulation, in general, and access rules, in particular, is key to cutting the cost of connecting to the Internet. I organize my comments around three topics: the main unresolved regulatory issues in the telecommunications industry, particularly in Latin America; recommendations for improving regulation; and the relevance of affordability and the digital divide.

Most of the issues that the authors discuss are relevant not only for Internet access and diffusion, but also for telecommunications regulation in general. In particular, their arguments also apply to the regulation of local call rates charged by dominant fixed phone companies, an issue that will still be with us for some time.

What Is to Be Regulated?

As the authors show, most people access Internet and other telecommunication services through a fixed phone network, which is thus an essential facility: you cannot reach users connected to a given fixed network unless

the owner grants you access to it.[1] Competition can occur at two different levels. The first level is between service providers such as long distance companies, Internet service providers (ISPs), cell phone companies, or call backs who use the network to reach users. Experience shows that these activities are fairly competitive. Regulators need only to ensure that providers can access the fixed phone network both technically and at reasonable cost; all else will follow. Second, fixed networks themselves can compete for end users—the so-called facility-based competition. In Santiago, Chile, for example, there are zones in which four different companies (one of them a cable company) offer fixed phone services, with each company using its own physical network. Nevertheless, regulation is needed even when fixed networks compete. As the authors discuss, network externalities imply that a dominant company with most of the subscribers can easily derail entry by others simply by denying them access to their larger pool of clients; this concern is very relevant, because in all countries incumbents are former legal monopolies. In addition, each fixed network has monopoly power on access to their subscribers, and companies may easily collude to set high reciprocal access charges, which soften competition.[2] On top of that, there is far less agreement whether facilities-based competition is desirable in the first place, because it is inevitably duplicative and thus prevents firms from taking full advantage of scale economies.

The authors are right in pointing out that improving access regulation is central as far as Internet diffusion is concerned. Their examination of regulatory practices and regimes across the continent reveals that with some exceptions, governments essentially privatized first and have yet to design adequate regulatory regimes. Thus, access rules are still not clear in most countries, and governments have not developed the capacity to fix access charges. The consequence is that the cost of providing Internet services (and hence the price of the service) is still too high, while investments in fixed digital lines are probably being delayed because of uncertainty about regulatory rules. This distortion means that access to the Internet is sub-

1. There are other means of accessing the Internet, such as through the cable television network. The issues are similar, and so I do not mention these alternatives in the rest of the discussion.

2. See Laffont and Tirole (1998).

optimally low. While the evidence presented in the paper falls short of proving their claims, well-informed observers would basically agree with their assessment. I am less convinced, however, by their arguments that the poor are somehow being rationed out of the market. If prices are too high and investment too low, then every segment of the market is buying less than they could if prices more accurately reflected opportunity costs. I don't see an affordability problem here, but rather a standard welfare-decreasing distortion.

The authors identify the main problems that countries need to address. The first set of issues that needs to be resolved is practical. First, network interconnection is not mandatory in many countries, but is negotiated. Second, while most countries have introduced legislation and decided to adopt a price cap to fix access charges and tariffs, many have not yet defined the methodology they will use. Third, most regulators in Latin America have chosen the long-run incremental cost standard to value facilities, but they have developed neither the rules nor the capability to value the assets that access charges are supposed to finance.

The second set of issues that each country needs to tackle is conceptual. First, the authors argue, there is a trade-off between optimal static and dynamic access regulation: setting access charges based on simple cost-recovery rules encourages efficient use of assets but discourages investment, because everybody will then wait for somebody else to make the investment. Second, former legal monopolies are still powerful incumbents, and it is not clear whether they should be allowed to compete downstream. Third, experience has yet to show whether facilities-based or service-based competition is better. Fourth, no one has developed formal rules that indicate how the cost of the network should be allocated among the owner (who usually provides at least local phone services) and the rest of the users (such as cell phone companies, ISPs, and long-distance companies). In what follows, I comment on the authors' recommendations for addressing these issues.

How Should Countries Improve Regulation?

Estache, Manacorda, and Valletti start their summary of tips with two common-sense proposals, namely, to eliminate exclusivity periods granted

in privatizations and to make access to the essential facility mandatory. I would add a third recommendation: make the technical interconnection of different fixed networks mandatory and develop the technical capability to enforce it. The Chilean experience is quite telling in this respect. Entry by fixed phone companies other than the (then) state-owned monopoly was allowed as early as the late 1970s, but the two entrants barely grew over the next decade because the former monopoly sabotaged them, claiming that it was technically impossible to give good interconnection quality. In 1987 the law was amended to make technical interconnection mandatory, and the regulator began to enforce quality standards. Although access charges have been a source of endless quarrels both among companies and between companies and the regulator, sabotage is no longer a problem. Many companies have entered and grown quickly, to the extent that waiting times for a fixed phone in Santiago have been reduced to slightly over a week. Mandatory technical interconnection has been key, particularly the fact that disagreement about access charges cannot be a reason to delay physical interconnection. This is important, because the network externality is no longer relevant in practice when networks interconnect: no matter what the size of your fixed phone provider's network, you can reach all the users of any other network.

As the authors point out, establishing rules on how access charges will be set is also key. This is next to impossible when countries have neither the capability to value the essential facilities nor the expertise to develop workable rules for allocating the cost among the service providers that use these facilities. It is somewhat disturbing to learn from the authors that this seems to be the case in most countries in the region.

Their proposed remedy to the problem of valuing essential facilities is to develop an engineering model of the network, an approach they illustrate with the Argentine case. An easy criticism is that these models are very blunt. I can't see a much better alternative, however, considering that regulating access is inevitable for as long as fixed networks remain important. And the approach has some advantages. Unlike the fixing of tariffs for end users, access charges have the peculiarity of directly affecting the profits of other big players who have every incentive, and sometimes the information needed, to expose the attempts by the owner of the network to inflate costs. In addition, if the model is developed openly, it pretty much commits the regulator to apply a known set of rules—regulatory discretion is perhaps not eliminated, but it is surely moderated.

But developing an engineering model is not enough. As the authors point out, it is not clear which costing rule is best or how to allocate costs among the owner and the different users of the network. Access charges are forced to perform too many tasks. They further claim that there is an intricate static-dynamic trade-off problem (that is, nobody wants to invest in the network, instead waiting for some one else to invest). This is in addition to the fact that if regulators are too strict in curbing monopoly power, too little investment may result. Can we go beyond the conclusion that we can't conclude?

I think that the authors exaggerate a bit. Whatever rule you choose, any sensible regulatory regime must be sustainable, that is, it must ensure a normal rate of return for the owner of the essential facility.[3] At the same time, a normal rate of return should be the regulator's target.[4] If that is granted, there is no reason to believe that investment will not be forthcoming. Furthermore, the dynamic free rider problem, while relevant, can be solved with adequate mechanisms that force latecomers to pay their fair share. Given scale economies, ensuring sustainability will lead to some static inefficiencies, but this is well known. This is probably why a lot of effort should be spent in trying to make Ramsey pricing feasible in practice.

A different issue is whether the regulator should opt for facility-based competition or local loop unbundling. Given that former monopolies will still be dominant players for some time, both forms of competition are probably desirable. On the one hand, service providers should have access to the customers of the dominant local phone companies; otherwise they would not be able to reach most potential users. But they should also be allowed to enter with their own facilities. It is by no means clear that duplication makes competition undesirable. For example, when cable companies offer Internet services, they take advantage of economies of scope. Even when fixed-phone networks are duplicated, the gains of competition may offset the costs of duplication by reducing information rents.[5]

3. On this point, see Newbery (1997).

4. Of course, asymmetric information means that an information rent will remain in the pockets of the monopolist. See Baron and Myerson (1982).

5. See Gasmi, Laffont, and Sharkey (1999). Using a standard model of telephone networks, they show that when competition between telephone providers is sufficiently intense, the welfare losses brought about by duplication may be more than compensated by the welfare gains stemming from the reduction of information rents.

Regulation is always imperfect, and welfare losses owing to information rents may be substantial.

Affordability and the Digital Divide: Should We Care?

Concerns about the digital divide often lie behind arguments that governments should actively pursue direct policies to spread Internet use. If nothing substantial is done, the argument goes, income inequality will increase even further. The Chilean case suggests that Internet diffusion can be promoted just by doing, essentially, what the authors suggest—namely, regulating so that the prices paid by users come closer to opportunity costs.[6] This is probably not sufficient, however, to close the gap in penetration rates. The evidence presented in the paper strongly suggests that the gap is mainly due to differences in incomes: poor countries and poor people within a country cannot pay for access to the Internet (or do not want to do so, given their budget constraint). Should we really worry about this? I doubt it.

To begin, the divide is not especially surprising or even very different from a lot of other social divides, such as the housing divide, the car divide, the energy divide, or the divide that exists for any other good or service with positive income elasticity, in the sense that the well-off consume more than the poor. Is there anything special about the Internet to justify special intervention? The authors argue that network externalities may justify subsidizing access for the poor, but I doubt that this effect is of any quantitative importance. (Regrettably, the number of people who want to communicate with you is positively correlated with your income.) Beyond that, their claim that bad regulation is responsible for making the cost of Internet access too high clearly points to a distortion. Improving the regulatory regime to correct this distortion is a recommendation that would follow from any standard welfare analysis anyway.

6. Fischer (2001) shows that Internet use has spread quickly in Chile. As of June 2001, there were more than 700,000 connections. Around 60 percent of the ABC1-3 socioeconomic group (55 percent of the population) has a computer, and of those, 55 percent have an Internet connection. Most of these new connections were contracted after regulatory changes unbundled local loops. Through competition, this led to a substantial fall in prices. For example, one can rent a high-speed home connection for a flat rate of about $35 a month. All this has been achieved without any subsidies.

More fundamentally, the optimal penetration rate in a low-income country is unlikely to be anything close to that in the United States. Consider the following hypothetical experiment: suppose that a government intent on closing the divide were to give away computers and connections with the objective of reaching U.S. coverage levels. Would that be good? The program would probably result in massive waste, among other things, because many of the newly connected consumers would not know how to use the computers or the Internet. Targets such as those set by the Chilean telecommunications secretariat say more about policymakers' urge to be in the news than about any serious analysis of the relevant issues. Surely there are other redistribution projects with far higher rates of social return.

Inequality is, of course, a pressing concern in Latin America. Just as redistribution in kinds of goods and services such as housing, health, and education may be justified, one might also think that access to telecommunications should be directly subsidized. But that is social policy, and it should be handled as such. The Chilean rural telephony scheme that the authors describe is probably the right way of doing it—subsidize the service and make providers compete for the subsidy. One should not lose sight, however, of what should come first. The pressing problem of the overwhelming majority of poor people in Latin America is the lack of telephones to call other people, to request an ambulance, to get in touch with a relative working far away. Being on line or surfing the web is unlikely to be among their main priorities.

Bernardo Mueller: In the introduction to their paper, Estache, Manacorda, and Valletti note the optimism of several Latin American countries toward the beneficial effects that are expected to ensue from the recent wave of telecommunications reforms. They portray the logic behind this optimism as a sequential chain of events that proceeds as follows (slightly adapted here): (1) liberalization, privatization, and regulation of the telecommunication sector lead to (2) cheaper technologies and lower cost of access, which lead to (3) increased use of the Internet and other information technologies, which leads to (4) productivity gains, economic growth, and reduced concentration of wealth.

One of the major purposes of the paper is to caution that even though this sequence of events seems intuitive and straightforward, it is by no

means guaranteed, and it may easily break down or lead to inferior outcomes if governments do not support it with the proper policies. This point is explored in the paper in three separate sections. First, the authors provide some stylized facts on how far events in point 1 (that is, liberalization, privatization, and regulation) have advanced in Latin America. They then report the results of an econometric test of the effect of points 1 and 2 on point 3, that is, the effect of accessibility on Internet use. Finally, they analyze how best to implement regulatory policies associated with access pricing and universal service obligations (point 1) so as to ensure that the benefits in point 4 are, in fact, realized.

The comments that follow are structured to reflect the sequence of the four points above, rather than the actual order of the sections in the paper.

From Reforms to Lower Cost of Access

The main purpose of the second section of the paper is to qualify the link between points 1 and 2. The authors note that although the recent telecommunications reforms in most Latin American countries represent great strides in liberalization and privatization, advances in the necessary regulation have been much more limited. Most countries have already seen dramatic improvements in performance, which is the reason for the policymakers' optimism. Much remains to be done, however, particularly in the area of ensuring competition and low prices, if the trend is to continue and the changes to be consolidated. The authors examine two issues that they consider to be particularly important for the effectiveness of the reforms. The first of these is interconnection access, that is, how to organize and price competitors' use of part of the network owned by a given firm. This topic has recently received much attention in the regulation literature, as it is key to the development of competition in the telecommunications sector.[1] The second issue is affordability and, in particular, the policy of universal service obligations, through which regulators require firms in the market to offer certain services at affordable prices to classes of customers who would not otherwise be served. The paper argues that although most countries in Latin America have already established the basic guidelines for dealing with these and other regulatory issues, the

1. See Laffont and Tirole (2001).

actual implementation of the specific policies has yet to be undertaken and may be crucial for the success of the reforms.

This point is well taken, and policymakers in Latin America should find the review of theory on interconnection pricing and universal service obligations to be useful. Complex issues such as network externalities, different pricing rules (including long-run incremental cost, Ramsey pricing, efficient component pricing rule), and skimming the market are hard to explain without getting too technical. The authors point out the perils and advantages of choosing certain forms of regulation over others, which is pertinent to understanding how regulation may affect the evolution of telecommunications in a given country. In addition, the paper tries to identify what each instrument can and cannot do, stressing that policymakers should not try to achieve too many objectives with a single instrument.

Important as it is, getting the incentives right is only part of the story. Even if a country has made all the right choices concerning how to regulate interconnection, access universalism, and so forth, the expected outcomes, such as competition, investment, and low prices, may not materialize. Getting the regulatory details right is a necessary, but not sufficient, condition for those outcomes, as they are also crucially affected by a country's institutional endowment and regulatory governance structure.[2] If the choice of incentives is incompatible with the institutional structure, investors and firms may not respond as expected, leading to inferior outcomes. These issues are clearly beyond the scope of the paper, although the authors do acknowledge the point in a footnote. Nevertheless, it deserves to be stressed in these comments, especially given the fact that in Latin America these institutional issues may constrain regulatory incentive choices even more than they do elsewhere. Once this is taken into account, the bleak message in the conclusion of the paper, that "the full success of reforms and its fair distribution among all segments of the population will require much more effort from regulators than these have been willing to give so far," becomes even bleaker. Not only is it difficult to get the incentives right, but some desirable options may not even be open to a given country.

2. Levy and Spiller (1996, pp. 3–6).

From Lower Cost of Access to Increased Use of the Internet

The second link in the chain of events presented above posits that once the cost of access to the Internet and other information technologies has been reduced, there will follow an increased use of those technologies by all sectors of society. Although this seems a fairly intuitive proposition, it is not actually all that straightforward, as shown by the paper's econometric exercises. The regressions are first run in a panel of countries in the world and then only in Latin America, with the dependent variable being different measures of the level of Internet use. The choice of explanatory variables is limited by the availability of data for such a diversified panel over such a long period (1990–99). These variables are per capita GDP, Internet access cost, per capita fixed telephone lines, per capita personal computers (PCs), and (in the case of Latin America) income distribution and dummies for the existence of regulation and privatization. In addition, a lagged dependent variable is included to test for the existence of a diffusion process, which is found not to exist. Although the results are not very robust to changes in the specification, they loosely confirm the expected relations. Higher income increases Internet use, as does lower access cost. The existence of more phone lines and more PCs in a country also tends to increase Internet use (depending on the specification).

The econometric test confirms the general message of the paper. Given that a natural diffusion process of Internet use is not happening and that other explanatory variables affect Internet use, policymakers do, in fact, have to accompany and buttress the reform process carefully, as the spread of those technologies will not simply happen on its own. That is, policy plays an important role in increasing the use of information technology by regulating access and affordability. This conclusion receives only weak support from the regulation dummy, which is included in the regressions on a restricted sample of Latin American countries. However, this probably stems from the fact that the dummy measures only whether regulation existed in a given country in a given year, and not the quality and suitability of that regulation for that country at that point in time. The major point of the paper is, after all, that not any kind of regulation will do. Regulation and policy have to be well elaborated and well implemented if good results are to be realized.

One problem with the whole econometric exercise is the possibility that several of the explanatory variables may be endogenous. It is reasonable to expect that increased use of the Internet—the dependant variable—may lead to several results: higher incomes, which is precisely what is stated by the link between points 3 and 4 in the chain of events above; lower access cost, through economies of scale and positive externalities; and more per capita fixed phone lines and personal computers, by increasing demand for these. Another possible endogeneity arises when the Gini coefficient for income distribution is used as an explanatory variable in the restricted sample. The effect of higher income concentration on Internet use is found to be very strong. Here again, the link between points 3 and 4 suggests that higher Internet use may play a role in reducing that concentration, of which the digital divide is a facet. The authors acknowledge the possibility of these simultaneities in a footnote and suggest that the possible biases they introduce would not work against their argument. Unfortunately, no instruments are available to use a consistent estimator, and the results must therefore be viewed with caution.

At first sight the link between lower access cost and higher Internet use may seem so obvious that it need not even be considered. Some important conditions must exist, however, for that relationship to hold. In particular, the level of education in a country may be an important obstacle for easier access to translate into higher Internet use. This point is not made in the paper and is not tested in the regressions, perhaps because the policy implication—that a country must improve its education system—is beyond the scope of the regulatory policies considered. Nevertheless, it is important to register that a low educational level is at the root of the digital divide and may be an important constraint in reaping the gains from information technologies.

From Increased Use of the Internet to Economic Growth

The final link in the chain of events postulated above is not addressed in the paper, which takes for granted that increased use of the Internet and other information technologies will generate payoffs in terms of increased productivity, economic growth, and a closing of the digital divide. An entire literature has recently arisen around the debate of whether this intuitive relationship actually exists, to the point that it has been called the pro-

ductivity paradox.[3] The possibility that increased Internet use may not have as big an effect on economic performance as is generally expected reinforces the notion that the realization of the "new economy" payoffs from telecommunications reform may not be as easy to realize as was initially believed. Even if this possibility turns out to be true, however, it does not invalidate the paper's main message. It would still be the case that countries must strive to adopt the correct regulatory policies to promote accessibility and affordability so as to increase Internet usage. It only warns that even if this difficult task is done correctly, the potential payoffs are not a panacea for the country's economic problems.

3. See, for example, Alan S. Blinder, "The Internet and the New Economy," *Brookings Policy Brief* 60 (www.brook.edu/comm/PolicyBriefs/pb060/pb60.htm [June 2000]).

References

Armstrong, Mark. 2001. "Access Pricing, Bypass and Universal Service." *American Economic Review* 91 (May, *Papers and Proceedings, 2000*): 297–301.

———. 2002. "Access and Interconnection Pricing." In *Handbook of Telecommunications Economics*, edited by M. Cave, S. Majumdar, and I. Vogelsang. Amsterdam: North-Holland, Elsevier Science.

Atkinson, Anthony B., and Joseph Stiglitz. 1976. "The Design of Tax Structure: Direct and Indirect Taxation." *Journal of Public Economics* 6(1–2): 55–75.

Baron, David, and Roger Myerson. 1982. "Regulating a Monopolist with Unknown Cost." *Econometrica* 50: 911–30.

Benitez, Daniel, and others. 2002. "The Potential Role of Economic Cost Models in the Regulation of Telecommunications in Developing Countries." *Information Economics and Policy* 14(1): 21–38.

Chisari, Omar, Antonio Estache, and Carlos Romero. 1999. "Winners and Losers from Privatization and Regulation of Utilities: Lessons from a General Equilibrium Model of Argentina." *World Bank Economic Review* 13(2): 357–78.

Estache, Antonio, Andres Gomez-Lobo, and Danny Leipziger. 2001. "Utilities Privatization and the Poor: Lessons and Evidence from Latin America." *World Development* 29(7): 1179–98.

Estache, Antonio, Quentin Wodon, and Vivien Foster. 2002. *Accounting for Poverty in Infrastructure Reform: Learning from Latin America's Experience.* Washington: World Bank.

Farell, Joseph, and Garth Saloner. 1985. "Standardization, Compatibility, and Innovation." *RAND Journal of Economics* 16(1): 70–83.

———. 1986. "Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation." *American Economic Review* 76(5): 940–55.

Fischer, Ronald. 2001. "Buena y mala regulación." Universidad de Chile, Centro de Economía Aplicada (CEA). Mimeographed.

Gasmi, Farid, Jean Jacques Laffont, and William Sharkey. 1999. "The Natural Monopoly Test Reconsidered: An Engineering Process-Based Approach to Empirical Analysis in Telecommunications." Université de Toulouse, Institut D'Economie Industrielle. Mimeographed.

———. 2000. "Competition, Universal Service and Telecommunications Policy in Developing Countries." *Information Economics and Policy* 12(3): 221–48.

Gutierrez, Luis, and Sandy Berg. 2000. "Telecommunications Liberalization and Regulatory Governance: Lessons from Latin America." *Telecommunications Policy* 24(10–11): 865–84.

Katz, Michael L., and Carl Shapiro. 1985. "Network Externalities, Competition, and Compatibility." *American Economic Review* 75(3): 424–40.

Keller, Wolfgang. 2001. "International Technology Diffusion." Working Paper 8573. Cambridge, Mass.: National Bureau of Economic Research.

Kiiski, Sampsa, and Matti Pohjola. 2001. "Cross-Country Diffusion of the Internet." Discussion Paper 11/2001. Helsinki: United Nations and World Institute for Development Economics Research (WIDER).

Laffont, Jean Jacques, and Jean Tirole. 1998. "Network Competition: Overview and Nondiscriminatory Pricing." *RAND Journal of Economics* 29(1): 1–37.

———. 2000. *Competition in Telecommunications*. MIT Press.

———. 2001. "Global Price Caps and Regulation of Access." *Brazilian Review of Econometrics* 2(1): 115–46.

Levy, Brian, and Pablo T. Spiller. 1994. "The Institutional Foundations of Regulatory Commitment: A Comparative Analysis of Five Country Studies of Telecommunications Regulation." *Journal of Law, Economics and Organization* 10(2): 201–46.

———. 1995. *The Institutional Foundations of Regulatory Commitment*. Cambridge University Press.

———. 1996. *Regulations, Institutions, and Commitment: Comparative Studies of Telecommunications.* Cambridge University Press.

Newbery, David. 1997. "Determining the Regulatory Asset Base for Utility Price Regulation." *Utilities Policy* 7(2): 129–41.

Röller, Hendrik, and Leonard Waverman. 2001. "Telecommunications Infrastructure and Economic Development: A Simultaneous Approach." *American Economic Review* 91(4): 909–23.

Stoneman, Paul, ed. 1995. *Handbook of the Economics of Innovation and Technological Change*. Oxford: Blackwell.

Valletti, Tommaso M., and Antonio Estache. 1999. "The Theory of Access Pricing: An Overview for Infrastructure Regulators." Policy Research Working Paper 2097. Washington: World Bank.

Valletti, Tommaso M., Steffen Hoernig, and Luis Pita Barros. 2002. "Universal Service and Entry: The Role of Uniform Pricing and Coverage Constraints." *Journal of Regulatory Economics* 21(2): 169–90.

Wallsten, Scott. 2001. "An Econometric Analysis of Telecom Competition, Privatization and Regulation in Africa and Latin America." *Journal of Industrial Economics* 49(1): 1–19.