SIEPR Discussion Paper No. 99-31

# Telecommunications Reform in Developing Countries

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June 2000

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Forthcoming in Anne O. Krueger (editor), *Economic Policy Reform: The Second Stage*, University of Chicago Press.

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ABSTRACT

Since World War II, developing nations have embarked on two massive changes in telecommunications policy. The first was the wave of nationalization of private companies that took place mostly in the 1950s and 1960s, and the second is the now ongoing process of re-privatization and, to a lesser degree, the introduction of competition. The purpose of this essay is to set forth the problems of contemporary neoliberal policy reform within the historical, economic and political context of these countries to assess the success of reform to date and to suggest future directions for research that might improve the performance of the sector. The existing literature well documents the decline in performance during the nationalization era and the improvements that reform usually brings; however, relatively little is known about the relationship between the details of reform and subsequent performance, or about the institutional factors that contribute to the stability of reform. The main conclusions are: (1) the recent literature on policy reform probably understates the importance of constructing regulatory governance institutions that are not captured by the newly reformed incumbent monopolist; (2) reform in some countries has focused too much on maximizing the revenues from the sale of state-owned enterprises rather than the long-run economic benefits of reform to consumers and society at large; and (3) too little attention has been given to creating an institutional environment, regulatory and legal, that supports a private and, where possible, competitive industry. The paper also argues that small developing countries probably should not allocate scarce educated technical civil servants to regulation, but should either adopt relatively simple “benchmark” systems or, better still, form multinational agencies for regulating prices and service standards.

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by Roger G. Noll*

During the late 1980s, telecommunications policy in developing countries entered a new era of neoliberal reform. This reform process achieved what some have called a watershed in early 1998, when the liberalization agreement of the World Trade Organization's Group on Basic Telecommunications came into force (Drake, 1999). The WTO Basic Telecommunications Agreement commits the signatories to liberalize basic telecommunications. Originally 69 countries signed the agreement, but by early 1999 the number was up to 80 of the 132 WTO members (Pandya, 1999). Twenty of these countries, including not only the advanced, industrialized nations but also Chile, Dominican Republic, El Salvador, and Guatemala, committed to complete openness to competition and foreign investment in what amounts to a single market (Tyler and Joy, 1997). Many other developing and transition countries have embarked on less ambitious reforms. The developing and transition countries that have adopted reform commitments are so indicated in Table 1.

Although the goals and process of reform differ among countries, the trend is unmistakable. In the early 1980s, the dominant institutional arrangement began moving from a state-owned monopoly that is run by a cabinet ministry towards a privatized and at least partially competitive industry that is subject to looser public control through either periodically renewed franchise contracts or American or British style continuous regulatory surveillance.[1] The purpose of this essay is to review the history and origins of these reforms, the politics and economics of the new regime, and the lessons to be learned from the experiences of the pioneer countries that have now acquired several years of experience with a new, liberalized industry. This chapter focuses on telecommunications; however, most of the theoretical arguments about the economics and politics of policy reform apply to other infrastructure industries, such as electricity and transportation. Moreover, many apply to urban water systems as well, as is apparent in the following chapter of this book.

The structure of this chapter is as follows. Section I describes the history and performance of telecommunications in developing countries. The main purpose is to explain the causes and consequences of reform. Section II discusses the types of reforms that are underway, and identifies the structural choices available and the political factors that influence this choice. Section III examines the economics and politics of the governance

institutions during and after reform. Section IV offers conclusions from the lessons of the past and questions that remain unanswered.

The main conclusion is that liberalization has substantially improved the performance of the industry, and that the more radical has been the reform, the greater has been the improvement. Nevertheless, liberalizing countries display considerable variance in post-reform performance. To some degree, this variation can be explained by details of the governance institutions in the sector; however, because reform has been relatively recent in most countries, further empirical research is likely vastly to improve our understanding of the relationship between performance and the details of the reform package.

## I. THE HISTORICAL ROOTS OF REFORM

The neoliberal reform movement, which began in the 1980s, is the third era of telecommunications policy in developing countries.[2] In the first era, telephone companies in nearly all developing countries were foreign owned, some by colonial governments but most by multinational firms with headquarters in developed countries, such as AT&T, ITT, or Cable and Wireless. Typically these entities provided little or no service outside of the national capital and other large cities. Penetration of service was very low, being confined to wealthy individuals, large businesses, and government agencies and officials. For the most part, these companies, even the privately owned monopolies, were either unregulated or loosely controlled through franchise contracts. In some countries several companies operated, and competition sometimes emerged in the largest cities; however, near the end of this era, exit and acquisitions caused the number of firms and the extent of competition to fall.

The second era witnessed the acquisition of foreign-owned telephone companies by domestic national governments. Some companies were acquired in the 1930s (e.g., Mexico) and 1940s (e.g., Argentina and India); however, the main wave of nationalization took place in later decades. Whereas this movement was fueled in part by the transformation of developing countries from colonies to independent nations, many countries, especially in Latin America, that had gained independence much earlier did not absorb telephone service into the government until the 1960s. The process was completed by the early 1970s.

Some countries did not pursue nationalization to the extent of creating a single, nation-wide company. One variation was to separate the local access company from the company that provided long-distance and international

service. Another variant was that small companies in secondary cities or rural areas were not incorporated into the nationalized enterprise that provided service in the largest cities. This variant was especially common if the smaller companies were either public entities or cooperatives; however, in any case, these exceptions typically accounted for a small fraction of all telephone customers. The discussion in this section will ignore these variations, and focus on the rise and consequences of nationalized monopolies.

***A Diversion: The Theory of Policy Outcomes***

Three aspects of the nationalization movement are worth bearing in mind because they shed light on how this era should be viewed in the spectrum between an anomaly reflecting the impetuousness of youth and a durable arrangement that is likely to return in the near future. A continuing theme in the contemporary development policy literature, and one that is discussed at length in Section III, is the issue of credible commitments to newly privatized entities not to re-nationalize them or indirectly to expropriate them through regulation.[3] The presumptions behind this argument are that public policies emanate from the underlying economic and political incentives facing political leaders, and that the incentives that led to the first wave of nationalization are still present. If so, the commitment problem is quite serious. Two other theoretical insights point to circumstances in which this rather pessimistic view of developing countries may not be true: path dependence, and ideological shift.

The idea of path dependence has economic and political dimensions. The economic version is a story about non-convexities in production technology, such as economies of scale, economies of scope, joint products, switching costs, and externalities.[4] The core idea is that a change in the structure of an economy, whether intentional or accidental, can so change relative prices and marginal factor productivities that the incentives of private and government actors are fundamentally changed, thereby altering the path of development of an industry or an entire economy. Because an efficiently managed telecommunications sector is large (two or three percent of GDP and as much as ten percent of gross domestic investment), is linked to many other industries, has network characteristics in that it requires common standards among suppliers and users to be maximally valuable, and is an integral input to the production and dissemination of information, which is a public good, it is a good candidate to cause the kinds of changes in the evolution of an economy that are predicted by path-dependence theory. If path dependence is to be taken seriously, an economic policy analysis of telecommunications should inquire whether policy reform in this sector will have the effects described in this theory.

The political version of path dependence is known as the theory of structure-induced equilibrium (Shepsle, 1979, and Shepsle and Weingast, 1981), which in turn is derived from the Condorcet paradox and the Arrow (1951) impossibility theorem. The Condorcet-Arrow theory, sometimes called chaos theory (McKelvey, 1979), concludes that liberal social decision processes (i.e., choice mechanisms that are based on aggregating individual preferences) are unstable under standard normative principles and assumptions about individual behavior. Specifically, majority rule democracy does not have an equilibrium if individuals are rational optimizers, if no majority has identical preferences over all possible combinations of public policies, if no person or oligarchic elite has a veto over the policy alternatives that can be considered, and if rejected policy proposals can be reconsidered.[5] In the context of telecommunications, examples of assumptions that imply instability of policy are that citizen-users differ in the priority (or value weights) that they accord to improved telephone service in comparison with other policy reforms, that neither a telephone company nor a specific user group can veto proposed changes in telecommunications policy, and that privatizing a company today does not rule out a proposal to re-nationalize it tomorrow. As is apparent from these illustrations, the conditions that lead to instability of majority rule are extremely plausible.

Chaos theory does not necessarily predict that social decision processes will be chaotic, but it does indicate where sources of stability can be found, namely in design features of government decision processes that violate the assumptions that lead to chaos. For our purposes, the important point is that institutions, or the structure and process of decision-making (McCubbins, Noll, and Weingast, 1989), constrain the feasible set of policies, and in some cases can make the outcome stable (equilibrium). The structure and process of government is complex, and includes how citizens influence government officials (e.g., the representation system) and how these officials (including elected officials, their political appointees, civil servants, and judges) resolve their disagreements in making policy decisions.

Path dependence enters this theory through the way that structure and process affect policy. The feasible set of policy changes, or the "win set," is defined as policies that would defeat the status quo if they were considered. In general, if either the method of making decisions or the social outcome changes (due to change in either policy or underlying economic conditions), so does the win set, even if the distribution of preferences in the polity has not changed. In this sense, policy is path dependent: a planned or unplanned, intentional or accidental change in the status quo alters the win set. If this choice represents an endogenous resolution of policy uncertainty (the choice of

one of many feasible outcomes) or an exogenous event (a colonial power decides to grant independence while nothing has changed in the colony), the likely evolution of future policy is altered.

In the case of telecommunications policy, nationalization may have been in the win set under the conditions of the 1950s and 1960s, but not in the win set of the conditions in the 1990s, because of intervening changes in either technology, exogenous economic circumstance (including preferences of citizens), or the design of the government. In examining the credibility of reform, one should inquire whether the events between nationalization and privatization have so altered the feasible set of policies that expropriation of the newly privatized companies is no longer plausible or even feasible.

Path-dependence implies the existence of multiple feasible outcomes when preferences do not change. Economic models normally do not attempt to explain, or even to take into account, changes in preferences, but other social sciences do. Frequently the term that many other social scientists use to refer to preferences is "ideology," which is off-putting to many others (including economists and business executives) for two reasons. First, the common parlance use of ideology connotes a fixed commitment to a set of socio-political values, independent of rational argument and empirical evidence. Second, some scholars in humanities and social sciences adopt the nihilistic view that all models of how the world works are "social constructs" that lack an objective basis in reality, being no more than another mythical human belief system, none of which should be privileged over any other. As a result, policy analysts tend to ignore arguments based on ideology out of the presumption that they are based on a denial of objective rationality.

In reality, some social scientists use the concept of ideology in a way that incorporates rationality and advances in knowledge. The core of this view of ideology is that preferences over policies and institutions are derived from combining personal valuations of social outcomes with theories about cause-effect relationships (how institutions and nature interact to produce social outcomes).[6] A person's political ideology is both a system for evaluating alternative social outcomes and a set of beliefs about how policy decisions (including the design of public institutions) affect outcomes. If ideology includes beliefs about the accuracy of theories of cause-effect as well as characterizations of values, acceptance of economic theory (as well as physical science) is an "ideology," even when the theory is accepted and applied on the basis of a rational evaluation of alternative theories. Thus, progress in economics and improved economic education can cause the same person to make different (and better) decisions,

based on the same set of facts, preferences over outcomes, and initial conditions, as time progresses.

A propitious example is Goldstein's (1986, 1993) theory of the emergence of increasingly free trade in the 1930s. Goldstein's argument has two parts. First, sparked by the events of the Great Depression, political leaders and influential citizens developed a more sophisticated economic view of the effects of international trade. Second, politicians reformed the structure and process of trade policy to reduce the influence of parochial protectionist interests and to increase the influence of the common interest in overall macroeconomic performance. Two changes in structure and process accomplished this objective. One shifted the locus of trade decisions from tax policy (deciding tariffs separately in each country on a product-by-product basis) to treaty negotiation (deciding the entire structure of tariffs among two or more countries in a comprehensive document that each government had to accept or reject in totality). The other created trade adjustment policies that operate as a safety valve to prevent isolated examples of economic disruption that citizens might attribute to free trade from causing protectionist policy to spread to all of trade policy.

A feature of Goldstein's theory is that it combines the ideological argument with the structure-induced equilibrium argument to predict that the new regime is stable. Political leaders, after an ideological shift that reflects adopting a better economic theory, created a structure and process of decision making on trade policy that made liberalization of trade policy feasible but removed broad protectionist policies like the Smoot-Hawley tariff from the feasible set. Note that Goldstein explicitly takes into account the fact that individuals – perhaps most individuals – have an incentive to protect their own interest by advocating a high tariff on a product that they or their neighbors produce, that they are likely to react intensely to personal economic disruptions that plausibly can be attributed to free trade, and that this reaction will be passed on to their political representatives. Goldstein argues that political leaders, realizing the presence of protectionist incentives and the greater benefit to all from free trade, changed the structure and process of trade policy to reduce the influence of these incentives.[7]

The concept of commitment in neoliberal reform is a part of the broader model of neo-institutionalist political economic theory. A credible commitment in the development literature refers to a set of institutional arrangements that creates powerful incentives for political leaders not to reverse a reform and that is transparent to an outsider who then will make a long-term investment on the basis of the perceived stability of reform. As such, commitment devices fall within the domain of structure-induced equilibrium. Neoliberal reformers create a structure

and process of policy making that increases the durability of the new policy. Examples are a system of independent regulation with review by an independent judiciary, or a financial arrangement that imposes costs on the government if it reneges on its reform commitments.

The broader political economic model of policy stability incorporates the idea that the policy preferences of the relevant actors may have changed. They may have changed their view of how the world works (ideology). Changes in the economy may have shifted their incentives (economic path dependence). Institutional changes having no direct connection to the reform in question, such as in how government officials are selected or interact to make policy decisions, may have altered the politically feasible set of policies (political path dependence).

***Circumstances Surrounding Nationalization***

The broader historical circumstances surrounding the nationalization era have three elements that may be consequential for understanding the nature and extent of the commitment problem.

1. At the time that developing countries nationalized telecommunications, most developed countries also had state-owned infrastructural industries, a circumstance that survived into the 1980s (Snow, 1986). Despite the well-known efficiency problems of state-owned enterprises, the state-owned monopolies did not perform horribly, and certainly did not prevent economic growth in Europe (Joskow, 1998). The unusual feature of developing countries was not that they nationalized telephones, electricity, water, railroads, and other core infrastructural industries, but that for the first half of the twentieth century many European colonies and independent developing countries *did not* nationalize this sector. Moreover, the exceptions to the general pattern of state ownership, the U.S. and Canada, did not have extensive colonial empires, although the U.S. did exercise considerable economic influence, especially in Latin America. To the extent that colonial connections influenced policy choice, the models offered to nearly all developing countries were Britain, France, Portugal and Spain, all of which had nationalized industries. As the first era became the second, the pertinent question would not seem to be why developing nations were nationalizing their telephone companies, but why the industry was privately owned for so long in many developing countries.

Applied to the commitment problem, to the extent that advanced economies influence institutional choice in the developing world by virtue of their example, that example is changing. Unlike the period when developing countries were nationalizing telecommunications, during the third era most advanced industrialized economies are in

the process of liberalizing their own system. Indeed, if a legacy of nationalized enterprises is the reason to doubt the commitment to liberalization, western European nations, too, should have a credibility problem.

2. During the nationalization era the most salient political fact in most developing countries was resentment over colonialism, even in countries that had gained their independence in the nineteenth century. The violent, repressive, and exploitative history of colonialism caused almost all domestic issues to be framed in terms of the lingering effects of colonial rule. Because infrastructural industries were important, visible, and foreign owned, they were natural targets for anticolonial resentment. In the case of newly independent countries, nationalization was part of the process of sweeping away the institutions of colonial influence, whether governmental or private. Indeed, an important barrier to liberalization in all developing countries, and one that is still present in Africa and South Asia, is the view that privatization amounts to loss of sovereignty (Mustafa, Laidlaw, and Brand, 1997, and Petrazzini, 1995). Moreover, because anticolonial resentment did not make careful distinctions between direct political control and other means of exercising economic and political influence, anticolonialism was not just aimed at the particular colonial power that ruled a developing nation, but at all large Western nations. Again, the more difficult question is not why independence brought nationalization, but why long-independent nations, such as most of Latin America, took so long to nationalize.

Anti-western attitudes arising from colonialism for ascertaining the nature of the commitment problem certainly have not disappeared. In parts of the world, notably some countries in Africa, the Middle East, and South Asia, anti-western sentiment is as intense as it was in the period when these nations gained independence.[8] But to the extent that anticolonialism influenced prior nationalization, the intensity of this sentiment should have some predictive power in the era of liberalization: countries with the strongest anti-western sentiments should be less prone to mimic western institutions by privatizing, and if they do liberalize, should be least able to make a credible commitment to liberalization, especially if part of the liberalization program includes encouraging foreign investment. Put somewhat differently, part of the credibility of a threat to re-expropriate foreign investments is a domestic political environment that is prone to blame foreigners, especially Western governments and capitalists, for domestic problems.

3. The peak of the nationalization movement corresponded to the period of maximum influence of the Soviet Union and the rise of China in international affairs. In the 1950s and 1960s, socialism appeared to offer a

viable alternative to Western market capitalism as a means to achieve long-term economic growth. The Russians and later the Chinese were not shy about preaching their message to leaders of the developing world, and gladly provided educational opportunities about the wisdom as well as the mechanics of Leninism and Maoism. Meanwhile, some westerners who deplored the loss of personal freedoms in these system nevertheless believed that a centralized, coercive national economic system might well out-perform a largely decentralized, capitalist system. In the West both academics who studied developing areas and practitioners in institutions such as the World Bank emphasized a model of top-down, state-led economic development, featuring large capital projects undertaken by government with financial assistance from developed nations, either directly through foreign aid or indirectly through international agencies.[9]

From the milieu of the nationalization era emerged a view of development that emphasized escape from colonial influence through strong domestic control over key institutions (including important businesses) and comprehensive central planning to guide the path of economic growth. A great deal of emphasis was placed on self-reliance and self-control, leading unfortunately to the pursuit of autarky (import substitution, strict currency controls, restrictions on foreign investment). Nationalization was part of a broader strategy to wrest power and influence from Western foreigners and to create centralized institutions that were strong enough to take control of the development process, undertaken be a new generation of political leaders who were patterning their policies on economic models of development that were dominant among intellectual elites and that were practiced in other nations that were or appeared to be very successful economically.

The influence of the Soviet and Maoist models for development is disappearing, with parts of Africa being the last stronghold. The approach to development that has become dominant in the West places less emphasis on top-down planning and more on decentralization and internationalization. To the extent that leaders in developing countries are influenced by theory and experience, and pick domestic institutions at least in part on the basis of their likely performance, these developments support the credibility of the present commitment to liberalization. Thus, the state-centered system in which important industries were nationalized was not a strange choice for a newly independent nation in the 1950s and 1960s, but had become idiosyncratic by the 1990s outside of Africa, the Middle East, and the Asian states that were created in the wake of the demise of the Soviet Union.

***Practical Lessons from the Second Era***[10]

In many countries, nationalization was followed by a short-lived improvement in performance. Before nationalization, one complaint about foreign-dominated companies was that they focused excessively on serving elites and, in particular, foreigners and the companies that did business with them. Some countries thought that telecommunications would remain a toy for elites and foreigners, and nationalized it to guarantee that its customers would be heavily taxed for other, more legitimate purposes, or simply to generate patronage jobs for political allies. In other countries, a broader future for the sector was foreseen, and one objective of nationalization was to expand service so that it would provide greater benefits to the domestic economy. To expand service required capital investments, and so frequently nationalization was followed by increased investment and service improvements.

These improvements did not last long. The ubiquitous, depressing fact about telecommunications during the nationalized era was its deterioration. One performance indicator of the telecommunications industry that is available for almost all nations is the penetration of telephones, as measured by the number of main lines per 100 population. Table 1 contains the penetration levels of a large number of developing and transition countries from 1981, before reform began, through 1996, when many countries were well launched into reform. As a baseline, penetration levels in advanced, industrialized countries in Western Europe, North America, the Far East, and Australia/New Zealand (Table 2) for the most part fell in the range of 25 to 45 per 100 population in the 1981-86 period. As is apparent from the table, penetration rates in the developing countries were generally highest in Latin America and lowest in Africa and Asia, but in all cases were extremely low. The transition economies had higher penetration rates than all but a few developing countries, but substantially lower than the industrialized countries.

Another performance indicator is the length of the waiting list for both repairs and new service. In many developing countries, restoring service to a line that was not functioning properly could take months, rather than the hour or days that are required in developed countries. Because developing countries are relatively poor, one would expect lower penetration rates than in richer countries; however, the length of the waiting list for new service indicates that there was large unsatisfied demand at current prices. Galal and Nauriyal (1995) provide data on the waiting time *in years* for service in several countries just prior to reforms that were launched between 1986 and 1991: Argentina (4.1), Chile (5.7), Jamaica (9.0), Malaysia (1.6), Mexico (4.9), Philippines (14.7), and Venezuela (2.5). By contrast, in most developed countries, service is installed within days after it is ordered.

Still another performance indicator is the likelihood that the telephone will work: if a customer tries to

make a call, what is the probability of success, and if a customer's line is dead, how long does it take to repair it? In many developing countries, the probability of receiving a dial tone was 80 percent or less, and the probability of successfully completing a call after a dial tone was received also was 80 percent or less, and even lower for a long distance or international call. For example, long distance call completion rates were under 50 percent in Argentina (Hill and Abdala, 1996) and Venezuela (Galal and Nauriyal, 1995).

The underlying cause of the poor performance of nationalized telephone companies was their unbelievable inefficiency. The number of employees per telephone line frequently was extremely high compared to both developed countries and the "best practice" developing nations. In addition, nationalized telephone entities generally were starved for investment funds, which led to inadequate replacement and expansion of capital facilities.

One source of this poor performance was scarce and expensive capital. The marginal capital cost of a new line in nearly all developing countries is two or three times the cost in developed nations, and sometimes even higher. In some developing countries, such as Argentina, Brazil and India, a major source of the problem was import substitution: the attempt to develop a domestic telecommunications equipment industry, including switch manufacturing, which has a very large minimum efficient scale and is an extremely complex product that has never yet been efficiently produced in a developing country. In most countries, telecommunications equipment is not manufactured domestically and so must be imported. Protectionist tariffs, currency controls, and regional trade preferences for neighboring high-cost producers made imported capital equipment expensive.

An additional source of capital scarcity arose from the way investment funds were made available. Because telephone companies were part of the government, revenues accrued to the treasury as if they were taxes, and expenditures were appropriated as part of the annual government budget. Moreover, in many cases government companies made no attempt to collect bills for either residential service for government officials or office service for government agencies. In addition, poor fiscal and monetary management cumulated to erode all investment funds in the budget, including those for telecommunications. Because long-term capital investments make up a large fraction (usually two-thirds to three-quarters) of the costs of a telecommunications company, the cost of keeping a system running in the short run was much lower than the costs of making investments to sustain the company in the long run as facilities become obsolete and demand grew. Hence, in the short run a nationalized telephone company can be operated as a very large cash cow, even if prices are actually too low to make the enterprise viable in the long run.

In many developing countries, the policy response to this circumstance was to use the short-term cash flow from operations to finance other parts of the government. Then, in the face of deteriorating service, governments mollified customers by cutting real prices (in most cases, by refraining from raising nominal prices as inflation eroded the value of the domestic currency). The political attraction of this policy was enhanced in countries in which, for reasons unrelated to telecommunications policy, governments were unstable. If expected terms of office are short, the deterioration in service during the tenure of an administration will be small, and the problem of coping with them will be faced by subsequent office holders.

Another source of inefficiency was employment practices. Although service was poor (including slow installation and repair), nationalized telephone companies typically employed far more workers than were necessary. Employment per unit of output was extremely high, even after adjusting for the lower productivity of workers in poor countries. One cause was the use of nationalized enterprise for patronage, but another cause was the perverse incentive structure that the budget process created for managers of nationalized entities. Whereas the budgetary process could starve capital investment funds without much short-term consequence, it could not starve operating funds to pay salaries without creating an immediate political backlash. Hence, the budget process gave managers an incentive to substitute labor for capital, which in a capital-intensive industry like telecommunications is extremely inefficient.

***The Dawn of the Third Era***

The neoliberal reform era had two fundamental causes. The first has little to do with telecommunications, and mostly to do with economic crises that swept over many developing countries in the 1970s and 1980s. The second is the poor performance of the telecommunications sector, irrespective of the larger economic conditions of developing countries. Of course, these two factors are not all that matters. Some of the worst performing state-owned telephone companies are in nations that show no sign of reforming. Thus, poor performance can be said to provide a good argument for reform, maybe increasing its probability, but not to cause it. One poorly understood issue that cries out for more research is a more complete explanation for the cause and timing of reform.

To discuss in detail the more general economic problems of developing countries at the dawn of the neoliberal reform period is beyond the scope of this chapter. The important point here is that periodic economic crises in developing countries caused a re-evaluation of all economic policies, not just those in telecommunications.

The centerpiece of neoliberal reform was domestic macroeconomic and international economic policies. The crises of the 1970s and 1980s occurred as the belief in state-led, semi-autarkic development gradually was supplanted by a belief in fiscal balance, monetary restraint, openness to trade and foreign investment, and flexible exchange rates. Partly because of external pressures from those who could provide a short-term rescue for collapsing economies and partly because of domestic political changes, developing countries were persuaded to adopt these changes. But the international and domestic macroeconomic reforms threatened significant additional short-term domestic economic disruption at a time when these nations were especially strapped for funds for policies that would ease the transition. Neoliberal reform of state-owned enterprises could help in this regard by cutting state subsidies, creating a new tax base, and generating revenues from privatization sales. Thus, part of the impetus for neoliberal reform in telecommunications and other infrastructural industries had nothing to do with their performance, but instead the possibility to use their reform as a means to ease the pain of the larger neoliberal reform agenda.

Nevertheless, the beginning of neoliberal reform also reflects the fact that the experience with nationalized entities during the second era has not been a happy one. In any nation in which the political structure makes the government even slightly responsive to the interests of its citizens, part of the motivation for policy reform is simply extremely poor performance. The stark difference between idealistic expectations prior to nationalization and harsh reality a decade or two later plausibly could have led the most dedicated proponent of socialism and state-led development to learn something during this unhappy interregnum.

Fixing these performance problems within the structure of nationalized enterprise was very difficult because it required suffering two big political costs. First, it meant increasing investment by an amount that is measured in percents of GDP and ten-percents of government investment through either a price increase or budget reallocation that is far from marginal for a government that is trying to please the IMF and other international investors with its parallel macroeconomic reforms. Second, it required reducing the serious over-employment problem and preferences for high-cost, low-quality equipment from domestic or regional manufacturers..

Privatization to foreign investors is a natural solution to both problems. Privatization allows a net infusion of capital investment from abroad while partially depoliticizing the solution to the over-employment and procurement problems. Indeed, if new investment is great enough, the employment problem can be solved at least in part by expanding output rather than reducing jobs.

***Performance after Reform***

The performance of telecommunications entities has improved almost everywhere, regardless of whether reforms were undertaken. For example, Table 1 reveals that telephone penetration has risen in most, though far from all, developing countries. Hence, one can not baldly assert that neoliberal reform is a necessary condition for improved performance. Indeed, as yet no research has focused on why some state-owned enterprises have improved their performance in the 1990s, and how these cases differ from the larger number of state-owned utilities that still perform poorly in Africa and, to a lesser extent, Asia, Latin America, and the Middle East.

Quite a bit of research has focused on the average effects of reform on performance, and has found that improvements have been greater for reformed companies. The case studies reveal that after reform, the investment rates of telephone utilities increase by fifty percent or more, and labor productivity, measured as main lines per employee, typically increases by 25 to fifty percent, and sometimes more.[11] More systematic research using a large sample of countries concludes that reform improved performance in four ways: a privatized firm usually operates with lower average cost (measured appropriately as opportunity cost – one needs to correct for factor price differences that reflect political rather than market influences), has a more efficient price structure, has a higher rate of investment, and is less successful in acquiring protections against competition (Boubakri and Cosset, 1998; D'Souza and Magginson, 1998; Galal, Jones, Tandon, and Vogelsang, 1994; Meggison, Nash and Van Randenborgh, 1994; Ramamurti, 1996; and Vickers and Yarrow, 1988).

This research indicates that telecommunications reform has been broadly successful. This success provides motivation for examining in some detail exactly what reform measures have been tried, and whether the details of reform actually matter in affecting future performance.

## II. BASIC FEATURES OF NEOLIBERAL REFORM

In the context of telecommunications policy, neoliberal reform is a movement away from ministerial, state-owned enterprise toward greater reliance on private organizations and market incentives to shape the evolution and performance of the industry. No single model of neoliberal reform describes the new institutional arrangements in most, let alone all, developing countries. Hence, attempts to characterize the neoliberal reform model are certain to contain more error than accuracy when applied to any particular country. Thus, a more useful approach is to

describe neoliberal reform as a movement away from one ideal-type (ministerial state-owned enterprise) towards another ideal-type (unregulated competitive private enterprise), with many feasible intermediate steps.

Neoliberalism is distinct from libertarianism. The latter implies unfettered private property rights and individual economic behavior, including the absence of policies to promote competition or to regulate monopoly. Neoliberal reform assumes that government can have a legitimate role correcting market imperfections, such as regulating the prices and service quality of a natural monopoly or using regulation and antitrust pro-actively to promote competition if an incumbent monopoly is not natural.

In designing a neoliberal reform program, the government has two tasks. The first is to identify the best feasible ownership structure for the incumbent carrier, and to implement a transition to that ownership. The second is to adopt a policy with respect to the market structure of the industry, including governance arrangements for telecommunications policy. Because decisions about ownership and market structure have a range of outcomes, I will not attempt to describe every plausible neoliberal reform. Instead, I will describe the most important issues surrounding the choice of ownership and market structure, and identify what might be called the ideal or prototypical neoliberal structural reform of the industry. Section III will deal with the problem of designing governance institutions.

***Ownership***

In nearly every country, the starting place for reform is a state-owned enterprise that is part of a cabinet ministry. The important features of ministerial operation are that high-level managerial appointments are maximally political, and that detailed, day-to-day decision making about prices, investments, wages, etc., are directly controlled by the chief executive (president or prime minister) and, sometimes, the legislature.

The prototypical neoliberal ownership reform is to convert a ministerial telephone entity into a joint stock company that is privately owned and, therefore, controlled by private investors. In principle, the government could decide not to influence the structure of ownership by simply converting the state-owned enterprise into a joint-stock company and selling the stock wherever and to whomever it could. In practice, because successful privatization usually entails providing investors with considerable information and assurances about the future governance structure, in most developing countries atomized ownership neither maximizes revenues, assures a smooth management transition, nor provides for an adequate infusion of funds for private investment. Hence, the best

available path usually is to sell a large portion of ownership to one or a few large investors.

An ideal-type neoliberal reform would not place restrictions on the identities of these owners; however, in most countries the structure that is likely to result from unrestricted privatization is predictable, and involves extensive participation by foreign firms. Three factors influence the likely outcome of unconstrained privatization: technical requirements, capital requirements, and political requirements.

First, a modern telecommunications system requires managers who are sophisticated in both the technological and business aspects of the industry. In all but the largest, economically most diverse developing economies, no potential domestic investor is likely to be as skilled in operating a telecommunications carrier as foreign companies from developed countries. Moreover, foreign ownership can be an effective way to transfer skills to a developing country. Hence, this factor favors foreign ownership.

Second, telephone companies are huge and require enormous amounts of financial capital to improve their performance. Consequently, potential investors need to have access to large sources of financial capital both to acquire and then to renovate and to expand the company. Domestic investors are not likely to be willing and able to provide adequate financial capital at something approximating the competitive rate of return, and maybe not even if privatization is structured in such a way that the firm is likely to earn substantially more than the competitive return. Thus, as with the first factor, capital requirements favor foreign investors.

Third, because of the importance of the industry, a privatized telephone company is likely to be subject to public scrutiny and governmental intervention. Indeed, no country in the world has a telephone industry that is not subject to considerable public control and periodic political controversy. Unlike the other two factors, the political salience of the industry favors domestic ownership. The cause lies in the principle of representation and political responsiveness. National governments (even undemocratic ones) are likely to favor domestic over foreign economic interests, all else equal, because the latter have greater domestic political importance and influence. Domestic ownership creates an interest group that is better positioned to influence domestic politics.

From these observations, the practically relevant neoliberal ideal is to sell controlling interest in the company to a consortium of foreign and domestic investors in which the former are financially more significant but the latter have a stake that is large enough to insulate the company from attacks that characterize it as a neo-colonial institution and to make the company a credible political influence on matters affecting it. Knowing this, the

government can minimize the transactions cost of privatization by deciding in advance to auction ownership to the highest bidder, without restricting the composition of the entities that will bid. In practice, if the government includes restrictions that the bidders be consortia that include experienced foreign firms plus some domestic investors, the result is not likely to differ much from the unrestricted outcome.

The neoliberal ideal faces problems of political feasibility. In most cases, compromises must be made with political forces that fear privatization in general and foreign ownership in particular. Thus, countries are likely to pick a variation on the neoliberal ideal that has one or more of the following features. First, the fraction of the company that is foreign owned, either in total or within the controlling consortium, is frequently limited to less than half to assure a domestic majority ownership. Second, the government itself may retain a significant ownership share. Third, ownership may be given or sold at a reduced price to the domestic political interests that most fear privatization, such as labor unions or equipment suppliers. Fourth, to increase popular support for reform, some ownership may be sold in atomized quantities to domestic small investors, even though the realized price of these shares is less than the price of shares that are sold to the controlling consortium because atomized sales have greater transactions costs and because the domestic capital market is underdeveloped.

Argentina provides a useful illustration of this overall political strategy (Petrazzini, 1995, and Hill and Abdala, 1996). Argentina sold[12] 60 percent of its two main telephone companies to large, mainly foreign investors for $5.7 billion.[13] Thirty percent of each company was sold to small, domestic investors for $2.1 billion, and ten percent was sold to employees of the firms for $17 million. Thus, one percent of the equity cost foreigners and large domestic investors $900 million, small domestic investors $700 million, and employees $2 million.

While these measures may increase the political feasibility of neoliberal reform, they come with a cost. These restrictions dilute the control and financial returns of foreign investors, who must be the primary source of financial capital and expertise if the newly privatized entity is to succeed. The government's dilemma in considering the extent to which it will restrict the allocation of ownership is that enhancements to short-term political feasibility must be purchased at the expense of long-term performance. Thus, these restrictions have both positive effects on the long-term political sustainability of reform.

If domestic politics proves to create impossibly high barriers to even these restrictive variants of the neoliberal ideal, the least drastic reform that can still be called neoliberal is public corporatization that grants to the

public corporation the power to control its expenditures, to incur debt, and to make capital investments without formal government approval. In this case, the ministerial public enterprise is converted to a formally independent joint stock company in which the government owns all or most of the stock. The most important feature of public corporatization is that it transfers day-to-day managerial control from political leaders (ministers and legislators) to corporate executives. Likewise, the revenues of the company are primarily, if not fully, in control of the company and constitute a hard budget constraint for expenditures. In principle, corporatization can solve the problem of inadequate financial capital if the company is allowed to incur foreign debt.

Of course, public corporatization has shortcomings. Government ownership allows political leaders to appoint all or most of the company's directors, and usually these will be the same types of people who ran the ministerial state-owned enterprise: cabinet ministers (finance, commerce, trade, labor) and recipients of political patronage. In addition, future reversal of reform (removal back to a ministry) is easier if the government owns the company and so does not have to buy its stock to re-nationalize it. These problems can be mitigated by partial privatization, in which private investors buy a minority interest in the company; however, because of the issue of control, the share price that private investors are willing to pay for minority ownership is likely to be low compared to the price if private investors are given majority control.

Some scholars who believe that private enterprise is more efficient are willing to live with public corporatization if by so doing they can achieve better outcomes on the other issues (especially market structure).[14] For example, many observers contend that creating a truly competitive environment is easier if government retains control of the incumbent monopolist because of the greater tractability of effectively solving the problem of nondiscriminatory interconnection.[15] The assumption underpinning this argument is that the durability of the government's commitment to competition is independent of the ownership structure of the company, which is almost surely false. Competition will lower profits, and most likely employment and wages, of the incumbent monopolist. Under corporatization, government retains its financial stake in the flow of monopoly profits, and political responsibility for the welfare of the employees of the company it controls. Thus, government's greater ability to implement competition must be weighed against the inevitable political pressures that will arise to undermine its commitment to competition. This argument does not necessarily mean that the net effect of corporatization on the prospects for competition will be negative, but competition has generally been slow to emerge everywhere and the

few countries where it has emerged tend to have privatized telephone companies.

***Market Structure***

Ideally, neoliberal reform involves a commitment to a competitive market structure if it is economically and politically feasible. In practice, with the exception of Chile, no developing country has fully implemented competition in all segments of the industry. A number of reasons have been advanced to defend the decision to rely on monopoly. This section explores these reasons, and concludes that a commitment to long-turn monopoly is indefensible, and that even temporary protection of incumbent monopolists is dubious.

In the ideal-type neoliberal reform, decision makers must ascertain whether production technology dictates that the most efficient industry structure is a monopoly. For nearly all of the history of the telephone, conventional wisdom held that the industry is a natural monopoly. Originally the main basis for this belief was the presence of economies of scale in switches and transmission links, i.e. the connection between customer equipment and the first switch in the network, and connections between switches for carrying interexchange, long-distance and international calls. This belief probably never was accurate, but technology has made it increasingly unlikely.

The natural monopoly argument was most plausible early in the history of the telephone industry. At that time, the industry produced a single, homogeneous product – a voice-grade telephone circuit – and almost all service was local access and local calls. The technology to supply these services made use of copper wire pairs that connected each customer to the nearest local switch, and switches in which connections initially were made manually by operators but eventually were completed by electro-mechanical devices. The optimal capacity of an operator-controlled or electro-mechanical switching system is related to peak usage. Because of the statistical uncertainty of calling activity, the ratio of optimal switching capacity to the number of customers declines as the number of customers increases, thereby creating economies of scale in the old switching technologies. Likewise, whereas the number of copper wires in a local network was strictly proportional to the number of customers, constructing a traditional local telephone network had fixed costs (telephone poles and underground conduits), which were another source of scale economies.

A more recent argument in support of the natural monopoly idea is the “network” feature of telecommunications. A network technology has the characteristic that its value to one user depends on the number of others who also use it. In the case of telecommunications, the value of access depends on whether one user can reach

others. Thus, for the telecommunications industry to supply maximum value to customers, it must be interconnected. Regardless of the pattern of ownership, each customer must be able to reach every other customer for the usage value of the system to be maximized.

In principle, the requirement to interconnect does not imply a single, monopoly owner. Instead, separate companies can arrange to connect. Analytically, one can anthropomorphize each network of customers as a single actor, seeking service to connect to other networks, which is exactly what national monopoly telephone carriers arrange to do to make international telecommunications feasible. All that is required to complete a ubiquitous network is common technical standards for the information that is transmitted from one network to another (the counterpart to railroad gauges and electric current specifications), and an agreement among the networks about sharing the costs of their interconnection. Of course, as is discussed in detail elsewhere in this chapter, the theoretical simplicity of this requirement masks what has proved to be the very large and as yet unsolved practical problem of adopting pro-competitive interconnection arrangements between incumbent monopolists and entrants.

Regardless of the merits of the natural monopoly argument, in countries where policy did not encourage or require monopoly, competition emerged soon after the invention of the telephone. In the United States, competition blossomed as soon as the original telephone patents expired before 1900, and was common in cities during the early history of the telephone industry (Brock, 1981). Within ten years after the expiration of the Bell patents, the market share of the old Bell monopoly slipped below half. A virtual Bell monopoly was not reestablished until the decade between 1910 and 1920, after a new patent monopoly emerged for long distance transmission. Both the federal and state governments responded by allowing local mergers and regulating the industry rather than requiring nondiscriminatory access to AT&T's long-distance system for all local access companies. The policy challenges presented then by the need for pro-competitive interconnection rules, and the failure to solve the problem, presaged the interconnection debates that emerged at the end of the 20th century, and in the U.S. after the passage of the Telecommunications Act of 1996, when once again the policy environment became favorable for competition.

Even in some developing countries, competition emerged before 1900. For example, in Buenos Aires, where entrepreneurs were not constrained by the Bell patents, “ferocious competition”[16] among four firms, one domestic and three foreign, broke out in 1881. When these firms agreed to merge to monopoly in 1882, predictably prices rose and service quality fell. Then, in 1887 competition emerged again, persisting for forty years until ITT

bought the competitors and once again merged them to monopoly. This time, the government responded by imposing regulation, followed a decade later by nationalization, rather than using competition policy to attack the monopoly.

The presence of competition, despite economies of scale in some components of production, should not have been surprising. As the number of telephone customers in a locality grew, scale economies in network components became less significant in the overall cost structure of telephone companies. Other factors, such as diseconomies of scale in management and less than fully efficient operation by firms that were not subject to the discipline of competition, could offset scale economies. Eventually, when competition came to an end through merger, the motives of the company were not necessarily to improve operating efficiency, but instead to eliminate competition. Moreover, a durable merger to monopoly was aided by government policies that created entry barriers and substituted regulation or nationalization as the means for improving the performance of the incumbent monopolist.

The modern telecommunications industry is less likely than the early one to be a natural monopoly because of intervening technological progress combined with enormous growth in demand.[17] Whereas technological progress has reduced scale economies for most components of a telephone network, another effect that probably is even more important is that technological progress vastly reduced the real cost per unit of output of all components of the network. The latter effect has reduced the economic significance of scale economies in comparison to managerial efficiency, technical capabilities, and service quality as determinants of the cost structure of a telephone network.

Digital microelectronic technology allowed many messages to be transmitted over the same physical connection (whether by wire or over the air) and, more recently, over the same electromagnetic frequency on the same transmission medium, which in turn has reduced the physical resources that are necessary for connections in both local loops and inter-exchange transmission. The replacement of mechanical switches by digital switches based on microelectronic technology vastly reduced the cost of switching capacity (which is now analogous to computer memory) as well as eliminated scale economies in switches except at very small scale. Finally, radio technologies for customer connections and long-distance transmission do not have significant economies of scale. Fiber optic cables do exhibit scale economies, but their cost per circuit is so low that, given the demand for transmission, this technology has not undermined the feasibility of multi-firm competition.

The implications of these developments are as follows. First, relatively small digital fixed wireless service for local access without mobility reaches minimum efficient scale at a few thousand customers in a local calling area at a cost and performance that is comparable to wireline service in all areas except those which the spatial density of telephone customers is the highest. Second, in the areas of high customer density, wireline competition is likely to be economically feasible. Third, transmission has become so inexpensive and such a low proportion of long-distance costs that it is unlikely to create important scale economies in long distance between major population centers.

Technological progress in the use of telecommunications also has created heterogeneous demand among customers. Examples of features that have created heterogeneous demand for technical characteristics in the network are mobility (cellular telephones provide high-quality mobility at low cost), speedy transmission of large data files (inexpensive networked personal computers and work stations create a demand for transmitting many kinds of information other than voice communication), and high speed digital transmission (which made possible the internet and other means for rapid transmission of complex information for interactive computer use). These developments favor entry by specialized firms that fill a particular qualitative niche in terms of the capabilities that they offer to users. Whereas a single network can offer all qualitative features to all customers, the practical reality is that many uses, especially for large businesses, are most efficiently provided over a separate network that is designed to satisfy specialized demands, but that also is connected to other networks to permit simpler forms of communication (especially voice-grade and low-end computer transmissions) between them.

For these reasons, technological progress has favored competition over monopoly in telecommunications services. Policy decisions early in the 20th century that were based on the idea that telephony is a natural monopoly probably were incorrect then, but they are certainly incorrect now for all types of interexchange connections and local access in cities. In smaller urbanized communities and rural areas, wireline technology may still be a natural monopoly. But off-air technologies for providing access, such as fixed-base digital radio and low-earth satellites, are not natural monopolies, and technological progress favors them as the most cost-effective means for providing service in remote areas where the demand for service is low. Perhaps already, but certainly in the near future, the only remaining natural monopolies are likely to be in communities that are so small and poor that demand is insufficient to justify more service than a single pay telephone.

If modern telecommunications is not a natural monopoly in almost all circumstances, the structural reality is

that access service is a monopoly almost everywhere, and even long distance service is monopolized in most of the world. Some analysts recognize that the industry probably is not a natural monopoly, but question the significance of this point because they suspect that monopoly is a durable reality (especially in basic access service) that policy makers must accept, focusing their attention instead on how best to liberalize telecommunications policy in a durably monopolized circumstance (Joskow, 1998). Thus, a practically relevant policy question is how fast, and even whether, competition can be successful in the presence of a powerful, entrenched monopoly.

The presence of entrenched monopoly is not necessarily hopeless. Working in favor of potential competitors are two factors: the inefficiency of incumbents, and the presence of heterogeneous demand. In countries where service is very poor and penetration is low, entrants can take advantage of excess demand to build a network of equal scale and superior performance that is especially attractive to the best customers. Thus, the worse is the performance of the incumbent, the better is the prospect for effective competition.

Working against competitive entry is the availability of effective strategies by incumbents that make entry difficult. Examples are denial of adequate interconnection, refusal to sell some services without purchasing others so that entrant must enter all parts of the industry simultaneously, and predatory pricing. These problems are essentially regulatory challenges in managing the transition to competition. How these problems can be solved, and whether their solution is plausibly within the competence of regulators, is addressed in Section III.

Another defense of monopoly, especially in developing nations, is that it can be used to promote more rapid improvements in capacity and quality of service, even if the monopoly is not natural. The basic idea is that a monopoly can be granted subject to a condition that it meet aggressive service goals, and that this agreement will lead to more rapid improvements than competition. In reality, this argument is bad economics. To illustrate why requires decomposing the argument into several separate elements.

One argument is that a protected monopoly reduces the risk facing a firm, which in turn increases the firm's willingness to invest. By itself, this argument is false. With one exception, monopolists and competitive firms face exactly the same investment risks concerning costs, demand, and the political environment. Thus, for any given investment, the cost of capital facing a firm is affected in the same way by risk factors, and hence the effect of risk on the revenue from a marginal investment that is sufficient to justify it are the same.

Market structure does have two additional effects on the financial attractiveness of investment to a firm,

both of which work in favor of competition. First, the greater market power of a monopolist provides an incentive to undertake less investment than is justified by cost and risk considerations. Absent an explicit policy to engage in internal cross-subsidization within the monopoly firm, the best that regulators can do is to impose investment requirements that duplicate the investments that would be made under competition. Neither a monopolist nor a competitor will make investments unless expected revenues justify the expense. Second, the one source of risk that is present under competition, but not monopoly, is the possibility that competitors will be more efficient and so win customers by offering better combination of price and quality of service. The presence of monopoly does not eliminate this risk, but instead transfers the risk to consumers as a hidden cost of monopoly. The fact that the risk of inferior service can be passed on but not avoided is an argument in favor of competition, not monopoly.

Given these advantages of competition, advocates of monopoly as a means to improve performance usually also advocate cross-subsidization. The idea is to let the monopoly earn excess profits from some customers that can be used to finance money-losing investments for other customers. The most basic attack on cross-subsidy is the questionable wisdom of making economically unremunerative investments in a capital-starved developing country. Moreover, as is apparent from Table 1, the extent of service in most developing countries is so small that significant subsidies to low-income customers can not possibly be taking place. Instead, the cross-subsidies run from long-distance (especially international) service to basic access service for wealthy and middle class customers. But even if the political attractiveness of subsidized service is irresistible, cross-subsidization is a poor way to achieve it.

Cross-subsidies can not possibly beat the alternative of opening all markets to competition, imposing a tax on all telecommunications services, and using the revenues to finance direct subsidies for users who require them. The most efficient mechanism for providing a subsidy is through a competitive bidding system in which the bids are the amount of subsidy a firm would require to provide the desired service. In the absence of natural monopoly, the monopoly provider of self-financing services can at best be as efficient as a competitive supplier, so that the best that can be expected from cross-subsidization is to replicate the outcome of an explicit tax-subsidy system.

Equal performance from monopolists and competitors is a theoretical ideal, not a practical reality. Like all private firms, a monopolist prefers not to make investments that lose money, so will drag its feet in making them. Unless enforcement of the franchise agreement is perfect, the firm will invest less than the maximum that could be financed by the cross-subsidy in the price structure. Moreover, because monopolists have weaker incentives to be

efficient and because regulation of monopoly further weakens these incentives, monopoly will be less efficient than competitive firms. Consequently, to pay for the same amount of subsidized investment, the after-tax price faced by customers who pay the subsidy will be higher under a monopoly cross-subsidy regime than with an explicit tax-subsidy system.

The last gasp of the advocate of cross-subsidy is to claim that explicit tax-subsidy systems are politically infeasible for two reasons. First, they are inconsistent with neoliberal reform, which on the fiscal policy front seeks to shrink the size of the budget. Neither domestic fiscal conservatives nor international bankers (including the IMF and the World Bank) will accept solutions involving a bigger public sector. Second, telecommunications firms and their customers who would pay the tax will resist it, causing political support for neoliberal reform to dissipate. The problem with these arguments is that they assume selective rationality and even stupidity on the part of all relevant parties. Somehow all relevant political actors will prefer a more costly, less efficient reform with hidden taxes to a more efficient system in which the tax, though lower, is explicit. In principle, one can not disprove this argument on theoretical grounds, but its plausibility seems questionable.

As a practical matter, the most likely explanation for the decision to embrace monopoly is the desire to maximize the revenues or political advantages that accrue to the government from neoliberal reform.[18] Two especially important features of neoliberal reform in telecommunications are that the market value and potential cash flow of a telecommunications monopoly is extremely high, and that telecommunications reform is usually part of a much larger package of policies, including more disciplined fiscal and monetary policies.

Recall that in most cases the most important element of a neoliberal reform package is not to reform infrastructural industries but to eliminate large fiscal deficits and the lax monetary policy (and resulting inflation) that is used to finance them. Fiscal and monetary reform can complicate telecommunications reform. As explained in Section I, nationalized telecommunications firms can be a source of substantial net cash flows for the government, especially if they are not properly maintained and expanded, which explains why they are starved for investment and perform poorly. As a result, reformers, especially those in the finance ministry, are likely to seek ways to make the fiscal impact of telecommunications reform positive in order to offset the short-term cash-flow loss from the state-owned enterprise. Preserving monopoly while improving its efficiency maximizes the fiscal benefit to the government. If the company is corporatized, the government as the primary or only stockholder can collect the

monopoly profits – those that are not used for increased investment – as dividends. If the company is privatized, buyers will pay the discounted present value of the monopoly profits. In both cases, the financial returns to the government are higher than if the reformed company must face competition.

The validity of this argument for continuing a protected monopoly in telecommunications depends on a further argument about the domestic politics of a comprehensive neoliberal reform, and in any case is at best a defense of temporary monopoly. The political argument is that an implicit tax through monopoly pricing in telecommunications generates less opposition than other taxes or expenditure reductions that could deliver the same fiscal benefit. Unlike the comparison between cross-subsidies and tax-subsidies, where both tax the same people, this argument is not irrational on its face. Other taxes may have imperfect compliance and greater distortions, and both other taxes and expenditure reductions are likely to have a much different incidence, which may cause either to provoke more political resistance.

At best, the political argument justifies a temporary commitment to monopoly. If the government privatizes the monopoly, the effect of potential monopoly profits several years into the future on the sales price of the company will be of low importance, due to discounting.[19] Hence, committing to promote competition in the future will have a modest depressing effect on the government's sales revenues. Because the optimal public sector discount rate typically is much lower than the private rate and because presumably the government counts consumer satisfaction as well as profits, the value to the government of avoiding long-term monopoly is much higher than the value of monopoly to private investors. Consequently, the government ought to be willing to make a modest sacrifice in purchase price in order to limit the term of the monopoly.

Likewise, if the government corporatizes the firm with a commitment to privatize it after competition is introduced, it can convert the cash flow from its ownership into an immediate cash infusion by selling a revenue bond for the years of monopoly plus the sales price of the firm after competition is introduced. This maneuver exactly replicates the effect of selling the firm today, including the modest financial sacrifice that arises from granting a temporary rather than a permanent monopoly. Hence, the financial incentive to create a permanent monopoly is not materially different in the two regimes.

The preceding critical tour of the arguments for monopoly leads to the conclusion that competition is likely to be a superior alternative. In addition to its efficiency advantages, competition holds another political attraction as

well. Given that developing countries are likely to find foreign investment very attractive for increasing capital flows into the industry, competition offers the possibility of defusing future anticolonial reactions to foreign control. The presence of several competitors eliminates both the appearance and the reality of exploitative foreign control of the industry, thereby reducing the chance of subsequent counter-reform.

## III. REGULATION AND NEOLIBERAL REFORM

Section II argues that the goal of neoliberal reform in telecommunications as well as electricity, transportation, and even in some cases water (see the chapter on water that follows) should be a privatized, at least partially competitive industry, although for political reasons, some defensible and some not, countries usually pursue far less ambitious objectives. Indeed, one wireline carrier and two radio telephone companies in the same area constitutes the norm around the world for the market structure of local service. In any case, the goal of competition can not be achieved instantaneously because the status quo is monopoly. Even in countries with several telephone companies, some of which are private, service is monopolized locally by exclusive franchises, and long-distance and international service are provided by either a separate nationalized entity or, more commonly, the largest state-owned local access provider.

Consequently, as noted by Joskow (1998), in embarking on a neoliberal reform programs, countries face a two-fold problem: to prevent the incumbent monopolist from extracting monopoly profits from its customers (the price regulation problem), and to create market conditions that foster competition (the entry problem). In addition, governments must convince potential investors that its regulatory institutions will not be used to expropriate their investments, and that regulatory arrangements, if fair and reasonable, are enforceable and politically durable (the commitment problem).

This section examines the problem of establishing an effective and efficient mechanism for dealing with the incumbent monopolist and, if competition is the goal, for managing the transition. This problem raises three types of questions, which can be characterized as designing the leaves, trees, and forests of regulatory institutions. The leaves are the details of regulatory decision-making processes: how regulators collect information, promulgate decisions, and enforce rules, and what specific conceptual approaches agencies take to making decisions. The trees are the structure and authority of regulatory agencies: the formal power and scope of the agency's legal mandate, the

relationship of the agency to the rest of the government (ministers, legislators, courts), the procedures for appointing and removing the agency's leaders, and the budget and staff of the agency. The forest is the overall institutional environment of the nation: the representativeness of its leaders, the stability of its policies and institutions, its system of commercial law, and the nature of the system for enforcing law – are contracts enforced, does the legal system obey the Rule of Law, and are economic rights and the rights of minorities protected? Although the discussion in this section will use illustrations from telecommunications, it also applies more generally to all infrastructure industries.

***Background Economics***

Recall the historical tendency for governments to use nationalized telecommunications firms as a cash cow to support the government. This policy is feasible for a reasonably long period because a large proportion of the cost of a telecommunications firm is sunk in durable capital investments. The failure to use the cash flow from the operation of the company to maintain, replace, and expand capital facilities accounts for the deteriorating performance of state-owned firms. With privatization, investors must expect to be able to retain sufficient revenues to cover these capital costs plus a competitive return on their investments or they will not invest in the enterprise.

Because the incumbent is a monopoly that can expect to enjoy substantial market power for a considerable period after it is privatized, the economic feasibility of establishing a price structure that enables the firm to satisfy this cash flow requirement is not really in doubt as long as the firm is reasonably well managed. Thus, from the perspective of investors, the main financial risk associated with acquiring the privatized firm is whether the government will allow prices that make the investment worth while. Because telecommunications investments are so durable, the primary determinant of financial risk is not the adequacy of the initial price structure, but the firm's expectations about the policies of the government for controlling prices in the future.

In the literature of regulatory economics the commitment problem refers to whether government can take actions today that convince investors that future regulatory decisions will not cause the expected earnings from their investments to fall below the competitive return. This section deals with one part of the commitment problem: establishing pricing rules that enable a well-managed firm to earn a reasonable return on investment. The next section deals with another aspect of the problem, which is assuring that a reasonable system of regulation will be enforced fairly and will endure. In reality, the former problem is far easier to solve than the latter.

A core problem in designing regulatory institutions is how to deal with the fact that regulators are not likely to know as much as the firm about demand, cost, technology, and, as a result, the true efficiency and profitability of the firm.[20] If regulators possess perfect information, they can set prices equal to the prices that would emerge in a competitive industry, and the firm would then have to operate with maximal feasible efficiency in order to earn the competitive return on its investments. In this case, the only advantage of competition over monopoly would be that the former avoids the direct costs of the regulatory process.

The selection of a pricing method is primarily a problem of regulatory design (the leaves problem), but it is also related to the trees problem (what powers and resources to give to the regulators) and the forest problem (what legal rules regarding economic rights must the agency follow).

***Cost of Service Regulation***

Until the 1980s, the standard approach to solving this regulatory problem was cost of service regulation. In this system, regulators periodically audit the books of the regulated firm for some recent historical period (usually a year), estimate the total costs of the firms for that period, and insist that the firm set prices such that had those prices been charged in that historical period, the total revenues of the firm would have equaled its total costs. In addition, regulators also concerned themselves with some aspects of the price structure to assure that no politically salient customer group was charged an unreasonably high price.[21] Aside from simple calculation errors, a virtual certainty due to the complexity of telecommunications firms, uncertainty creeps into this process for three reasons.

First, because capital investments are durable, regulators must pick a depreciation rate, which then determines how much of a firm's investment cost should be recovered in a year. This decision is fundamentally arbitrary because the regulator can not know when in the future, through obsolescence or physical deterioration, a capital facility should be replaced, nor how optimally to allocate the responsibility for paying for the facility between current and future customers.

Second, whereas the concept of a competitive return on investments is clear, the actual competitive rate of return is impossible to calculate with precision. The cost of capital to is affected by random, short-term volatility in markets for financial assets, and depends on investor expectations about future conditions in all of the input and output markets in which the firm operates as well as the future political climate for regulated firms. Consequently, regulators can only crudely estimate the minimum return that is necessary to induce adequate financial investment by

the firm.

Third, regulators do not know whether the costs incurred by the firm actually were reasonable. Regulators can not know precisely the best combination of inputs for producing the services that were sold in the historical period. Even if they could, the proper standard for evaluating the efficiency of the firm is whether it made good decisions, based on the information available to it at the time. These decisions must be based on expected demand, which is uncertain, and on the optimal choice of technology and investments over the life of durable capital assets, not just on conditions in a single historical period.

Thus, the fundamental problem with cost of service regulation is that regulators can not know the firm's true costs and demand, and whether the firm is efficient. The most common response to this problem is to use the periodic cost audit for a second purpose, which is to adjust future revenues to account for errors in the previous regulatory constraint. Thus, if the revenues of a firm did not cover its estimated costs in the historical audit period, the shortfall would be added to the revenues that can be recovered in the next period. Likewise, subtractions from future revenues (or customer rebates) would be required if the firm earned excess profits.[22]

This system of regulation has three significant costs. The first is that it requires an elaborate regulatory process that employs many skilled professionals in order to produce reasonably accurate estimates of the firm's costs and, even more demanding, to reach reasonable conclusions about the efficiency of the firm's operations. Moreover, regulatory agencies are likely to exhibit significant economies of scale since the problem of assessing the reasonableness of costs is not closely related to the size of the regulated firm. Thus, the cost of regulation is higher in relation to the welfare at stake in the regulatory process in a small developing country, where professional accountants, economists, and engineers are likely to be scarce and the size of the regulated industry is likely to be relatively small.

The second cost of this form of regulation is that it is likely to distort the input choices of the regulated firm. Given the uncertainties surrounding the regulator's estimate of the competitive return on investment, the optimal strategy for a regulator is to err on the side of generosity to the firm. The reason is the asymmetry of the costs of an error. If the regulator slightly overestimates the competitive return to capital, prices will be slightly higher, but the firm has an adequate incentive to make capital investments so that service quality (and customer satisfaction) is maintained. If the regulator slightly underestimates the cost of financial capital, the incentive to invest disappears

entirely. Even if the firm expects the error to be corrected in the future, in the short run the firm will face difficulty maintaining its interest and dividend payments to investors if it also maintains an adequate investment program. Thus, slightly lower prices will be accompanied by deteriorating performance.

The tendency to be slightly generous in calculating the financial cost of capital gives firms the opportunity to earn excess profits on capital investments, but not on other inputs. Thus, firms, in seeking to maximize profits, have an incentive to over-invest in capital facilities. At some point, regulators will detect this over-investment and disallow their recovery; however, because regulators lack perfect information about production technology, they will not be able to prevent over-investment to some degree. Consequently, the regulated firm will not be efficient in its capital investment decisions.

Third, cost of service regulation blunts the incentive of the firm to operate efficiently. Somewhat higher costs than are necessary are not likely to be detected by the regulator, and so lead to higher prices. Because monopolists do not face the discipline of competition, their incentive to minimize cost is blunted; however, unregulated monopolists can charge monopoly prices, so that inefficiency can not be compensated for by further price increases. If regulation causes prices to be below the monopoly level, inefficiency is less costly to the firm because the regulators will allow it to raise prices in the direction that the firm prefers.

The second and third problems interact in the following way. If a firm has already engaged in as much profit-enhancing over-investment as it can get away with, the incentive to operate efficiently (notwithstanding excess investment) is essentially eliminated. No profit-enhancing investments or price increases are available to the firm; however, other unnecessary costs will be passed through in price increases.

The underlying economic conditions in a developing country may cause the inefficiencies of cost of service regulation not to be very important, and, indeed, as Joskow (1998) reminds us, the U.S. telephone system performed very well for nearly a century under this system. The most important feature of newly privatized telephone companies is that they require enormous capital investment to improve service and meet unsatisfied demand. Moreover, these firms generally have excess labor relative to capital. Hence, the incentive to be excessively capital intensive plausibly is of dubious significance for many years. Moreover, because these firms face extensive opportunities for profitable capital investments, they seem less likely to fall prey to the generally weak incentives to control costs that affect regulated monopolies that operate in more stagnant market conditions. Thus, it is not clear

that concerns about the inefficiencies that arose in developed countries after well-functioning networks were constructed are transferrable to the context of a developing country in which the main problem is building a network of adequate capacity and reliability.

***Alternative Pricing Mechanisms***

The inefficiencies of cost of service regulation have led economists and some regulators to propose alternative methods that do not depend so heavily on cost audits of the regulated firm. The three primary alternatives are price cap regulation, benchmark competition regulation, and negotiated franchise contracts.

The basic idea of these alternatives is to break the connection between prices and costs so that a profit-maximizing firm can increase its profits only by cutting costs. If prices are set at something approximating costs, then frozen, the firm has a high-powered incentive to cut costs and improve efficiency. The resulting excess profits of the firm do not harm consumers because, in the absence of the sharper incentives to cut costs, the initial price decision would be sustained by the inefficiencies created by cost of service regulation.

**Price cap regulation** represents the maximal disconnection of prices from costs.[23] When price caps are initiated, the regulator begins with the existing price structure. If these prices were adequate to cover cost (which would apply to firms that were subject to cost of service regulation), the regulator first creates a price index using current prices and outputs. If the regulator believes that prices were too low (a frequent problem with nationalized firms) or that the firm did not minimize costs in the past, the initial price index can be adjusted up or down to initialize the system appropriately.

After determining the initial price index, the regulator then estimates the extent to which the industry can be expected to have future increases in productivity that exceed the average for the economy, and cuts the real price index in future years by this estimated excess productivity growth. This adjusted index becomes the firm's price cap. The regulatory rule, then, is that the firm must not change prices in a way that causes the actual real price index to exceed the cap. The shorthand for this system is "PI-X," where average annual price changes, weighted by historical quantities, can not exceed the rate of increase in a standard price index (PI) minus excess expected productivity growth (X). As is the case with cost of service regulation, the regulator may also impose further ceilings on particular, politically salient prices.

If the regulator can promise never to change this formula and not otherwise to interfere with future prices,

this system creates a powerful incentive to minimize costs. Furthermore, if the regulator does not place additional restrictions on specific prices, the firm's profit-maximizing price structure also will be efficient. Hence, looking forward to the future, price cap regulation has the property that if regulators make the best use of the information that they have about demand, costs, and technology, the price cap formula will produce a future path of prices and costs that is at least as good as, and probably better than, the outcome from cost of service regulation.

Pure price cap regulation is impossible to implement for two fundamental reasons. First, because the regulator can not perfectly estimate future excess productivity growth in the industry, the price adjustment formula is certain to cause the profits of the regulated firm either to rise or to fall as actual productivity diverges from estimated productivity. Eventually, the firm will find itself in the position of either the nationalized firm, with revenues that are insufficient to cover its costs (including a competitive return on investment), or a *de facto* unregulated monopolist, earning monopoly profits and finding that the price cap no longer constrains its pricing behavior. Both outcomes are inefficient and, most likely, politically unstable, or else privatization with regulation would not have been the original political choice.

The second reason that pure price caps can not be implemented is that technological progress causes the bundle of products to change. Entirely new products may be created, or technology may cause an increase in the optimal quality (and the cost) of an established product. Price cap regulation has no provision for adjusting the original price index to account for changes in technology because there is neither a base price nor a base quantity for new or altered products.

These two problems naturally lead to periodic adjustments of price caps. In telecommunications, the planned duration of price caps typically has been in the range of five years; however, in both the U.S. and the United Kingdom, where price caps have been in use since the late 1980s, regulators have readjusted the price index before their planned readjustment date. Usually the primary reason has been to increase the stringency of the index (by increasing X) because the firm has cut costs and increased profits by more than the regulators expected.

If price caps are frequently readjusted, price cap regulation becomes very close to cost of service regulation. As a practical matter, cost of service regulation does not require that the regulator must examine costs and readjust the ceiling on total revenues every year. In the U.S., many regulatory bodies that practiced cost of service regulation reviewed costs and reset prices only if someone, either the regulated firm or a customer group, complained (Joskow,

1974). For example, the U.S. Federal Communications Commission once went 34 years between formal investigations to determine the costs of long-distance service. This practice is called "regulatory lag," or a period during which, if the firm cut costs, it can keep the savings as long as the regulator chose not to audit its costs. The most important lesson from the theory of price caps and the practice of cost-of-service regulation is that in the long run prices and costs will be lower if regulators do not continuously audit costs and scrutinize the operations of regulated firms.

**Benchmark regulation** sets the prices of a regulated firm on the basis of information about other firms. One approach is to use the costs of another firm to establish a price cap index or total revenue ceiling. This cost basis can be created by randomly selecting firms to audit, or relying on the audit of another firm by another regulator. An even simpler approach is to set prices on the basis of the prices set by other regulators without even considering costs.

Most developing countries are unlikely to have a large number of regulated monopoly telephone companies, so randomly auditing the costs of some domestic companies as a basis for regulating the others is not likely to be a feasible strategy. Hence, the realistic choice is for one country to rely on the cost audits and price decisions in another country, which may create problems of reliability and domestic political feasibility. In any case, telephone companies are likely to have significant cost differences for legitimate reasons having to do with subscriber density, the pattern of demand among different services, domestic factor prices, international trade policies, and the nature and extent of sunk capital costs. Thus, even under the simplest benchmark system, regulators are likely to be called upon to consider adjusting price regulations to take account of these differences. The basis for these adjustments will be the same kind of information that regulators must collect and evaluate to update either a price cap index or a cost of service revenue requirement, although the regulator may not be required to evaluate as much information under benchmark competition.

Whether benchmark competition is an attractive alternative to the other approaches depends on the extent to which the regulator will need to adjust the benchmark to accommodate special local conditions. If other regulatory processes are sufficiently reliable and the conditions of the regulated industry sufficiently similar that another regulatory body can trust their results, regulators can achieve comparably effective regulation at much lower costs. But a conscious decision to rely on the benchmark and, as a result, to create a bare-bones regulatory structure leads

to other problems. First, investors in the regulated firm may regard the system as imposing additional risks if they believe that benchmark costs and prices are likely not to be good indicators of their own costs, or if they believe that in the future regulators in benchmark countries may be inclined to expropriate the capital of their telephone company. Second, the domestic company has a strong incentive to take advantage of the minimal capabilities of the regulator by demanding extensive exceptions to the benchmark, supported by extensive information that the regulator can not evaluate.

**Negotiated franchise agreements** set prices for the term of a contract. The franchise agreement indirectly reflects expectations about cost in that the firm's negotiating position will be based on its cost estimates. In the pure form, the contract specifies the services it covers and the prices that the firm will charge (perhaps with some adjustment formula over time to reflect inflation and productivity changes). In this sense, the product of the negotiation is much like the product of other forms of regulation: a pricing formula that will be in force until some future date when it will be readjusted.

The reputed advantage of a franchise agreement is that it avoids the necessity for creating a formal regulatory authority. In reality, this is not the case, for several reasons.

First, during the initial negotiations, the government needs to have information about costs, demand, and technical possibilities in order to establish a rational negotiating position. The single most powerful lesson of recent research on regulatory mechanisms is that government will be able to extract a better deal from the regulated firm if it can reduce the firm's informational advantage. Government can generate better information for itself by deciding to use competitive bidding to determine prices and service obligations as well as the amount it will receive for the privatized entity; however, to evaluate these bids, the government also must have some basis for comparing the price and service commitments in bids for the company, which requires information about costs and demand. In the absence of such information, government is in danger of awarding the franchise to a "low-ball" bidder that knows full well that its bid is unrealistic, but relies on the fact that once it is entrenched, the government will face significant costs if it seeks either to enforce the performance agreement or to dislodge the winning bidder.

Second, if a firm acquires a company with a franchise agreement that is good for only a few years, it legitimately has a concern about the outcome of future negotiations for renewing the agreement. A firm easily can walk away from the initial negotiations, but once it has bought the company, it has substantial sunk costs that can be

recovered only through multiple renewals of the agreement. To avoid being placed in a weak bargaining position at the time of renewal, the firm will require either that first period prices be very high (or the purchase price of the company be very low), or that future agreements be guaranteed to allow the firm to cover a reasonable estimate of costs. Because the second alternative almost certainly is more efficient, both parties will prefer it, but to implement it, the government must be capable of gathering and evaluating the same information that it needs to undertake other forms of regulation.

One way out of the renegotiation problem is for the government not to sell the company, but instead to sign an operating contract with the franchisee. In this case, the franchisee does not have sunk costs that can be recovered only through multiple renewals of the agreement, and in negotiating prices is concerned only about recovering its actual operating costs during the period of the franchise. Unfortunately, this form of agreement creates another major problem that largely vitiates the neoliberal reform. The franchisee no longer is responsible for capital investments; the decision about how much to invest still resides with the government. Moreover, the franchisee also has no incentive to undertake repair and maintenance that will keep capital investments in optimal operating condition. In essence, in this system the government has retained responsibility for capital investments while distancing itself from their operation. This arrangement is likely to be very inefficient.

Third, a long term contract can not fully anticipate all the significant changes in market conditions that will arise over its term. Just as in the case of price cap regulation, unexpected events can cause either party to seek to renegotiate the contract. Consequently, both parties are likely to want to incorporate provisions for reopening negotiations, and protections concerning the relationships between prices and costs should the other party exercise these provisions to change the price agreement. The result is likely to be a process that looks very much like cost of service regulation.

The upshot of the preceding analysis is that a nation is not likely to be able to avoid investing in a regulatory process, regardless of the details of the formal arrangements between the firm and the government. On the basis of either their effects on the efficiency of the firm or the cost of the process, these alternatives are not likely to differ very much, especially in a developing country. The most important implication is that every approach other than cost of service regulation with continuous monitoring, which is dominated by a system that has regulatory lag, creates an intermittent demand for the services of regulators. Consequently, a specialized regulator with authority

over a small number of companies will be essential to rational policy making on occasion, but will not be useful much of the time. Whereas intermittent excess capacity is worth avoiding in any context, in developing countries, where the skills needed for effective regulation can be extremely scarce, opportunities for avoiding this excess capacity are especially attractive.

The preceding observation argues for one of two approaches. One is to create a general regulator with responsibility for all newly privatized monopoly utilities, which is the model followed in implementing state regulation in the U.S. This approach is not fully satisfactory, for even in the developed context of the U.S., assigning multiple responsibilities to an agency still does not enable agencies in smaller states to be large enough and to possess sufficient specialized expertise to be effective. The other approach is to for several nations to collaborate in establishing an international authority to regulate telephone companies in all participating countries, which is the approach taken to implement international trade disputes under the WTO, the European Union, and the North American Free Trade Agreement.

The latter alternative has never been attempted in any form of utility regulation, for each nation seems to want to retain full autonomy over these industries. Nevertheless, it has crept in indirectly through trade disputes about the use of regulation as an indirect trade barrier (Noll, 1997). Internationalization of regulation has many attractive features (Noll, forthcoming). First, it allows the development of specialized expertise in telephones at a scale that a small developing country can not afford. Second, it captures economies of scale in regulation by applying the lessons learned when a new problem is raised in one proceeding to the same problem as it arises in subsequent cases. Third, it permits the regulator to use information about technology, costs, and demand in one country to assist it in detecting inefficiencies in other countries, much as in the theory of benchmark competition. Thus, a promising agenda for developing nations is to consider creating joint regulatory authorities, perhaps through existing regional trade alliances.

***Political Factors Influencing Regulation***

The discussion to this point focuses on the mechanics of price regulation, specifically what method will be used to set prices. In practice, this choice is likely to be less important than the broader issues of the structure and process of the regulatory authority. All regulatory processes are inherently conflictual, and participants in the regulatory process will seek to influence that process to their own advantage in any way that is available to them.

Submitting information to regulators that supports a favorable decision is only one way of exercising influence. Another is to seek intervention by political allies. Moreover, because every group expects that others will try to exercise the same political influence, collectively they are likely to seek some mechanism for protecting themselves against highly unfavorable outcomes that reflect effective political intervention on behalf of others.

Commitment is one aspect of this problem. Restated for the present discussion, the commitment problem refers to the desire on the part of a privatized utility to be permanently protected against other interests that might seek low output prices, high input prices, financially unrealistic service requirements, or confiscatory taxes that, effectively, would expropriate the firm's investments for the benefit of others. In addition to the commitment problem, which is one of price-cost margins that are too low, regulation presents another danger that actually has proved to be more common: regulatory capture. Here the problem is that the regulators are especially solicitous to the regulated firm, allowing it to charge high prices, earn high profits, and provide low quality service.

To understand both expropriation and capture requires identifying their political and bureaucratic causes.[24] In general, all policy making, including regulation, is subject to inefficiencies and unfairness that arise from representation bias. Representation bias arises because those who organize themselves to participate in the policy process are more likely to have their interests taken into account in policy decisions.

One source of representation bias is incomplete information. Because information is imperfect, policy makers seek data from more expert sources. For information pertaining to the details of technology, demand, and costs in an industry, those who supply service frequently have extensive private information that is necessary for making efficient policy. Because all parties can be expected to submit information that is beneficial to their interests, on balance the effect of the information that they do submit will to bias policy outcomes in their favor.

A second reason for representation bias is that not all interests are likely to apply pressure on political officials to intervene on their behalf. Political pressure here refers to a credible threat to withhold support from an official whose policy preferences and actions are unsatisfactory. If some groups with a stake in the regulatory process are organized to make such a threat, but others are not, political intervention will be biased in favor of organized groups.

The third mechanism which can bias regulatory decisions relates to the interests and biases of the regulators. These biases can arise because agencies may be staffed by political actors who are not fully representative of even all

of the organized groups, let alone the groups that are not organized. For example, in a parliamentary system with strong, ideologically based parties, each important interest may be represented by only one party, so that swings in the partisan control of government cause significant swings in the identity of the interests that regulators will favor. In addition, regulatory officials may be inclined to favor some interests for other than political reasons. For example, regulators may expect to have short government careers, and so may seek to enhance their post-regulation employment by favoring a likely future employer. Or, some specialized skills of regulators may be obtained or usefully applied only in organizations that actively participate in the regulatory process, so that regulators naturally are inclined to think like those who are represented before their agency.

These problems are intensified because not all interests are likely to participate in the regulatory process. Participation is motivated by the prospect for economic gains, and so is determined by the stakes of a group in regulatory outcomes and the costs they must incur to become effectively represented. In general, groups that are already organized, that are small and homogeneous in their interest, and that have high per capita stakes are more likely to be represented. In particular, the regulated firm and perhaps a few very large users and input suppliers are likely to participate actively, while most user groups are not.

With this background, we can identify how both expropriation and capture can emerge. Expropriation can arise for two reasons, one internal and one external to the agency. First, user groups may be well-organized in the regulatory process, and cause service to be provided below cost. Second, an election may cause political pressure to be placed on regulators to favor users against suppliers. Capture can arise for parallel reasons. The firm, and perhaps some but not most users may be effectively represented in the regulatory process, causing regulators to allow the firm to earn excess profits, perhaps as a reward for cross-subsidizing select users (such as government officials). Or, electoral politics may bring to power a party that favors the regulated firm at the expense of user interests.

***Regulatory Design Implications***

The solution to both capture and expropriation is the same: to construct a regulatory agency that is unlikely to be unduly influenced by any particular interests. Basically, the design of the agency must assure that as much relevant information is presented to the regulators as is reasonably feasible, that the decision makers are neither homogeneous in their biases nor subject to unbalanced external pressure, and that neutral arbiters can intervene should an agency make an unreasonable decision. These requirements raise both the tree and forest issues: how to

design the agency, its connections to the larger system of government, and the principles for deciding whether an agency or the government as a whole has acted unreasonably or unfairly. The specific arrangements that contribute to this objective are as follows.

First, the personnel of regulatory agencies should be heterogeneous and stable. Short-term changes in the political control of government should not cause dramatic short-term swings in the composition of the agency, and the careers of regulatory officials should be secure through political change as well as long enough and remunerative enough so that regulators are not constantly seeking interesting future employment possibilities. The personnel requirement implies that civil service procedures should govern influential regulatory positions, and that political appointments to agencies should not be purely partisan. The U.S. independent regulatory commission, in which political appointments to a multi-headed body are for several years and are subject to partisan diversity rules, represents the extreme form of insulation from political pressures. The British and Japanese systems, in which heads of regulatory authorities and their lieutenants are professionals, but policy authority rests in a cabinet ministry run by a partisan appointment, seek to achieve independence by giving more authority to civil servants.

Second, the agency can be given independent authority to generate information and even resources to represent interests that otherwise are not organized to participate in its processes. For example, regulators can undertake their own investigations and research on technologies, the performance of firms that they do not regulate, and cost and demand. In some cases, separate bureaus within the agency can be established to advocate unrepresented interests.

Third, the agency can be subject to openness requirements. The agency can be required to conduct all business in public, to refrain from secret contacts with either interested parties or political officials, and to release all relevant information pertaining a decision as well as a preliminary indication of the decision it is likely to make before the actual decision is made. Openness requirements are beneficial because they give advance warning to those who are affected by a decision, enabling them to intervene if the decision is unfavorable, but simultaneously guaranteeing that both the existence and the content of their intervention will be public. Openness forces regulators to reveal the informational basis for their decision, and is therefore useful for revealing whether the agency's decision is biased and unsupported by facts (McCubbins, Noll, and Weingast, 1987 and 1989).

Fourth, a nation can adopt a form of “high law” (such as a constitution) that constrains ordinary laws (such

as legislation, decrees, or administrative rules). An example is a prohibition against expropriating property without compensation if the property owner is not using the property in a manner that is negligent, monopolistic, or criminal.

Fifth, the decisions of the agency can be subject to review by another body that is freer of representation biases, especially biases affecting participation in the agency's processes, at the instigation of anyone who is dissatisfied with a decision. The most common reviewing body is a general purpose court that itself is politically independent and diverse in composition (see Levy and Spiller, 1996). The advantage of a general purpose court is that it is less likely to favor a particular industrial interest and less likely to regard itself as possessing sufficient specialized expertise that it can substitute its own technical analysis for that of the regulator. The issues to be decided through judicial review are whether the decision is supported by the evidence, is authorized by the regulator's formal policy objectives, as stated in its formal legal mandate, and respects limitations that are imposed by high law. The use of judicial review, by implication, requires that the agency's authority and decision-making processes be clearly specified in some form of legal document, such as legislation or decree, that predates the decision under review.

The unfortunate part of this litany of procedural and structural safeguards is that they are costly to implement and assume the presence of a highly developed legal system that is not yet present in many developing countries. For some large developing countries with a substantial middle class, such as Brazil, India, or Mexico, these safeguards plausibly are present and affordable, so that a recommendation to implement western-style regulatory agencies is not out of the question. In a small, poor country, the domestic supply of professionals to implement this kind of regulatory system is low and inelastic. Hence, the realistic choice facing a small country is either a system with elaborate safeguards that is operated primarily by foreigners (perhaps in a regional regulatory authority as described above) or a far less elaborate system. Moreover, the cost of protecting against confiscation of property is lower than the cost of protecting against capture. Reasonable protection against expropriation involves little more than an enforceable high law against expropriation that is enforced by an independent judicial system where regulated businesses have standing. Protection against capture requires creating a structure and process that gives regulators enough relevant information to do a reasonably good job and that enfranchises otherwise unrepresented interests, which implies a large bureaucracy. The more plausible scenario in a small, poor country that retains regulatory autonomy is that the regulator will be too small and weak to avoid capture, rather than that the

system will lead to expropriation.

The preceding conclusion does not imply that neoliberal reform is not desirable in small, poor countries. Private monopolies that are not tightly regulated may earn high profits, but have a powerful incentive to provide service to anyone who can pay their prices, and thereby to eliminate multiyear waiting lists for obtaining a connection. If these firms can profit from usage, they also have an incentive to avoid service quality problems such as failure to obtain a dial tone, failure to reach a called number, and interruption of service.

Other than high prices to those who subscribe, the unsatisfactory feature of the performance of loosely regulated monopoly is in providing "universal service" – that is, extending the penetration of the phone service to anyone who will not or can not pay the super-competitive prices that may emerge under weak regulation. But decades of experience with nationalized telephone companies teaches that they also do not serve the universal service objective. History teaches that the stronger political influence affecting nationalized entities is more likely to be used to provide a cash flow to the government and to support excessive employment at the expense of both universal service and efficient operation.

The political issues surrounding the creation of effective regulators also make both benchmark regulation and international collaborative regulation more attractive. By pooling resources, a regional association of small nations can produce a regulator that is more expert, more independent, and freer from representation bias than any could create on its own. Of course, for either the soft (benchmarks) or strong (international agency) forms of collaboration to work, the political institutions and values of the collaborators must be broadly similar.

***Facilitating Competition***

The inherent difficulty of implementing effective regulation constitutes a powerful argument in favor of policies to encourage competition. Moreover, the universal service problem arises in part because monopolies have an incentive to provide less service than the market can support, so that in a nation that is likely to have weak regulation the universal service goal is a reason for permitting competition. But creating a competitive telecommunications industry is far from an easy task. The first step is to eliminate regulatory entry barriers. This task is easier said then done, because in almost all countries regulation typically requires that all firms obtain a license or franchise, and then the entrant, like the incumbent, must satisfy requirements about filing tariffs and sometimes cost information. The fundamental reason for this practice is that regulation frequently creates massive

cross-subsidies in the price structure, which encourages entry to serve customers who pay high prices. If entrants are not required to participate in the cross-subsidy system, the cross-subsidies are unstable. To protect the pricing structure regulators simply prevent competition that might attack the source of the subsidies. Preventing entry is an expensive way to protect cross-subsidies, and is still another reason to adopt explicit industry-wide taxes as a means to implement subsidies. But in any case, extensive cross-subsidization within the price structure of a regulated firm is fundamentally at odds with the objective of promoting competition. Regulators can have one or the other, but not both.

Abstracting from the dubious purpose of sustaining cross-subsidies, if several firms enter a market, anything more than perfunctory notification requirements are unnecessary and can be pernicious because notification facilitates collusion. Entrants, because they are competing with a dominant firm that is subject to price regulation, need not themselves be subject to price regulation because they lack market power: their combination of price and service must equal or beat the incumbent's offerings for them to succeed. Whereas relieving entrants of regulation seems simple and obvious, few countries have been able to do so.

Assuming that regulatory entry barriers can be avoided, the fundamental problem in promoting competition in telecommunications is overcoming the economic and technical advantages of an incumbent monopolist that arise from the network aspect of the industry: telecommunications services derive their value from connecting the originator of a message to the recipient. Whereas some customers may be content to reach few other customers, in general the demand for telecommunications by one customer is increasing in the number of other parties that can be reached. Because an entrant can not immediately enter at a scale that gives it a large fraction of access customers, initially at least almost all connections must make use of the facilities of the incumbent. Unlike nearly all other industries, competitors in telecommunications must accommodate joint use of their facilities in order for the industry to operate efficiently in a competitive environment.

In all infrastructural industries including telecommunications, by far the most difficult regulatory problem has been to force incumbents to provide efficient interconnection arrangements for its competitors (Armstrong, Cowan, and Vickers, 1994, and Joskow and Noll, 1999). Interconnection pricing must cope with two fundamental problems: the inevitable market power of local access carriers in termination charges, and the incentive of the incumbent monopolist not to offer interconnection to entrants.

A basic principle of telephone pricing is that the calling party pays. This policy protects consumers against facing the equivalent of an automatic, unauthorized collect call every time the telephone rings, but it also creates a big economic distinction between origination (the use of the customer's access provider) and termination (the use of the recipient's access provider). If the industry is competitive, access firms will compete over the service prices that they offer customers, including the origination fee. However, a customer can not choose how a call will be terminated, so companies will not compete over termination charges unless the principle of "caller pays" is abandoned. Hence, even in a competitive environment, an access firm is likely to have substantial market power in termination charges.

Incumbent monopolists have the additional advantage that they can use termination charges to create a barrier to entry. The incumbent will seek to retain all customers who are profitably served by the existing network. If entrants can not offer their customers the opportunity to connect to customers of the incumbent, the entrant will win few customers because the object of telecommunications is to reach other parties. The sole exception is that a large company or group of customers may still have an incentive to create a private network, allowing communications within the group that is served by the entrant, and then to rely on separate service from the incumbent for contacting others. But the vast majority of customers are not likely to want to subscribe to two separate telephone systems, and even if they were so inclined, requiring them to do so is inefficient because interconnection of two systems is far cheaper than extending the reach of each to all customers who want to reach users of both networks.

Given an entrant's need for interconnection, an incumbent monopolist has two strategies that enable it to create barriers to entry. One is to charge high prices for completing connections that make use of the entrant's facilities. The other is to provide technically inferior connections between its facilities and the facilities of a competitor. Together these strategies create the "interconnection problem" for entrants. High prices for most connections can force the entrant to suffer financial losses every time one of its customers connects with a customer of the incumbent, and poor interconnection prevents the entrant from competing effectively for customers who care about service quality. If the incumbent adopts interconnection policies that create an entry barrier, successful entry requires offering services (access and long distance) at sufficient scale that entrants can avoid the facilities of the incumbent for a large fraction of their service and can impose costs on the incumbent that are comparable to the costs

the latter imposes on the former for the remaining services that use the facilities of both. If such is the case, extensive regulatory intervention is unnecessary, for parties with the power to impose costs on each other have a strong incentive to negotiate efficient interconnection agreements. This argument constitutes the main reason for breaking up a nationalized telecommunications entity into several components when it is privatized.

The interconnection issue has given rise to many different approaches to policies for encouraging competition. Denial of efficient interconnection is a ubiquitous problem in telecommunications, and no nation has yet fully solved the problem of facilitating competition among local access providers (Armstrong, Cowan, and Vickers, 1994, and Joskow and Noll, 1999).

One approach is simply to ignore the problem and to require that competitors negotiate interconnection agreements privately. Whereas this policy can work if the firms are roughly equally well-established, it is not likely to generate entry by firms that initially lack a significant customer base. Negotiations, without further rules and requirements, can not solve the problem if only one negotiator has an incentive to make a deal. When entry is first permitted, entrants have few customers, so the customers of the incumbent are not likely to place a high value on reaching the entrant's network. Consequently, the incumbent has no good reason to negotiate an agreement that does anything less than preserve all of its existing net revenues.

As a supplement to private negotiation, one can rely on competition (antitrust) policy to detect and punish anticompetitive pricing. This approach was tried in New Zealand. Unfortunately, antitrust, because it is a slow process, imposes additional costs on entrants. Moreover, the tests for anticompetitive pricing also all involve comparing prices and costs, and so have informational requirements that are like those of regulation. In New Zealand, this approach failed for another reason. The British Privy Council, which serves as New Zealand's Supreme Court, overturned a lower court decision that the incumbent monopolist behaved anticompetitively when it insisted upon interconnection prices that were based on the Efficient Component Pricing Rule, which had the effect of ending competition for most services.

For long distance and value added services, another relatively easy solution to the problem is to require vertical separation of these services from local access. Vertical segmentation of the industry removes the incentive of an incumbent local access monopolist to favor one provider of the other services over any other. A similar but somewhat less effective strategy is to require the incumbent to operate competitive services through a separate

subsidiary and to offer service to its affiliates under the same terms that are offered to competitors. This policy does not eliminate the incumbent's incentive to discriminate against an entrant, but makes such discrimination easier to detect; however, the incumbent still may operate the competitive subsidiary at a loss by charging extremely high prices for access to the monopoly components of the network, and obtain further advantages if it provides better technical capabilities or more complete and up to date information about the technical features of the network to its affiliate.

The last mechanism for coping with the interconnection issue is to attempt to formulate pro-competitive rules for interconnection arrangements between the incumbent and its competitors. Interconnection regulation is an alternative to vertical segmentation for promoting long distance competition, and at least temporarily a necessary means for promoting local access competition. Interconnection regulation has two components, one dealing with prices and the other dealing with technical interconnection arrangements.

With respect to pricing, the absence of effective practice has led to a three-way debate over the best theoretical approach. One proposal is to make use of price cap regulation, another is to set interconnection prices equal to long-run average incremental cost, and the last is the "Efficient Component Pricing Rule" (ECPR). None is fully satisfactory because each has a significant potential loophole that could lead to inefficiencies.

If strategic considerations are ignored, price cap regulation has the property that a firm will not offer a service if it is inefficient in doing so, and will adopt Ramsey pricing – prices that exceed marginal cost by an amount that is inversely proportional to the elasticity of demand – for every service that it does offer. Unfortunately, strategic considerations may prevent price caps from assuring that efficient entry will occur.

First, the incumbent may wish to punish small scale entry in one market as a means of foreclosing it in other markets, either to preserve monopoly elsewhere or to prevent the entrant from growing in a manner that would enable it to capture economies of scale, scope, or experience (learning by doing).

Second, the incumbent may enjoy opportunities for price discrimination in one market that are not available in another, which would be destroyed if the first market became competitive. By setting a high price for inputs for the potentially competitive market, the incumbent can create a price squeeze on competitors that permits the incumbent to practice price discrimination.

Third, price caps have the unfortunate property that they increase the attractiveness of predatory pricing

strategies. In the absence of price cap regulation, a firm will charge profit-maximizing prices in each market, but under binding price-cap regulation, profit-enhancing price increases are available (but unattainable) in each market. In the latter case, if a firm cuts price predatorily, part of the financial losses during the predation period can be recovered by profit-enhancing price increases elsewhere.

The strategic possibilities under price caps are ameliorated if the services that are offered by a firm are separated into distinct groups, with a separate price cap for a bundle that contains only competitive services. This policy prevents offsetting anticompetitive prices in competitive markets with price changes in monopoly markets, which is they key to several of the strategies described above. But if regulators hope that all prices are potentially competitive, but do not know the sequence and intensity of entry across services, they must either have a large number of small bundles, or be prepared to redefine the bundles whenever a firm enters a new market or a new product is introduced. The former amounts to freezing the price of an incumbent monopolist when it faces entry (and so is anticompetitive), and in any case its implementation requires estimating costs. The latter amounts to something like cost of service regulation if entry is frequent and so bundles must be redefined frequently.

Another approach to pricing policy is simply to have regulators set interconnection prices equal to long-run average incremental cost. Specifically, this pricing rule requires charging an entrant only for the costs of creating a connection to the incumbent's network and then using that network. Aside from the problems of cost of service regulation, this system creates some other problems as well. Suppose, for example, that the incumbent local access monopolist faces significantly different costs of service in different areas. If the regulator sets a single price equal to system-wide average cost, the entrant has a financial incentive to enter in places where the costs of local access are below average but to purchase interconnection service in areas where costs are high. If regulators set a separate price for each area, allowing prices to reflect differences in costs, they are required to devote far more resources to measuring the costs of the incumbent firm.

The approach that has been followed in the U.S. is to establish elaborate regulatory rules regarding the interconnection services that each carrier must offer and the prices that they can charge.[25] In the U.S., local access carriers are required to sell customer connections at wholesale (to be resold by their competitors), to "unbundle" and sell separately the components of local service so that their competitors can construct hybrid networks (partly their own facilities, partly the resold facilities of the incumbent), and to interconnect their networks to the networks of

their competitors with service that is technically equivalent in quality and capability with the interconnection that they provide to themselves. Moreover, all of these services are to be priced at the forward-looking long-run incremental cost of an efficiently designed network, regardless of the actual cost of the incumbent. Theoretically, this system is designed to generate exactly the scope and nature of entry that is most efficient; however, the informational requirements that this scheme places on regulators is truly awesome, and probably beyond the capability of U.S. regulators, let alone the regulators of much smaller countries.

In the process of setting interconnection prices, regulators also have faced another issue: whether the incumbent will be guaranteed that competition will not prevent it from recovering the costs of its investments (commonly called its "stranded costs"). The premise of such a guarantee is that regulation is a contract between the government and the incumbent monopolist in which the latter agrees to have its business decisions controlled by the government in return for the government promising not to expropriate its capital. Thus, the decision to permit competition is made equivalent to the decision to nationalize, with the government bearing the responsibility to compensate the incumbent for financial losses that it suffers due to competitive entry. The method for compensating the entrant is not simply to appropriate the funds as part of the government's budget, but to set interconnection prices in a manner that fully compensates the monopolist for its lost business, essentially making the monopolist indifferent between maintaining and losing its customers as long as its investments for serving them are in place. This argument was the basis for the Privy Council's decision regarding interconnection pricing by the incumbent monopolist in New Zealand.

If this view is accepted and if entry causes customers to switch to competitive service providers, entrants somehow must be taxed to pay off the incumbent for the excess capacity that is left after customers migrate. Out of this requirement has emerged the "Efficient Component Pricing Rule," or ECPR (Willig, 1979, and Baumol and Sidak, 1994). This approach to pricing was designed to be the least distorting method for pricing interconnection that insures the incumbent against financial loss. In essence, interconnection prices are set so that the incumbent recovers all the costs that it did not save when its customers switched to its competitors. Thus, suppose that the incumbent's price, P, equals average cost, C, which can be decomposed as follows: $C = C_1 + C_2$, where $C_1$ is the component of cost that can be saved if a customer switches to an entrant, and $C_2$ is the "stranded cost" component that remains after the customer switches. Under ECPR, the entrant must pay $C_2$ to the incumbent, so that the

entrant's financial cost of serving the customer is $C_2 + C_e$, where $C_e$ is the entrant's average cost.[26] To compete effectively with the incumbent, the entrant must be able to offer service at the same or lower price as the incumbent charges, P = C. Thus, the entrant can be profitable and compete effectively only if its average total cost, $C_e$, is below the cost savings of the incumbent when the customer switches, $C_1$.

ECPR tracks the expected pricing behavior of a competitive firm facing either efficient entry or a fall in demand relative to supply in a competitive market. A firm will stay in the market as long as price exceeds variable cost. Hence, ECPR is efficient in the sense that entry occurs only if the entrant offers society a cost saving.

The policy issue that is raised by ECPR is the extent to which the effect of entry on prices in a competitive market sheds useful light on regulatory policy in a market that is making the transition from regulated or state-owned monopoly to competition that is very likely to be substantially less than perfect, and perhaps no more than duopoly. The conceptual foundation of ECPR is that the incumbent is operating efficiently with zero excess profits. In this milieu, entry can accomplish very little, even if the incumbent monopoly is not a natural. If one buys this assumption, then the ECPR framework makes sense – its main concern is protecting against entrants who are not efficient, but who, instead, are responding to distortions in pricing that arise in regulated markets.

The criticism of ECPR from both academic economists (Economides and White, 1995; Joskow, 1998; and Laffont and Tirole, 1998) and regulators arises primarily from a fundamentally different conceptual model of regulation. The critics start with the position that regulated or state-owned monopolies are inefficient, in particular that they sit on a stock of costly and poorly performing investment, and that entry will lower costs (including investment costs). Under this assumption, the philosophical principle that the inefficient incumbent is entitled to continue to earn returns on its bad investments is not as compelling. To the critics, ECPR enshrines the inefficiencies of the incumbent carrier not only as social obligations that must be repaid, but as obligations on competitors and their customers. By so doing, it reduces the benefits of allowing competition, which is to punish inefficient operation by the incumbent monopoly. Consequently, the critics tend to come down in favor of either price caps or forward-looking, cost-based methods for pricing unbundled network elements, and either this approach or no charge at all ("bill and keep") for call-completion services between competing local carriers.

From the perspective of developing countries, the debate about interconnection pricing among economists in advanced, industrialized democracies has a certain other-worldly character. All of the cost-based pricing

proposals for wholesale of network elements and all interconnection proposals other than "bill and keep" require a lot of information and a resource-rich regulator. Obviously, one can not just take the word of the incumbent or a competitor concerning either the incumbent's historical incremental capital cost or the forward-looking average incremental cost of various services. To be effective, regulation must have sufficient sophistication to reduce the informational advantage of carriers, and in a complex, dynamic industry like telecommunications, satisfying this requirement is far from trivial. Moreover, even in the best of circumstances, the regulated prices that one competitor charges another are virtually certain to be "wrong" (not perfectly efficient), and hence to cause distortions in both entry and consumer prices. Thus, in developing countries it probably is not worthwhile to pursue hybrid entry through regulating unbundled wholesale pricing of access elements except as a short-run strategy while entrants build out their own networks, and quite attractive to consider "bill and keep" rather than completion charges among competitors.

The research literature does not support a very firm conclusion on which regulatory approach a nation should adopt for encouraging access entry, partly because the experience to date with any approach to interconnection pricing is too limited to support robust empirical analysis. Nevertheless, three policies are likely to be reasonably effective and easy to implement: to eliminate artificial barriers to entry that arise from imposing on entrants the same licensing requirements that are imposed on the incumbent monopolist; to separate local access from long distance, thereby eliminating the incentive of a local access supplier to discriminate in favor of its affiliate; and either to eliminate usage-based interconnection tariffs or to place a ceiling on interconnection prices that is closer to actual costs than the ECPR price, whether through cost of service regulation or a more arbitrarily selected price ceiling in a form of price cap regulation that does not bundle monopoly and competitive services.

A useful side requirement is to require that originating and terminating access usage charges be equal both to each other and for local and long distance carriers. The logic of this requirement rests mainly on the fact that origination and termination access costs are virtually identical, and do not differ according to the distance of the call. Because long distance calling has quite elastic demand, an incumbent monopolist faces a disincentive to raise long distance prices through high usage-based access charges, which can dampen its ardor for high interconnection prices for local access if these interconnection prices must be equal. Likewise, if an incumbent is encouraged to exercise its market power in terminating access charge, a rule that requires a parallel increase in the incumbent's originating

access charge will undermine its ability to compete for access customers.

Finally, the presence of regulation in telecommunications should not cause the industry to be ignored by competition policy agencies. Competition policy is not a panacea because it also requires substantial information. But ongoing independent scrutiny by competition policy agencies is useful because it provides an independent source of information and pressure in the regulatory process to encourage competition, and thereby helps to protect against regulatory capture. Moreover, competition policy agencies are more expert in anticompetitive business strategies, and so can assist regulators in implementing a policy to encourage entry.

In one important sense, some developing countries may face better prospects for significant competition in local access than the developed countries that are attempting to introduce it. The obvious disadvantage of developing countries is that their smaller markets may prevent competitors from achieving sufficient scale to be successful; however, as discussed above, the scale barriers to competition probably always were overstated, and in any case are disappearing due to technological change. The advantage of developing economies is the poor performance of incumbent monopolists. Multi-year waiting lines and vast areas where no service is offered at all offer entrants the possibility of gaining a large number of new subscribers very quickly without having to win them from the incumbent. And, poor service quality is likely to make customers less attached to the incumbent than is the case in developed countries, where service is generally much better. Of course, soon after neoliberal reform of an incumbent monopolist, these favorable conditions will erode, because even a profit-maximizing monopolist will perform better on all these counts than a state-owned ministerial monopolist. Hence, nations that postpone opening their markets to competition risk foregoing the benefits of competition for a much longer time than the duration of the formal postponement.

## IV. CONCLUSIONS

Two areas of conclusions are suggested by the preceding analysis. One pertains to the policy advice that can be deduced from both theory and empirical analysis of the performance of the industry to date, and the other pertains to identifying the areas where more knowledge might be very useful.

### *What We Know*

Economic theory teaches that the first job of policy makers is to create institutions that convey the right

incentives to buyers and sellers in a market. In the context of telecommunications, this task is made more difficult by the technical characteristics of the industry and its historical structure. The most important technical characteristic is its network character, which makes monopoly difficult to overcome even if the monopoly is not natural. History matters because of the inheritance of a nationalized structure that is highly politicized and highly inefficient. This history leads to bad news and good news: the bad is that some powerful political forces have a stake in preserving their private benefits that arise from the inefficiency, but the good news is that modest changes can create dramatic improvements in performance. There is nothing like a poorly performing nationalized incumbent to set the stage for a highly successful introduction of privatization and competition.

Getting more to the details, we know that governments have a powerful incentive to privatize in a manner that creates a monopoly, partly because that maximizes their revenues from privatization and partly because it threatens less disruption of employment by the incumbent. And, simple privatization with weak regulation certainly solves the problem of the visible commitment to let the firm operate without expropriation for long enough to recover its investment. But this approach creates another problem, regulatory capture. If historical path dependence implies that the commitment problem is really not that severe while the window for relatively easy introduction of competition is short, the commitment to loosely regulated temporary monopoly is a mistake.

In any event, at least temporary monopoly is likely to be a reality regardless of how the industry is liberalized. Hence, for some period a country is well-advised to attempt to control monopolistic behavior. To do so will benefit consumers and the national economy by providing lower prices, and because monopoly profits are not necessary to induce investment, lower prices do not come at the expense of slower improvements in service and expansion of capacity. Indeed, a plausible threat of competition is an inducement to improve service and increase capacity.

Economics is less clear about exactly what form regulation should take. In practice, all forms of regulation are distortionary and create incentives for anticompetitive behavior. Even though price cap regulation as it appears in the theoretical literature can not be implemented, the fundamental insight of price cap regulation is useful and applicable: less intensive and more intermittent scrutiny of a firm's costs and profits actually produces, on average, lower costs and prices in the long run. Nevertheless, regardless of the name attached to the particular regulatory system, all realistic alternatives require that regulators periodically audit the firm and check not only for the

reasonableness of the overall price structure in relation to costs, but also the reasonableness of specific prices that can have a significant effect on the viability of competition.

Of course, good regulation is expensive, and may not be feasible in some countries. In these cases, the desirability of an early commitment to competition, when the incumbent is more vulnerable to successful entry, is especially important, for it can minimize the extent to which costly regulation will be needed. In addition, developing countries, especially smaller ones, might capture significant benefits from pooling their resources to form regional regulatory entities, which may be necessary to generate sufficient regulatory firepower to competition even a fighting chance.

***What We Don't Know***

The main hole in research about neoliberal reform of telephone service in developing countries is empirical knowledge. Serious reforms only began in the mid to late 1980s, and sufficient data to evaluate the many differences in details across countries is only now emerging. The comparative performance of different methods for reorganizing the incumbent and different regulatory systems, and their dependence on the history and circumstances of a country, in some cases have not been identified convincingly by theory, and in other cases have not been quantified. As in much of applied microeconomics, the theory to fact ratio is far too high in this area.

Research to date has quite naturally focused on case studies of reforms. The best studies describe the reform (with varying degrees of detail), use basic principles of economics to make predictions about the incentive structure that was created by the reform, compare the pre- and post-reform performance of the industry, and reach conclusions about its strengths and weaknesses. Sometimes these are gathered together in a multi-author compendium that tries to make generalizations about the cases. Examples that exhibit considerable variation in the sophistication with which they pursue this approach are Levy and Spiller (1996), Galal, *et al.* (1994), Kikeri, Nellis and Shirley (1992), Petrazzini (1995), Ramamurti (1996), Roth (1987), and Wellenius and Stern (1994).

Whereas much of this work is extremely useful, its contribution has two important limits. First, the cases are not thoroughly integrated: they do not contain the same information and are not based on the same conceptual model because they have different authors who take somewhat different approaches. Any attempt to integrate them is limited by the absence of full comparability. Second, the number of cases is too small to support general conclusions. The books that are listed at the end of the last paragraph cover mostly the same cases, and collectively

provide reasonably complete information on only about ten developing countries. In short, the number of policy decisions in a reform process is so large that a summary of case studies that attempts to draw inferences about the independent contribution of each part of the reform has negative degrees of freedom. Of course, one can not fault the authors and editors of comparative case studies for this shortcoming, for a book of case studies that could support an econometric test of the effects of differences in the details would be encyclopedic in length.

A few authors have tried to construct larger samples in order to sustain statistical analyses of the effects of reform. Examples are Boubakri and Cosset (1998), D'Souza and Megginson (1998), and Megginson, Nash and Van Randenborgh (1994). The strength of these papers is that they provide interesting information about the overall effect of reform on several measures performance, including profits, prices, productivity, investment. But to date, this work has not adopted a very comprehensive approach to characterize the institutional and policy differences among reforming countries. Instead, reform is represented by simple indicators, such as whether a SOE was privatized. As with the case studies, one can not fault these authors for the simplicity with which they characterize reform, for the task of developing good quantitative indicators of the institutional details would require something like a case study for each country in the sample.

The main research agenda, then, is to combine the richness of institutional detail that one finds in the best case studies with a large enough statistical sample to support stronger conclusions about the direct links between distinct policy decisions and ultimate performance. This task is not a small one.

**Table 1:**
**TELEPHONE LINES PER 100 INHABITANTS: DEVELOPING COUNTRIES**

| | 1981 | 1986 | 1991 | 1996 |
|---|---|---|---|---|
| ***Latin America*** | | | | |
| Argentina* | 7.7 | 9.3 | 9.7 | 17.0 |
| Belize* | 2.6 | 4.7 | 11.0 | 13.3 |
| Bolivia* | 2.6 | 2.6 | 2.7 | 4.3 |
| Brazil* | 4.3 | 5.5 | 6.9 | 9.6 |
| Chile* | 3.4 | 4.5 | 7.9 | 15.6 |
| Columbia* | 4.2 | 5.9 | 7.7 | 11.8 |
| Costa Rica | 7.3 | 7.9 | 9.9 | 15.5 |
| Cuba | 2.4 | 2.8 | 3.2 | 3.2 |
| Ecuador* | 3.0 | 3.1 | 4.7 | 7.3 |
| El Salvador* | 1.6 | 1.9 | 2.5 | 5.6 |
| Guatemala* | 1.2 | 1.6 | 2.1 | 3.1 |
| Guyana | 2.1 | 2.5 | 2.0 | 6.0 |
| Haiti | .4 | .5 | .7 | – |
| Honduras | .9 | 1.2 | 1.9 | 3.1 |
| Jamaica* | 2.6 | 3.5 | 5.4 | 14.2 |
| Mexico* | 4.3 | 5.2 | 7.2 | 9.5 |
| Nicaragua* | 1.1 | 1.3 | 1.3 | 2.6 |
| Panama | 6.9 | 8.0 | 9.4 | 12.2 |
| Paraguay | 1.7 | 2.1 | 2.7 | 3.6 |
| Peru* | 1.8 | 2.2 | 2.5 | 6.0 |
| Uruguay | 7.7 | 10.1 | 14.5 | 20.9 |
| Venezuela* | 5.6 | 7.5 | 8.0 | 11.7 |
| ***Middle East*** | | | | |
| Afghanistan | .2 | .2 | .2 | .1 |
| Algeria | 1.9 | 2.6 | 3.5 | 4.4 |
| Egypt | 1.0 | 2.2 | 3.4 | 5.0 |
| Iran | 2.5 | 2.9 | 4.1 | 9.5 |
| Iraq | 2.0 | 3.5 | 3.6 | 3.3 |
| Jordan | 3.2 | 5.7 | 7.2 | 6.0 |
| Lebanon | – | 9.5 | 8.5 | 14.9 |
| Libya | 2.8 | 3.9 | 5.0 | 6.8 |
| Morocco* | .9 | 1.1 | 2.0 | 4.6 |
| Oman | 1.5 | 3.4 | 6.4 | 8.6 |
| Syria | 3.4 | 4.2 | 3.9 | 8.2 |
| Tunisia | 1.9 | 2.9 | 4.0 | 6.4 |
| Turkey* | 2.8 | 5.4 | 14.2 | 22.4 |
| Yemen | .3 | .8 | 1.1 | 1.3 |
| ***Africa*** | | | | |
| Angola | .5 | .6 | .8 | .5 |
| Botswana | .8 | 1.1 | 2.5 | 4.8 |
| Burkina-Faso | .1 | .1 | .2 | .3 |
| Burundi | .0 | .1 | .2 | .2 |
| Cameroon | .2 | .3 | 4 | .5 |
| Central African Rep. | .1 | .1 | .2 | .3 |
| Chad | .0 | .0 | .1 | .1 |
| Congo | .5 | .5 | .7 | .8 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Cote d'Ivoire* | | .5 | | .6 | | .7 | | .9 |
| Equatorial Guinea | | .2 | | .3 | | .4 | | .9 |
| Ethiopia | | .2 | | .2 | | .3 | | .3 |
| Gabon | 1.3 | | 1.5 | | 2.7 | | 3.2 | |
| Gambia* | | .3 | | .4 | | 1.0 | | 1.9 |
| Ghana* | | .3 | | .2 | | .3 | | .4 |
| Guinea | | .2 | | .3 | | .2 | | .2 |
| Guinea-Bissau | | .2 | | .6 | | .6 | | .7 |
| Kenya | .5 | | .6 | | .8 | | .8 | |
| Lesotho | | .3 | | .6 | | .7 | | – |
| Liberia | | .4 | | .4 | | .1 | | .2 |
| Madagascar | | .2 | | .2 | | .3 | | .3 |
| Malawi | | .2 | | .3 | | .3 | | .4 |
| Mali | | .1 | | .1 | | .1 | | .2 |
| Mauritania | | .2 | | .2 | | .3 | | .4 |
| Mozambique | | .3 | | .3 | | .4 | | .3 |
| Namibia | | 3.1 | | 3.8 | | 4.1 | | 5.4 |
| Niger | | .1 | | .1 | | .1 | | .2 |
| Nigeria* | | .2 | | .3 | | .3 | | – |
| Rwanda | | .1 | | .1 | | .2 | | .3 |
| Senegal* | | .3 | | .3 | | .6 | | 1.1 |
| Sierra Leone | | .3 | | .4 | | .3 | | .4 |
| Somalia | .1 | | .2 | | .2 | | .2 | |
| Sudan | | .2 | | .3 | | .3 | | .4 |
| Swaziland | | 1.0 | | 1.4 | | 1.7 | | 2.2 |
| Tanzania | | .2 | | .2 | | .3 | | .3 |
| Togo | | .2 | | .3 | | .3 | | .6 |
| Uganda | | .2 | | .2 | | .2 | | .2 |
| Zaire* | | .1 | | .1 | | .1 | | .1 |
| Zambia | | .6 | | .6 | | .8 | | .9 |
| Zimbabwe* | | 1.3 | | 1.2 | | 1.2 | | 1.5 |
| ***Asia*** | | | | | | | | |
| Bangladesh* | | – | | .2 | | .2 | | .3 |
| Bhutan | | .1 | | .1 | | .5 | | 1.0 |
| China | .2 | | .3 | | .7 | | 4.5 | |
| North Korea | | – | | 3.2 | | 3.6 | | 4.9 |
| India* | .3 | | .4 | | .7 | | 1.5 | |
| Indonesia* | | .3 | | .4 | | .7 | | 2.1 |
| Laos | | .2 | | .2 | | .2 | | .6 |
| Malaysia* | | 3.5 | | 6.5 | | 10.0 | | 18.3 |
| Mongolia | | – | | 2.6 | | 3.1 | | 3.9 |
| Myanmar | – | | .1 | | .2 | | .4 | |
| Nepal | | – | | .1 | | .3 | | .5 |
| Papua New Guinea* | | .8 | | .8 | | .9 | | 1.1 |
| Philippines* | | .9 | | 1.0 | | 1.0 | | 2.5 |
| Seychelles | | 5.5 | | 10.2 | | 13.2 | | 19.6 |
| Sri Lanka* | | .4 | | .6 | | .7 | | 1.4 |
| Thailand* | | .8 | | 1.5 | | 2.8 | | 7.0 |
| ***Transition*** | | | | | | | | |
| Belarus | | 7.8 | | 11.1 | | 16.4 | | 20.8 |

| | | | | |
|---|---|---|---|---|
| Czech Republic* | 11.7 | 13.4 | 16.6 | 27.3 |
| Estonia | 15.4 | 18.1 | 21.2 | 29.9 |
| Georgia | 6.7 | 8.3 | 10.3 | 10.5 |
| Hungary* | 6.0 | 7.3 | 10.9 | 26.1 |
| Latvia | 18.4 | 21.0 | 24.3 | 29.8 |
| Lithuania | 12.1 | 16.4 | 21.9 | 26.8 |
| Macedonia | na | 12.5 | 14.3 | 17.0 |
| Poland* | 5.6 | 7.0 | 9.3 | 16.9 |
| Romania* | 7.6 | 9.3 | 10.8 | 14.0 |
| Russia | 7.9 | 10.9 | 15.2 | 17.5 |
| Slovak Republic | 9.6 | 10.9 | 14.4 | 23.2 |
| Tajikistan | 3.4 | 4.0 | 4.7 | 4.2 |
| Turkmenistan | 4.1 | 5.1 | 6.3 | 7.4 |
| Ukraine | 8.0 | 10.8 | 14.2 | 18.1 |
| Uzbekistan | 4.0 | 5.4 | 7.0 | 6.7 |
| Yugoslavia | 8.1 | 12.8 | 17.1 | 19.7 |

* Indicates submitted commitment to WTO Basic Telecommunications Agreement.

Sources: Pandya (1999) and *World Telecommunications Indicators, 1960-1996* (1998).

**Table 2:**
**TELEPHONE LINES PER 100 POPULATION:**
**INDUSTRIALIZED ECONOMIES**

| | 1981 | 1986 | 1991 | 1996 |
|---|---|---|---|---|
| ***Europe and Offshoots*** | | | | |
| Austria | 34.0 | 40.6 | 46.6 | 51.9 |
| Australia | 30.7 | 37.3 | 42.9 | 46.9 |
| Belgium | 26.3 | 32.7 | 41.0 | 46.5 |
| Canada | 41.3 | 49.4 | 56.2 | 60.2 |
| Denmark | 44.7 | 51.3 | 57.2 | 61.8 |
| Finland | 38.3 | 46.2 | 54.0 | 54.9 |
| France | 32.7 | 43.0 | 51.0 | 56.4 |
| Germany | 35.1 | 42.9 | 42.1 | 53.8 |
| Greece | 24.7 | 33.0 | 40.8 | 50.9 |
| Iceland | 38.0 | 46.4 | 52.2 | 57.6 |
| Ireland | 15.6 | 21.2 | 29.7 | 39.5 |
| Israel | 23.4 | 29.7 | 34.1 | 44.1 |
| Italy | 24.5 | 31.9 | 39.9 | 44.0 |
| Netherlands | 35.8 | 41.4 | 47.6 | 54.3 |
| New Zealand | 37.2 | 40.5 | 43.8 | 49.9 |
| Norway | 31.7 | 44.6 | 51.4 | 55.5 |
| Portugal | 11.3 | 15.6 | 27.4 | 37.5 |
| Sweden | 58.8 | 64.2 | 69.1 | 68.2 |
| Switzerland | 45.5 | 51.4 | 59.3 | 64.0 |
| United Kingdom | 33.4 | 38.3 | 44.9 | 52.8 |
| United States | 46.7 | 50.6 | 55.3 | 64.0 |
| | | | | |
| ***Asia*** | | | | |
| Honk Kong | 27.0 | 34.1 | 45.9 | 54.7 |
| Japan | 34.2 | 38.5 | 45.4 | 48.9 |
| Korea | 8.4 | 18.2 | 33.7 | 43.0 |
| Singapore | 24.1 | 32.5 | 40.3 | 51.3 |
| Taiwan | 15.5 | 23.3 | 33.3 | 46.6 |

Note: all of these countries have at least partially liberalized telecommunications, and all but Taiwan, which is not a WTO member, have signed the WTO Basic Telecommunications agreement.

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FOOTNOTES

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1. For an account of the beginnings of this reform in the advanced, industrialized democracies, see Snow (1986).

2. For an early history of the industry, see Kingsbury (1915). Many recent compendia of reform case studies contain essays with useful historical backgrounds for particular countries, including Levy and Spiller (1996), Ramamurti (1996), Roth (1987), Saunders, Warford and Wellenius (1983), and Wellenius and Stern (1994).

3. For a clear statement of the commitment issue, see Levy and Spiller (1996).

4. The idea of path dependence can be traced to Marshall (1879) and Arrow (1962), although its full implications have only recently been given great attention. Other important contributions to the economics of path dependence and the related concept of lock-in include Arthur (1989, 1994), David (1985, 1993), Farrell and Shapiro (1988, 1989), and Romer (1986, 1990).

5. A common misperception is that the instability of majority rule arises from the fact that voting mechanisms, unlike markets, do not allow people to express the intensity of their preferences. But Arrow's results apply to all social decision processes, not just to voting mechanisms. For example, the Kaldor (1939)-Hicks (1939) debate over the indeterminacy of benefit-cost analysis as a social decision criterion, due to the relative price and real income effects of policy interventions, is another illustration of Arrow's theorem.

6. For an example of this approach applied to regulation, Derthick and Quirk on American deregulation in the 1970s. Similarly, Athreya (1996) notes the liberalization in India was facilitated by a generational change in leadership in the late 1970s because the new cohort had broader experiences with (and sympathies for) market economies. See also Noll and Weingast (1991) on the use of ideological appointments to regulatory agencies as a commitment strategy.

7. The important institutional innovation in trade policy was to change tariff setting from a taxation process, in which each tariff was set independently of tariff decisions in other countries and separately by Congress where

revenues to the government were a focal objective, to a subject of international treaties, in which the President negotiated with other countries for mutual simultaneous reductions in a large number of tariffs and the Congress was forced to vote the agreement up or down without amendment.

8. Interestingly, countries in South Asia began to reform telecommunications only in the mid-1990s, and most countries in Africa and the Middle East have neither started the reform process nor signed the WTO Telecommunications Agreement.

9. Athreya (1996), Chowdary (1998), and Sinha (1996) all argue that reform in India was delayed and slowed by the early commitment to socialism and state-led development immediately after independence in 1947.

10. This section distills the information contained in the national and regional case studies that are listed in the bibliography and the extensive performance data from 1960 through 1996 in International Telecommunications Union (1998).

11. There are some exceptions. The reforms in the Philippines do not appear to have had much of an effect, and in Jamaica labor productivity actually fell after reform. Esfahani (1996) and Galal and Nauriyal (1995).

12. Details of the transaction are found in Gillary (1999).

13. This figure includes cash, debt, accumulated unpaid interest, and the portion of the mandatory investment commitment of these investors that would become an equity interest of the other investors. Each consortium had to commit $600 million in investment expenditures within two years, forty percent of which would be part of the equity of the other investors.

14. See, for example, Petrazzini (1996).

15. See, for example, Galal (1996), Manzetti (1997), and Petrazzini (1996).

16. Petrazzini (1996), p. 109.

17. For a good review of cost studies of telephone systems, see Crandall and Waverman (1995).

18. Chowdary (1996), p. 17, argues that revenue maximization was the sole objective of the system selected for licensing entrants in local telephony in India.

19. Private investors in foreign companies typically demand rates of return that would enable them to recover their investment in four or five years. Thus, the sales price of a temporary ten-year monopoly will be roughly 75 to 80

percent of the price of a permanent monopoly.

20. For a comprehensive treatment of this issue, see Laffont and Tirole (1998). For interesting discussions of how these concepts apply to developing countries, see Galal and Nauriyal (1995) and Joskow (1998).

21. Telecommunications regulators frequently set the price for certain core services, such as new service installation, the basic monthly access charge, and usage charges for local, long-distance, and international calls. Typically, regulators did not attempt to base these prices on estimates of service-specific costs, instead adjusting them periodically to take into account overall trends in total costs. Firms were then given a great deal of latitude, sometimes complete freedom, to set other prices, subject to the requirement that total revenues equal total costs. For more details, see Noll (1985).

22. Rebates and negative adjustments were used by the U.S. Federal Communications Commission until the 1980s, when the Supreme Court ruled that the FCC lacked authority to order them. This decision made the FCC's regulatory system asymmetric: firms were entitled to recover losses, but did not have to return excess profits.

23. For excellent discussions of price cap regulation, see Baron (1989) and Laffont and Tirole (1998).

24. The following discussion summarizes the extensive literature on the politics of regulation that is surveyed in Noll (1989).

25. For a detailed exposition of this approach and its implementation problems, see Joskow and Noll (1999).

26. When entrants pay incumbents for several types of services, ECPR becomes a Ramsey pricing formula (the departure of each component price from long-run marginal cost is inversely proportional to the component’s elasticity of demand), but the basic principles and effects are the same as in the simple example.