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August 26, 2001

The Effects of Regulation and Competition on Telecommunications in Africa

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Introduction

Technological change has created opportunities for market competition to replace monopoly provision of telecommunications. However, in many countries the incumbent provider will have sufficient residual market power after liberalization to cripple or destroy new entrants. Market mechanisms have been established in the literature as superior to regulated monopolies in infrastructure, but only where there are clear rules and credible enforcement (see, for example, Levy and Spiller 1996 and Galal et al. 1995). The effects of market mechanisms in countries where rules are poorly defined and weakly enforced, as in sub-Saharan Africa, is not established.[1] Sub-Saharan African countries exhibit weak regulatory and legal institutions, yet they have been experimenting with different degrees of deregulation of their telecommunications markets, including competition in basic service. These natural experiments test the premise that market mechanisms will improve efficiency in telecommunications services only where rules are clear and well enforced. These experiments also allow us to explore the efficacy of different governance mechanisms under weak institutional circumstances.

This paper examines the effects of market competition and governance arrangements on performance in weak institutional settings by drawing on six African case studies. There is some variance among the cases, but their differences are small compared to their similarities. Specifically, they are all poor, rural, agricultural and small. The cases were chosen to represent a range of reform designs and different levels of entry. In two of the case study countries (Ghana and Uganda) the government privatized the incumbent, introduced competition in basic services by selling a second

[1] Sub-Saharan Africa in this paper excludes South Africa unless otherwise noted.

network license, and allowed multiple cellular operators.[2] In three cases (Cote d'Ivoire, Tanzania and Senegal) the government privatized the incumbent with a monopoly in basic services for four to seven years and allowed from one to four competitive mobile operators. A sixth case (Malawi) acts as a control: the wire line operator is still state owned and has only one mobile competitor.

A team of researchers investigated each of these cases in detail, using the same conceptual framework and questionnaire, and measuring the same set of variables in the same way.

Quality of regulation and enforcement varies somewhat among the six cases, but is consistently weak by international standards. Nevertheless, there are clear variations in performance after deregulation. These differences in performance are not associated with per capita income or with colonial inheritance. Although the sample is small, this paper provides early evidence of the effects of different degrees of market competition and variance in governance structures where regulatory and enforcement institutions are weak. This evidence suggests that competition and governance design can overcome some of the regulatory deficiencies common to institutionally weak countries.

The paper begins with a brief discussion of the characteristics of the telecommunications sector and the reasons why market competition is seen as vulnerable to rules and enforcement. Next it describes the characteristics of the cases, in particular the regulation and enforcement characteristics. It then discusses the performance of the sector after reform.

[2] Competition in basic services includes the right to offer service to end users (i.e. to compete in the local loop) and to build an international gateway.

Competition and Telecommunications

Four arguments are usually advanced in favor of continuing the monopoly in telecommunications in developing countries: (1) telecommunications still had strong natural monopoly elements, (2) monopoly rights will allow governments to maximize proceeds from the sale of an asset that has been an important source of fiscal revenues, (3) exclusivity is necessary to attract private operators in countries with weak protection of property rights, and (4) a regulated monopoly will allow countries that lack regulatory capacity to prepare for entry at a later date, when competition can be sustained.

The natural monopoly argument is based on scale economies in connecting customers to local switches by wires and in switching capacity. Rapid advances in technology have so greatly reduced these scale economies as to eliminate the natural monopoly argument. Not only can voice messages be sent efficiently without stringing wires, but increasingly more data can be transmitted over wires and by air, or over the same electromagnetic frequency (Noll 2000). In addition, computerized switching has greatly reducing the unit cost of switching capacity. While in small communities, such as towns in Africa outside the capital, wireline based technology may still be a natural monopoly, as Noll (2000) points out, fixed-base digital radio and low earth satellites are the most cost effect means of providing services to these communities, and these technologies are not natural monopolies.

The second rational for giving a monopoly or exclusivity to a private operator is that investors will pay a higher price for the privatized firm. If government is selling a revenue earning business, important to financing the budget, a high price is needed to replace this cash flow. Since taxes in developing countries are typically regressive and

inefficient, replacing revenues from telecommunications with general taxes may have many undesirable consequences (Laffont 1998). Regardless of the merits of this argument, it simply does not hold for much of sub-Saharan African, where most of the state-owned telecommunication firms were either drains on the budget or limited contributors.

A third reason given to justify monopoly or exclusivity rights, is that governments whose credibility with investors is low will need to offer protection against risk if they are to attract the large amounts of sunk capital required to expand access and improve service. By allowing the telecommunications operator to reap monopoly rents, the government is signaling its intent to allow high returns or posting a bond against future reneging. However, this argument ignores the possibility that political pressure to control monopoly rents, especially rents accruing to foreigners, is widely regarded as normatively valid (Noll, Shirley and Cowan 2000). Under such circumstances, the political risk faced by a private monopolist, particularly one with strong foreign participation, is larger than the risk faced by competitive firms. Furthermore, as Noll 2000 points out, this is an argument in favor of a temporary exclusivity contract rather than a monopoly, since buyers will discount the potential future monopoly profits. The gains from an exclusive period must be weighed against the losses to consumers from lower rates of expansion and higher costs of operation under exclusivity.

A final argument in favor of monopoly in underdeveloped countries is the belief that competition cannot be sustained in unstable and weak regulatory settings. Without strong enforcement of clear rules, a dominant incumbent will be able to deny its competitors interconnection on reasonable terms and physically restrict their access, or

provide technically inferior service to its rivals' customers. Poor bureaucratic norms and incentives and lack of information and public accountability make the regulator and the overseeing ministry vulnerable to capture by partisan influence. Usually it is the buyer of the incumbent telecommunications monopoly who has the most to offer and the most at stake. If the legal system is also subject to weak norms and incentives, new entrants will have few protections against abuse by the dominant operator, unless they can win support of a countervailing political force. Competition for customers will degenerate into competition for protection from politically powerful allies. Under such circumstances, the argument goes, it is preferable to focus first on establishing a regulator capable of overseeing a monopoly provider, than on trying to safeguard a doomed competitive market.

Sub-Saharan Africa offers an opportunity to study the evidence for the last two arguments, which are the most pertinent to the region.

Telecommunications in Africa

Until the mid to late 1990's telecommunications in sub-Saharan Africa was dominated by state owned enterprises.[3] These companies were over-staffed and under-capitalized; the penetration of service was very low; prices for long distance service were exorbitant while local calls were highly subsidized. For example, in 1992, only four inhabitants in 1000 had a phone in sub-Saharan Africa, compared to 40 in Asia and 60 in Latin America (World Bank 1995b). While network growth had accelerated in the 1990's in the rest of the world, the pace lagged behind in sub-Saharan Africa: the average annual expansion rate was 8% during the first half of the 1990's compared to 10.4% in

[3] The few earlier privatized firms were small: the telecom company in Central African Republic was sold in 1990; and the telecom companies in Guinea Bissau and Sao Tome Principe, both sold in 1991.

Latin America and 26.7% in Asia (ITU, 1996). Initially the telecommunications sector was a source of general revenues for many of the sub-Saharan African governments, but this was eroded by the slow expansion of service, the inefficiencies of the operators, and the very high prices for international calls. In addition, revenues from international calls were reduced by the expanding popularity of callback services.[4]

The poor financial state of many operators, pressures from international donors, and political changes, combined with the need to reduce fiscal deficits to fight inflation led many countries to launch reforms of their telecommunications systems in the mid-1990's. By June, 2001, some 17 telecommunications companies had been privatized, and nineteen others were slated for sale.[5] In addition, many African countries began to allow cellular entrants, based on the assumption that mobile telephony was a luxury good that would not affect the market for basic wire line service. This assumption proved to be incorrect. The dramatic fall in the cost of wireless technology led to a rapid expansion of mobile subscribers, faster than the pace of growth in mainlines, which also accelerated after 1995. By 2001 the number of wireless subscribers had surpassed wireline connections in the region as a whole. How quickly wireless encroached on wireline markets was not only a function of how large the country's wireline system was to begin with, but also depended on the number of wireless operators competing for the market. As figure 1 suggests, the number of mobile subscribers grew much faster as a percent of

[4] Call-back services allow the user to call to a local number and be called back with an international line. Although illegal in most of the sub-Saharan African countries, the governments were not able to effectively block these services. The service was lucrative because of the huge differences in rates. For example, in 1985 it was 40% cheaper to call Senegal from the U.S. than vice versa.

[5] All of the sales were for partial shares from 30 to 67%; management, however, was passed to the strategic investor.

wireline subscribers in countries with three or more wireless operators, than in those with two or one.

The competitive threat posed by mobile telephones to the dominant incumbent was usually limited, however. Regulations curtailed the services that wireless operators could provide. Most were not permitted an international gateway of their own, and were not allowed to offer wireline or fixed wireless service. There were two exceptions -- Uganda and Ghana. These two countries sold licenses for second networks that were allowed to compete with the incumbent in all basic services, including international, without specifying the technology. As we shall see, one of the new networks (Uganda) is cellular.

African countries also introduced important regulatory changes. Almost all reformed their laws and split postal services from telecommunications. Many created an independent telecom regulator, separate from the ministry that had supervised its state owned company and embodied the rules for operation in laws and regulations as well as in the licenses for private operators.

To understand how competition and regulation function in weak institutional environments, we must turn next to the six cases examined in depth.

Characteristics of the Cases

Our sample consists of six sub-Saharan African countries, three on each coast, two former French and four former British colonies.[6] All are poor: at the start of the 1990's none of our case study countries had a per capita above US$1,000. They are largely rural: at least 60% of the population in the countries we studied lived in rural

[6] Information on the cases comes from Azam and 2000; Clarke and 2000; Haggarty 2000a and 2000b; Laffont and N'Guessan 2001; and Shirley and 2001.

areas. They are agricultural: % or more of their GDP was from agriculture compared to only --% or less from industry. They are relatively small: the largest of the sample, Tanzania had 25.6 million inhabitants; the others had far fewer (Table 1). There are differences among them. Most notably, Cote d'Ivoire is wealthier and more urbanized than the rest of the sample, followed by Senegal and Ghana, while Malawi is one of the poorest countries in the world. When considered in a global context, however, these differences are slight in comparison to their similarities.

Table 1. Characteristics of the Cases, 1990

	Cote d'Ivoire	*Ghana*	*Malawi*	*Senegal*	*Tanzn.*	*Uganda*
GDP per capita (constant 1995 US$)	779	352	145	566	198	251
Population (millions) % urban	11.7 40%	15.0 34%	8.5 13%	7.3 40%	25.6 21%	16.8 11%
Main lines per 1000 inhabitants	6.2	2.9	3.1	6.0	2.9	1.7
Main lines per employee	28	13	8	38	19	25

The six cases in our sample all had a state owned monopoly prior to reform. Service was typical for the region: penetration rates were low, quality was poor and the waiting time for a telephone, long. Senegal and Cote d'Ivoire had larger and better-operated systems than the other cases, but even there penetration rates were low and service was poor compared to other developing regions. For example, there were 6 people out of every thousand with a phone in their homes in Senegal (Table 1) compared to over 60 in Latin America.

The quality of service was uniformly poor before reforms. By the mid-1990's the success rate for national long distance calls ranged from 56% in Ghana, 25% to 45% in Senegal, 27-40% in Cote d'Ivoire, and 35% in Tanzania, compared to a norm of 60% set by the International Telecommunications Union. Service was heavily concentrated in the capital city, which in 1995 had 65% of all phone lines in Ghana, 75% in Cote d'Ivoire and Malawi, and 75% in Uganda.

Productivity was low in all our cases. As Table 1 shows, Senegal had more main lines per employee than the other countries, and was even above East Asia's average of 31, but well below the average for Latin America (69). Corruption of employees was a serious problem. For example, customers reported that before reform, employees of the telecommunication company in Uganda and Ghana routinely extorted large payments for installing or repairing lines, and arranged for third parties to make phone calls at customers' expense.

In most developing countries profits from state owned telecommunications companies were an important source of revenues before privatization. In contrast, financial performance was poor in all our cases except Senegal, where it was merely mediocre.[7] Senegal outperforms the rest of the sample because it had introduced reforms in its telephone company in 1985, transforming it from a department to a parastatal and laying off some employees. The devaluation of the CFA franc also helped, by raising the value of telecommunication revenues earned in foreign exchange, and as a result the company was able to make a profit.

[7] Profits are hard to judge in all the cases because accounting profits were not fully adjusted for uncollectable bills.

In the other cases the telecoms firms frequently ran losses and built up large debts. The companies would routinely default on service on their government guaranteed debts, forcing the government to assume the obligation. This was a way to offset the government's arrears in its telecommunication bills. Their poor financial performance was partly the result of high rates of non-payment by government and poor bill collection in general, and partly due to the government's failure to raise local phone rates to keep up with inflation and rising costs, combined with mismanagement and corruption. The companies were also trapped in a vicious circle since without funds they were unable to invest to reach new customers. Their main source of revenues was a few large business customers who paid exorbitant rates for international calls.

Rates for phone calls were heavily distorted by politically motivated cross subsidies. International long distance was very expensive in all the cases, ranging from $7.50 to $2.00 a minute for a call to the United States in 1993/94. In all of the cases, charges for calls to Europe and the U.S. were much higher than charges to other African countries, even though the latter calls were frequently routed through Europe. Prices for local calls were much lower, between US$0.05 and US$0.15 for a three-minute call in 1993/94. Long distance calls within the country had higher rates, ranging from $0.10 to $0.90 a minute in 1993/94.

Institutions were weak in all six cases. All had a history of kleptocratic political structures and/or military intervention. Only one, Senegal, had a well-tested mechanism for non-violent transfer of power. Although Ghana, Uganda and Tanzania introduced democratic forms of representation during the period under investigation, these were fragile and recent. In the early 1990's full political competition, in the sense that an

opposition candidate had a serious prospect of taking office through elections, was not yet a reality in our case study countries. Despite some recent improvements, protection of property rights was secured in all six cases through political connections or intervention by outsiders, such as the French government or the World Bank, rather than through laws or norms. Checks on executive power were weak, although the courts evidenced some independence in the anglophone cases. Civil service norms of professionalism and honesty were also weak to non-existent, although the bureaucracy in the francophone cases was better paid and more professional. Shortages of skills were a problem, especially for a small country like Malawi. Constraints in the supply of necessary human resources were exacerbated by years of brain drain in countries with a history of civil unrest and repressive policies, such as Ghana and Uganda.

The Incentive and Opportunity for Reform

Three sector conditions motivated reform. First was the prospect of attracting private capital to invest in narrowing the gap between supply and demand. Evidence that this gap was a drag on growth was increasingly obvious. Politicians interviewed for the case studies reported that national firms complained of the high cost of doing business where they can only communicate with suppliers and buyers by traveling in person or notoriously unreliable mail services. These businesses reported that poor telecommunications made it impossible to compete in global markets. It was also a disincentive to foreign investment. For example, one reason the Coca-Cola Corporation gave for not locating its regional operations in Ghana was the poor state of its telecommunications. At the same time bilateral and international foreign aid agencies were increasingly unwilling to support government investment in a sector that had the

potential to attract private capital and where the past history of state performance was so poor.

A second motivation was the poor state of the finances of the telecommunication companies in our cases. Except for Senegal the telecommunications company was a drain on the Treasury, not a cash cow as it was in Latin America. Nevertheless, despite the small size and weak condition of the sector, these governments would be likely to raise more capital selling their telecommunications companies than by selling most of their other assets.

A third consideration was technology. There was an increasing risk that the subsidiaries of large foreign companies, who were a major source of telecommunications revenues in our cases, might invest in Internet telephony or satellite systems to avoid the poor service and exorbitant rates they faced with the local phone companies (field interviews). Charge back services were another increasing threat to the local telephone monopoly.

Poor sector conditions, however, are not in themselves sufficient to motivate a sustainable reform, as shown for water in Menard and Shirley 2001. This and other research suggest reforms are precipitated in state enterprises only when poor sector conditions are combined with an economic crisis and a favorable change in the governing political coalition (see also World Bank 1995a and Shirley 2001). Economic crisis, in particular rising inflation and rising fiscal deficits, make SOE inefficiencies less affordable. All of our cases experienced a spike in inflation (a rise in the CPI of over 30 percent a year) and serious budget deficits (over 10 percent of GDP except for 6 percent

in Senegal) in the five years before they passed a law to allow privatization of the wireline operator and other reforms.

A change in the governing political coalition favors reform when the new coalition has a different constituent base from its predecessor. Previously, those groups that stood to lose from reform were able to thwart it. Usually the losers from privatization and competition are the phone company workers who face the threat of layoffs, bureaucrats who lose power and perks, and customers who may have to pay more (or pay at all) for local and local long distance calls. Potential beneficiaries from reform are those without service who stand to benefit from investment in expansion, and customers, especially exporters, who benefit from lower international charges and better service.

There was a change in the ruling coalition in all of the six cases, but it favored reform in only four. In Ghana, Flight Lieutenant Rawlings assumed power in a coup in 1981 and began to institute a socialist program. However, his support base shifted after a severe economic crisis in 1983. Despite continued socialist rhetoric, the Rawlings administration began to rely more on support from rural areas and businesses and less on urban workers, as evidenced by legislation to curb unions and strikes, and policies favoring agriculture and commerce.

The coalition shift in Tanzania began in 1990 with the second Mwinyi administration, when the government first began to reverse some of the policies put in place by the charismatic leader since its independence, Julius Nyerere. However, towards the end of Mwinyi's term the old guard of his party began to reassert itself. The election of an unknown reformer, Benjamin Mkapa, in 1995, accelerated reform.

Although Mkapa was a member of the same party as Mwinyi and Nyerere, he quickly removed old line Socialists from key party positions and moved to win support from groups other than the state enterprise workers that had been the party's mainstay.

In Uganda, the change occurred in 1986 when Yoweri Museveni took power and ended a long civil war. Museveni's initial support base was largely outside of Kampala and the government apparatus, with especially strong support in the resistance forces and southern farmers. Although after taking power in 1986, Museveni moved to develop a support base that incorporated many of the competing political, religious, regional and ethnic factions in Uganda, although he continued to favor the rural areas.

Table 2. Political Change in the Cases

	Cote d'Ivoire	Ghana	Malawi	Senegal	Tanzania	Uganda
Change in ruling coalition	1993	1983	1993	1980	1995	1986
Ruling coalition controlled veto points	Yes	Yes	No	Yes	Yes	Yes

The political circumstances in Malawi were different from the cases just discussed. Malawi experienced a change in 1993, when President-for-Life Banda was defeated by Bakili Muluzi, the leader of the opposition United Democratic Front (UDF). However, the new regime did not have enough control over the political veto points to implement major reforms. Until 1999 the UDF was only able to put together a slim and unstable majority in the National Assembly, and this prevented Muluzi from implementing any major changes in telecommunications policy.

Circumstances were also different in Cote d'Ivoire and Senegal. In Senegal, Abdou Diouf, was elected President in 1980 at a time when the country was going

through an economic crisis with the end of the groundnut and phosphates boom. Diouf represented a young generation of technocrats trained in France. His main constituency was the urban voters in Dakar, and he was sensitive to the demands of the state enterprise workers. He also wished to maintain close ties with France. The rising strength of the opposition in the mid-1990's forced him to make some concessions to rural voters, although their strength was weakened after he moved to divide the opposition by inviting one of their main leaders, Abdoulaye Wade, join the government as Minister of State in 1995.

In Cote d'Ivoire a change occurred in 1993 when Konan Bedie declared himself interim president upon the death of the long-standing president. Critical to his success was the support of the government of France, and Bedie remained close to the French throughout his tenure. The Bedie government relied on the same constituents as his predecessor, the Francophile Roman Catholics, although, unlike his predecessor, he had little or no support from the large immigrant community and the Northern, mostly Muslin groups.

Overview of Reforms in Our Cases

The cases in our sample followed different approaches to reform. As we can see in Table 3, Ghana has gone the furthest, the earliest, at least in terms of restructuring. By 1997 Ghana had allowed four cellular operators, and sold not only the incumbent, but also a second network license to offer basic services including international calls. On the regulatory front, however, Ghana has lagged behind as discussed in the next section.

Table 3. Time Line of Reforms

	Cote d'Ivoire	*Ghana*	*Malawi*	*Senegal*	*Tanzania*	*Uganda*
Act Passed	1995	1996	1998	1996	1993	1997
First cell entry	1996*	1992	1995	1996*	1994*	1995
Second cell entry	1996	1994	1999*	1998*	1995	1998
Third cell entry	1996	1996	--	--	1999	--
Later cell entries	--	--	--	--	2000, 2001*	--
Regulator established	1995	1997	1999	--	1993	1997
Privatization incumbent	1997	1996	--	1997	2000	2000
2nd basic network	--	1997	--	--	--	1998

*Partly owned by incumbent wireline operator.

Uganda also allowed competition in basic services. Uganda permitted a cellular operator to begin providing service in 1995, then sold a second network license to offer all services in 1998, and finally privatized its wireline operator in 2000. At the other extreme is Malawi, which allowed a wireless entrant in 1995, but only as a joint venture with its wireline monopoly. It allowed a second cellular entrant in 1998, but has yet to privatize its incumbent wireline operator.

In between these two extremes are Cote d'Ivoire, Senegal and Tanzania. Cote d'Ivoire has allowed less competition than Uganda but more than Malawi or Senegal. In 1997 it sold its wireline operator with an exclusivity period over all fixed services and international calls for seven years; it has also licensed three cellular operators, one of them a subsidiary of France Telecom, the buyer of the privatized incumbent. Senegal sold a license to a cellular entrant in 1992, sold its wireline operator in 1997, and allowed the privatized wireline operator to create a mobile subsidiary in 1999. However, in 2000

the government announced that it would revoke the first cellular license and rebid it, arguing that it had been acquired through corruption. Finally, Tanzania started later, selling its incumbent in 2000 with a four year exclusivity over international and fixed line services. This exclusivity is only on the mainland; in Zanzabar this company must compete with a joint government/private phone company for basic services. Tanzania also sold five cellular licenses, including two to each of the basic service providers.

There are two aspects to the potential for competition to operate in these cases. One is the extent to which they allow entry and the other is how well they regulate the market to assure a level playing field. I consider each aspect in turn.

Entry

There are two sources of competition in the cases we studied: facilities based competition, so far allowed only in Ghana and Uganda, and competition from wireless. The extent to which wireless systems might compete with wireline was not fully appreciated when these markets began to be liberalized. At the time when cellular licenses were first issued, wireless telephony was seen as an expensive luxury, which would never control a large segment of the market or compete effectively with wireline service. The drop in the fixed costs of installing wireless systems, and the huge expansion in the capacity of wireless for voice transmission was not foreseen. As a result the earlier licenses (or operating privileges) were sometimes given at no charge, and mobile operators received entitlements to large chunks of the radio spectrum. For example, Tanzania allocated 25 MHz to each of its two operators in the capital. This was an inefficient use of this capacity, since 5 MHz can accommodate roughly 100,000 subscribers and there were only 112,000 subscribers among all five cellular operators in

2000. Malawi allocated the entire frequency set aside for cellular telephony to its first cellular operator, and had to renegotiate the license to allow a second entrant. In the other cases too, the governments gave large parts of spectrum to first entrants and then tried to reclaim it or to force operators who received free spectrum to pay for it. In Senegal one reason the government gave for revoking the license of the second cellular operator was that the company did not pay enough for the spectrum allocated to it in its license.

The potential for wireless to compete in basic services became apparent when a wireless operator, Mobile Telephone Networks or MTN of South Africa, purchased Uganda's second network license in 1998. In less than a year MTN had 36,500 subscribers, two-thirds the number of main lines served by the incumbent operator. By 1999 MTN subscribers exceeded the number of main lines in Uganda. Even where wireless is prohibited from offering basic services, it has been expanding rapidly in Africa. As a result, the number of wireless subscribers exceeds the number of main lines in Cote d'Ivoire, which is the largest system in our sample, and one where the wireline system was also growing rapidly.

Table 4: Competition in the Cases

	Cote d'Ivoire	*Ghana*	*Malawi*	*Senegal*	*Tanzn.*	*Uganda*
Monopoly in basic services	7 yrs.	Duopoly for 5 yrs.	5 yrs.[a]	7 yrs.	4 yrs[b]	Duopoly for 5 yrs.
Cellular competitors w/ basic operator	2	3	1	1[c]	4	2

[a]Government will reassess whether to allow a duopoly in basic services at the end of the five years from the incorporation of the SOE. [b]On mainland only. [c]License for this cellular operator has been revoked.

In terms of entry, competition in the six cases varies widely, as is evident in Table 4. Ghana has the greatest potential for competition since it has two networks licensed to compete fully with each other in basic services, plus three cellular operators and the potential for the two basic networks to also offer cellular service. It is followed by Uganda, which also has competition for basic services, as well as two companies already operating in cellular and the privatized incumbent planning a major cellular roll out in late 2001. Tanzania's wireline incumbent still has a monopoly over basic services, but only for four years and only on the mainland. Plus Tanzania has four functioning cellular operators and another licensed operator that is not yet active. Next is Cote d'Ivoire with only one basic network that has seven years of exclusivity, and three cellular companies. Senegal lags behind with only one cellular company in competition with the privatized incumbent, and that cell company is slated to have its license terminated and rebid. Finally, Malawi is our control case, where basic service is still a state owned monopoly and there is one small cellular operator in competition with a firm jointly owned by the state owned wireline monopoly.

Regulation in the Cases

The ranking of the countries changes if we consider the quality of regulation. Noll 2000 argues that regulatory agencies will be better able to withstand both capture and expropriation when:

- regulatory personnel are stable and not subject to short term political pressures;
- regulatory discretion is limited by prohibitions against, for example, expropriating property rights;

- the regulator can require detailed information from the operators;
- the regulatory process is open to public scrutiny and
- regulatory decisions are subject to appeal to a credible body that has less of a stake in the outcomes than the participants, such as an independent court.

Table 5 describes regulation in each of the cases in terms of independence, limits on discretion, power to compel information, public scrutiny and appeal.

Table 5
Regulatory Characteristics of the Case Study Countries

	Cote d'Ivoire	*Ghana*	*Malawi*	*Senegal*	*Tanzania*	*Uganda*
Creation of regulator	1995	1997	2000	Not created yet	1993	1997
Relations w/ ministry	Separate, nine regulators representing different ministries	Separate but minister may give directives	Separate but minister may make regulations	Not a separate body	Separate but minister may give directives	Separate, minister gives guidelines only.
Nomination, appointment of regulator	Nominated & appointed by nine ministries	Nominated by minister & appointed by pres. Not appointed yet	Nominated by Public Appointments Committee & appointed by president	Nominated & appointed by minister	Nominated & appointed by minister. Chair appointed by president.	Nominated by private professional groups or minister & appointed by minister w/ cabinet approval
Removal of regulator	For cause specified in law.	For cause, but not specified in law.	For specified cause, but first regulator removed for political reasons.	Ministerial decision.	For cause, but not specified in law.	For cause, specified in law.
Independent sources of funds	Fees	Fees	Fees & fines	None	Fees	Fees
Limits on discretion	Law & concession contract detail powers but these do not always agree.	Law & contracts detail powers. Regulator in practice very weak.	Unilaterally imposed new interconnec. policy. Overturned by courts.	Since regulator is part of ministry, no limits specified.	Law & contracts detail powers.	Law & contracts detail powers.
Power to compel information	Can compel information & investigate operators.	Can compel information, but has poor information.	Can compel information, but has poor information.	Cannot compel information, although minister can.	Can compel information, but has poor information.	Can compel information, & has good information.
Open to public scrutiny.	Concession agreement never published. No consumer represen.	Not open.	Not open.	Not open	Must publish decisions, but in practice not open.	Members of public on commission. Held workshops. Licensing procedures are published, public comment on proposals.
Appeal to independent body	Separate council arbitrates disputes; strong defender of operators' rights.	Courts. In one dispute sided with operators against government	Courts. Overturned regulator's new IC policy.	None.	Courts. Courts have sided w/ operators against regulator.	Tribunal & courts. Courts are indepen. Several disputes settled.

The experience of our cases suggests that protecting the regulator from political pressure and giving it sufficient power to compel information are serious problems in Africa. Uganda and Cote d'Ivore have met this challenge by having regulators nominated by someone other than the supervisory ministry: private professional groups in Uganda and nine different ministries in the case of Cote d'Ivorie. Only in Uganda and Cote d'Ivoire did the regulator have sufficient power to compel the information it needed to function.

Although the regulator is nominated by the Public Appointments Committee in Malawi and can only be removed for causes spelled out in the law, this did not protect the newly appointed board of the regulator from dismissal after the 1999 elections, when all political appointees were dismissed.

Tanzania's regulator seems powerful in law, but has proved to be subservient to the Minister of Communications. The Ministry dissolved the commission four years after it was created and replaced it with a new one. Ghana's laws also give the regulator considerable power, but the regulator had not been appointed by mid-2001. Ghana's regulator did not have access to even the most minimal data about the operators and was unable to control blatant abuses of market power by the privatized incumbent, Ghana Telecom.

The least independent regulator is in Senegal. In Senegal the law creating a regulator had not yet been passed by mid-2001, and the regulator was still the minister of Communications.

All of the laws creating the regulators spell out the extent of their powers and the licenses detail the operators' rights and obligations. In Malawi the law gives the regulator considerable room for discretion, allowing it to "modify any condition of a telecommunication licenses" in accordance with the provisions of the license, or in the absence of such provisions, in accordance with the public interest. In its first major decision, Malawi's regulator unilaterally overturned all the interconnection agreements and replaced them with a sender-keeps-all policy (highly disadvantageous to the new cellular entrant). This decision was overturned in the courts, leading the regulator to propose a third cellular license in an apparent retaliatory move. In most of the cases the laws limit the regulator and regulators have not acted arbitrarily or even very forcefully. For example, regulators in Ghana, Tanazania and Uganda have the power to impose a default interconnection agreement if the operators cannot agree, but all three have been reluctant to do so. There has been some confusion about the extent of the regulator's powers in Cote d'Ivoire because some important rules are spelled out in the concession agreement, but not in the law; (for example, the monopoly's exclusivity in international service). Nonetheless, these discrepancies have been ironed out and a reasonable working order established.

As for public scrutiny, Uganda is one of the only cases where a serious effort has been made. Not only are prominent members of the public are appointed to the regulatory commission but also, the UCC has held workshops to consult with the public on major issues (such as the use of the fund for rural telephony); and the licensing procedures are published and a timeline provided for public comment. In the other cases

much of the information has been kept secret and the public are not given an opportunity to comment.

Appeal to an independent body has been important in all of our cases except Senegal. As mentioned, appeal to the courts allowed the operators to overturn the regulator's ruling on interconnection in Malawi. In Uganda, operators can appeal regulatory decisions to a special Tribunal, designed to be a neutral oversight body with judicial powers, whose decision can also be appealed to the Appeals Court. Like Uganda, Cote d'Ivoire has a special body dedicated to resolving disputes over telecommunications, the Telecommunications Council of Cote d'Ivoire. The council has reversed some of the regulator's decisions, for example overturning a fine the agency imposed on the operators for violating stipulated subcontracting procedures.

In Ghana, although the law allows disputes to be arbitrated by an independent panel, this has yet to occur. Disputes are brought instead to the Minister of Communications. Appeal to the courts is possible and has been used to try to overcome the paralysis of the regulator. Likewise, in Tanzania, disputes have not been settled and operators have tunred to the high court for resolution.

Based on this discussion and Table 5, we can summarize the regulatory characteristics of the sample in Table 6. Senegal is the worst with no functioning regulator, followed by Malawi, Tanzania, and Ghana, in that order, while Cote d'Ivoire is better, and Uganda is the best, meeting all of Noll 2000's requirements for good regulation.

Table 6. Characteristics of Regulation in the Cases

	Cote d'Ivoire	Ghana	Malawi	Senegal*	Tanzania	Uganda
Independent of political pressure	**Yes**	No	No	No	No	**Yes**
Limits on discretion	**Yes**	**Yes**	No	No	**Yes**	**Yes**
Able to collect information	**Yes**	No	No	No	No	**Yes**
Public Scrutiny	No	No	No	No	No	**Yes**
Neutral dispute resolution mechanisms?	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**
Have settled one or more disputes	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**

*Senegal has not passed the legislation to enable the regulator.

Surprisingly, the dispute resolution mechanisms have worked reasonably well in settling disputes in a prompt and fair fashion in all the cases except Senegal.[8] For example, the incumbent in Ghana, Ghana Telecom, was charging some of the cellular companies for interconnection more than its retail long distance price. GT was also unresponsive to requests to direct more of its investment towards reducing interconnection bottlenecks that adversely affected its rivals, and refused to allow the other operators to co-locate equipment in GT facilities. The other operators tried to convince the regulator to get involved, since the law stipulates a default interconnection agreement if firms disagree and gives the regulator the power to enforce equitable treatment of competitors. After considerable delay the operators appealed to the courts and won a settlement with GT. This sort of regulation by lawsuit in the face of a ineffectual regulator as in Ghana, or a regulator exercising discretion in an arbitrary

fashion as in Malawi, is not a sustainable situation. Third party resolution is too costly to be used routinely as a way to enforce contracts.

Effects of Reforms

In order to compare the effects of reform in our cases we need to pinpoint the appropriate time for when reform occurred. Although not without drawbacks, we take the entry of a second cellular operator, where both cellular operators are independent of the incumbent wireline operator, as the beginning of effective competition with the dominant wireline operator.[9] A single cellular provider is unlikely to be an effective competitor to the incumbent wireline operator since the two firms have a strong incentive to agree explicitly or implicitly to segment the market, giving each a monopoly in its segment. In this situation, the cellular operator is likely to be content to offer mobile service to a small market at very high prices, too high to offer a threat to the wireline service. Indeed, this is what occurred with the entry of the first cellular operator in many of our cases. Competition begins to have an effect with the entry of a second, independent cellular operator, (as well as with a second basic network operator).[10] At that point, the incumbent cellular operator faces price competition in mobile, and prices could fall to a point where cellular becomes a reasonable alternative to some wireline customers. The incumbent wireline operator will have an incentive to use the advantages of its position to prevent the expansion of both of its cellular competitors; its implicit, market-sharing contract with the first cellular operator is no longer advantageous. The wireline operator

[8] Although the law stipulates that the International Chamber of Commerce would settle any dispute between the regulator and an operator, the government acted unilaterally in revoking the license of a cellular company and has no plans to permit an appeal.

[9] We exclude the operators that where the incumbent wireline operator has a majority or strategic ownership stakes.

will be motivated to set high prices for interconnection, refuse to invest in services that create bottlenecks for its rivals' customers, refuse to allow the cellular operators to co-locate equipment on its sites, fail to give the cellular operators information they need for billing, or take other, similar actions that raise its competitors' costs. (It would want to take the same actions against a second network operator as well.) The quality of regulation is an important determinant of whether these tactics are permitted.

One factor that has to be taken into account in treating the second cellular entry as the point where reforms should begin to have an effect is the entry of a third or fourth cellular operators in some of our cases. Since we know from the data for subSaharan Africa that a third cellular operator makes a difference in the rate of penetration, we should expect that to affect our cases. Two cases, Ghana and Tanzania, should get a boost from having more than two cellular operators in the time period under consideration.

To measure the effects of reform we look at the rate of expansion in new connections (for the wireline operator) and subscribers (for the cellular operators), and the trend in unregulated (cellular) prices. If weak rules and enforcement override the effects of competition, we expect to see little effect of entry on the pace of expansion. New entrants would either collude to skim the market, or they would be unable to expand much because of the exercise of market power by the dominant operator. Unregulated prices would fall, but not by much, for the same reasons. If competition can have an effect even in these weak institutional environments, then we would expect to see more rapid expansion and faster drops in prices in cases with more entrants.

[10] We could also take the second network entry as a reform starting point. Since the second basic network was the second cellular operator in Uganda, and entered after the second cellular operator in Ghana, it does

Figure 2 suggests that Cote d'Ivoire grew the most after the entry of a second cellular operator, while Figure 3 shows the average annual rate of growth was highest in Tanzania, followed by Uganda. There is some question whether Tanzania's high rate can be sustained over time, however, since the data are for only one year. Uganda's average expansion rate for three years is close to 60 percent a year. In Uganda, the entry of the second cellular operator, MTN, seems to have had a large effect, especially during its second year of operation. Recall that MTN had a license to operate a second basic network, and so was less vulnerable to interconnection threats from the incumbent. Furthermore, the incumbent was small, the smallest network in our sample before reform. Cote d'Ivoire has averaged 45% for five years, an especially strong performance since it's network was one of the largest.

Ghana scores less well in expansion rate, probably because its regulation is considerably poorer than that of Cote d'Ivoire or Uganda. It's expansion rate is high, given the virtual absence of the regulator, and reflects the competitive pressure on the incumbent.

Senegal's growth performance is on a par with Ghana and well below than Uganda, even though it is a much wealthier country. This suggests that a wealthier market cannot offset lack of entry and poor regulation.

Cellular is the main factor explaining the rapid growth in service in all the cases except Senegal. Telecommunications connection and subscriber numbers expanded by an average rate of 27% a year in Senegal in the second half of the 1990's, which is high, but still less than in countries with high cellular growth, Cote d'Ivoire (37%), Ghana (36%) and Uganda (42%).

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not affect our analysis.

Is it risky for countries to rely so much on cellular for growth in their systems? Cellular has some drawbacks, the principal one being limited capacity for data transmission. This is not yet an issue in most of sub-Saharan Africa. Furthermore, new technology is rapidly expanding wireless capability. Other features of cellular are more salient to our cases. First, since cellular investment is not as sunk as wireline, investments could be more easily removed if adverse political or economic conditions arise. This is a risk, but also the reason why countries with such low credibility with investors were able to attract multiple operators in the first place. Second, although cellular retail prices for calls have come down in the cases, they are still higher than wireline, especially if we consider subscription charges. This makes it harder for poorer customers to get access to phones. Harder, but not impossible. In all of the countries we studied only the caller is billed for a call. Those poorer customers who are able to afford the subscription for a cellular phone can then use it exclusively to receive calls (e.g. from potential customers, employers or wealthier friends). Pre-paid phone service was introduced rapidly in the more competitive cellular markets and this has also greatly increased the access of people who lack credit and cannot be easily billed because they live in neighborhoods without postal service.

To round out the picture of the effects of reform, Figure 4 shows how the price to some mobile customers has evolved, based on 100 minutes of intra-network local calls during peak time. We only have data for one of the cell operators in each case, but the results are very suggestive.[11] Cell prices have dropped sharply in Ghana, Tanzania

[11] The results are not affected by exchange rate movements. The cell companies in Ghana, Tanzania, and Uganda use dollar pricing, and the trend in Cote d'Ivoire's cell rate in dollars is the same as in local currency (i.e. virtually unchanged).

and Uganda, but not in Cote d'Ivoire, which arguably shows the effects of the different degrees in competition in Table 4.

Competition has not had as negative an effect on proceeds per main line as theory would predict. As predicted, Senegal received the most proceeds per main line when it sold its wireline operator with a seven year exclusivity and only 1 cellular competitor. However, the amounts paid in cases with more competition, such as Cote d'Ivoire and Tanzania were not much lower. Moreover, the buyer in Tanzania is obligated to rollout out twice as many lines in half the amount of time as in Senegal. Ghana and Uganda received considerably less per main line, but they also sold licenses for a second network operator for US$10 million in Ghana and US$5.6 million in Uganda. It is too early to tell if the costs from inefficient operation of an incumbent with monopoly power will offset these differences in revenues from privatization.

Table 5. Proceeds per Main Line for Privatized Incumbents

	Cote d'Ivoire	Ghana	Malawi	Senegal	Tanzania	Uganda
Proceeds per main line (US $) (year)	$2,675 (1997)	$1,626 (1996)	n.a.	$2,983 (1997)	$2,449 (2000)	$1,095 (2000)
Rollout obligation (no. of mainlines)	295,000 (over 7 yrs.)	225,000 (over 5 yrs.)		300,000 (over 7 yrs.)	635,100 (over 3.5 yrs.)	97,000 (over 5 yrs.)

Conclusion

Competition contributed to accelerated growth in the telecommunication sectors in our case study countries, despite confusing rules and weak enforcement. In some respects competition made up for some of the deficiencies of regulation in these institutionally weak countries. Where there are multiple operators, there are multiple stakeholders with a strong incentive to lobby for access and to oversee and report on

infractions by their rivals. In these countries with their dictatorships or relatively new democracies, consumer interests were not strongly represented in the regulator with the exception of Uganda, and the press was often weak and easily muffled. Larger business consumers might once have been a lobby for reform, but increasingly they were opting out of the system entirely, relying on their own private networks. Arguably, it was the threat of competition that was responsible for expanded service and lower prices in the presence of a weak regulator.

This is not to suggest that institutions did not matter in our cases. To the contrary, the effects of competition varied among the cases depending on the strength of the regulatory framework. One institution in particular – the dispute resolution mechanism -- proved to be critical to the survival of competition in several of our cases. Although African judicial systems have been much criticized as weak, corrupt and dependent, the judiciary helped lessen abuses by the incumbent in Ghana and Tanzania, and by the regulator in Malawi. The dispute resolution mechanism has settled disputes in all of the cases except Senegal.

It is still an open question whether competition can survive in the long run in these cases. Among other things, a less costly way to resolve disputes must be found, and the obvious answer is to build an independent and capable regulator. The experience of Uganda is recent, but suggests that it is feasible to have a reasonably well functioning regulator in subSaharan Africa under favorable political conditions. It is not lack of talent that impedes the regulators in the other cases, but the absence of political institutions able to force powerful interests to lobby within the rule of law and to hold politicians accountable.

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Figure 1

Mobile Subscribers as a Percent of Mainline Subscribers
One, Two and Three Mobile Operators

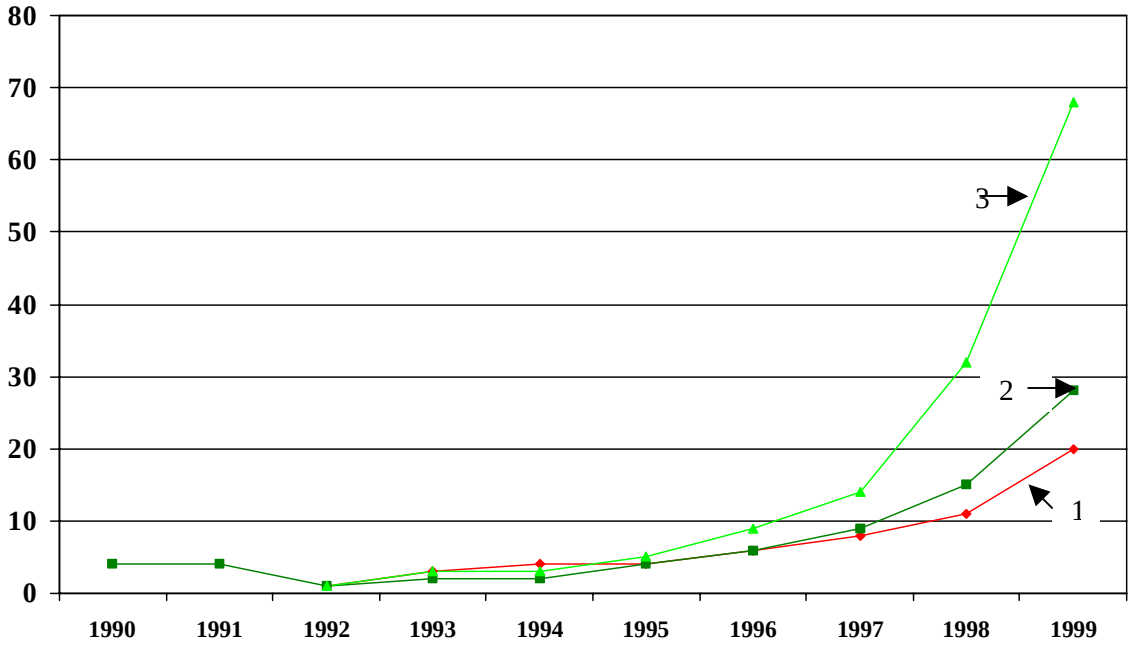

Figure 2
New Telephone Connections and Subscribers
(number of mainlines and cellular subscriber per year)

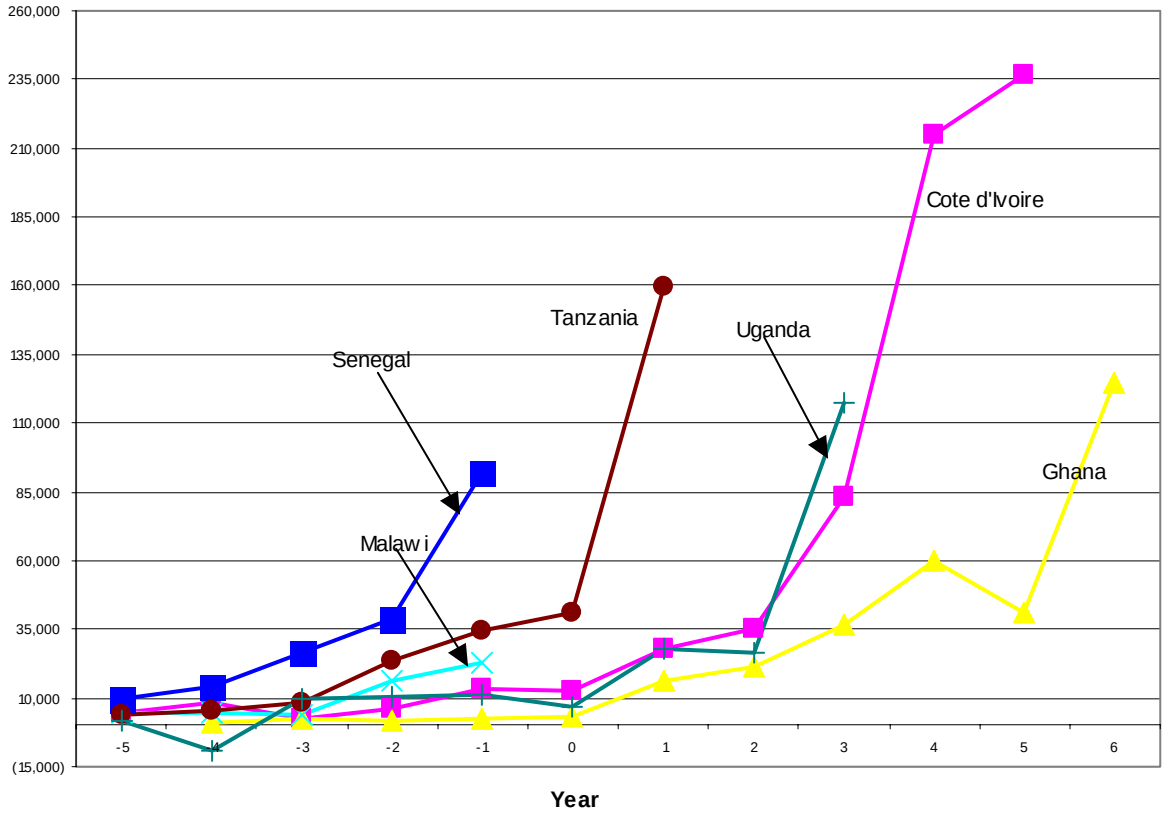

Figure 3
Average Annual Growth in Telephone Subscribers
(Before and After Second Cellular Entry)

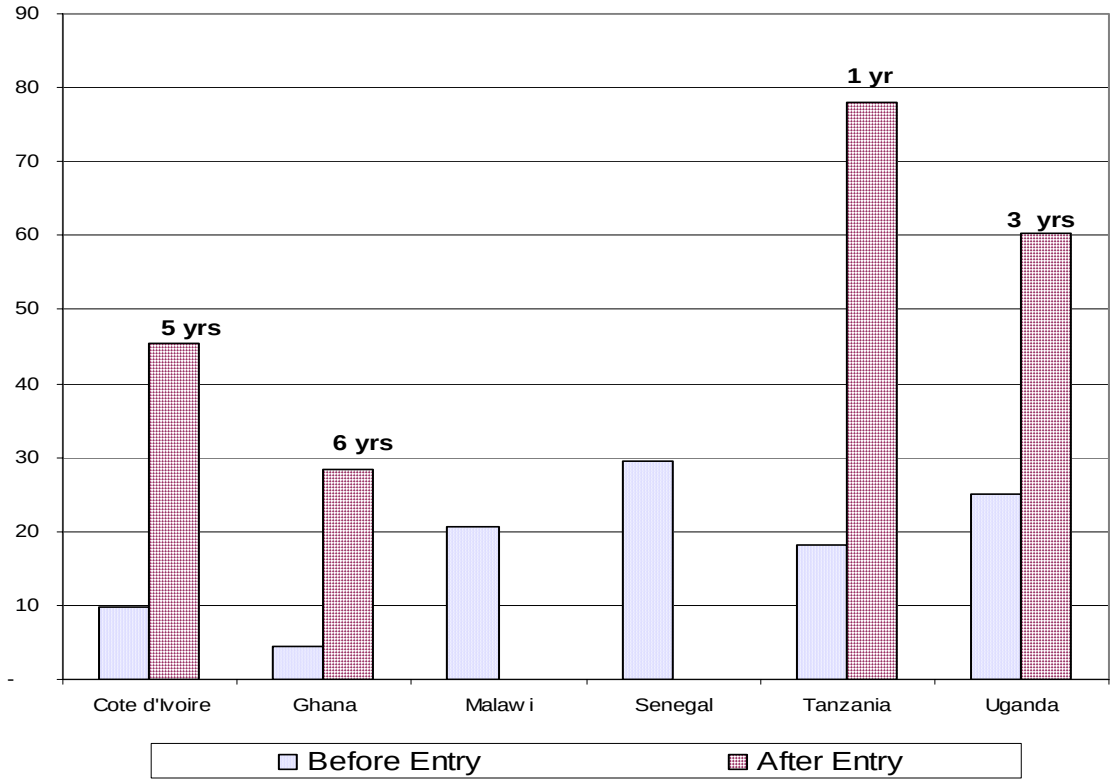

Figure 4
Trend in Cellular Tariffs:
Cost of 100 minutes of intra-network local, peak time calls per month
(US Dollars; year 0= year of 2nd cellular entry)