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ECONOMIC REGULATION OF THE TELECOMMUNICATIONS SECTOR IN SOUTH AFRICA 2009-2014

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ABSTRACT
South Africa's electronic communications sector regulator, the Independent Communications Authority of South Africa (ICASA), has a mixed track record in carrying out its mandate. ICASA is part of a regulatory system for the telecommunications sector, that may be characterised as dysfunctional for the following reason: ICASA is not sufficiently independent from government. While regulated entities are generally partially state owned, this does create a conflict of interest for government. Nonetheless, ICASA has had some successes, where the interests of state-owned enterprises coincide with those of consumers. Its interventions in markets for voice services during the course of Telkom Mobile's entry into the market, for example, have resulted in retail voice price reductions of more than 30%. Now that problems relating to voice services markets have largely been resolved through the call termination rate intervention, ICASA needs to shift its focus to markets for broadband services in order to ensure that South Africa becomes more competitive relative to its peers through unbundling the local loop and assigning spectrum for broadband. In order to achieve this, Telkom needs to be fully privatised in order to reduce government pressure to delay local loop unbundling (LLU) and Telkom's wholesale and retail fixed-line operations should be functionally separated. ICASA needs to be further insulated from political interference and be properly resourced through industry levies and fees. Furthermore, a single appellate body for economic regulators ought to be established in order to improve accountability of the regulators and improve outcomes in the sector.

KEYWORDS
telecommunications, spectrum, LLU, local loop unbundling, regulator performance, economic regulation

INTRODUCTION
The telecommunications sector in South Africa is regulated by the Independent Communications Authority of South Africa (ICASA). Historically, the Department of Communications (DoC) established policy for the sector. It has recently been replaced in this role by the Department of Telecommunications and Postal Services (DTPS). ICASA has been criticised for, among other things, ineffective monitoring of network operators (MyBroadband, 2014), incompetence in carrying out its duties (Masote, 2013) and repeated qualified audits (McLeod, 2012). These problems have been attributed to a range of factors, including overlapping regulatory mandates, that lead to a lack of role clarity (Sibinda, 2008), a lack of independence from government and a lack of funding (Moyo & Hlongwane, 2009).

There has been relatively little work, however, measuring ICASA's effectiveness in carrying out its mandate in respect of economic regulation of the telecommunications sector, including regulation of access to facilities, interconnection and prices. This paper addresses this gap and contributes towards answering the following questions: How effective is ICASA in fulfilling its role as an economic regulator? How has the wider regulatory system influenced ICASA's performance?

ICASA's effectiveness will be evaluated by assessing market outcomes (including pricing, quality and access to services) in respect of voice and broadband services. These two services have been chosen because ICASA's economic regulation activities have focused on them over the period 2009-2014, through its call termination rate and local loop unbundling (LLU) interventions. While this contribution does not amount to a full performance assessment of ICASA, it measures an important aspect of performance, namely market outcomes.

First, the methodology is presented. Next, the performance assessment evaluates the regulatory governance framework in South Africa (rules and institutions). Finally, there is a discussion of the impact of ICASA's interventions on voice and broadband services. In each of these sections, regulator interventions and instances of lack of intervention are described, and reference is made to the outcomes predicted by economic theory pertaining to these actions or inactions. This is followed by an evaluation of outcomes in terms of price, quality and access.

METHODOLOGY FOR THE ASSESSMENT OF REGULATOR PERFORMANCE AND MARKET OUTCOMES
There are a number of methodologies that can be used for the assessment of regulator performance. These include frameworks designed for the telecommunications sector, such as the NERA framework for evaluating the effectiveness of telecommunications regulators in sub-Saharan Africa (NERA, 2004), the LIRNEAsia telecommunications regulatory environment survey-based methodology (LIRNEAsia, 2008) and the European Competitive Telecommunications Association (ECTA) scorecard (ECTA, n.d.). There are also regulator performance assessment frameworks that are widely applicable to a number of sectors, including the World Bank's handbook for evaluating infrastructure regulatory systems (Brown, Stern, Tenenbaum & Gencer, 2006).

While these methodologies include the assessment of a range of dimensions of regulator performance, an important feature is the assessment of market outcomes in terms of price, quality and access (Brown et al., 2006). These are the key dimensions of performance assessed in this paper.

Brown et al. (2006, p.5) emphasise the evaluation of the wider regulatory system, not just the regulatory authority, and see the regulatory system as '… the combination of institutions, laws, and processes that, taken together, enable a government to exercise formal and informal control over the operating and investment decisions of enterprises that supply infrastructure services'. They stress the importance of assessing both regulatory governance and regulatory substance. The governance questions relate to regulatory processes (formal and informal), independence, transparency, accountability and predictability of decisions. Governance also concerns the relationship between the regulator and policymaker in decision-making and the resources and institutional structure of the regulator. The evaluation of the substance of the regulatory system involves assessing decisions made by the regulator, including decisions on tariff setting and market access. The evaluation of regulatory substance in this paper is confined to the evaluation of market outcomes in two areas, namely broadband and voice services.

Brown et al. (2006) further propose that assessing outcomes in the sector against goals set by the government, and the regulator's role in helping or hindering the achievement of those goals, are key to evaluating the regulatory environment. The detailed set of standards proposed by Brown et al. (2006) are: legal framework, legal powers, property and contract rights, clarity of roles in regulation and policy, clarity and comprehensiveness of regulatory decisions, predictability and flexibility, consumer rights and obligations, proportionality, regulatory independence, and financing of regulatory agencies.

The regulatory governance framework impacts on the substance of regulatory decisions. The governance framework constitutes the formal institutions (rules) that govern the sector. There are also informal institutions (rules) that govern the sector, which are influenced by the range of interests that compete for distribution of benefits across the sector (Khan 2010). These give rise to 'settlements', which ensure the distribution of benefits matches the 'holding power' of interested parties, subject to a minimum viability constraint, which is that consumers (those without 'holding power') benefit sufficiently from the settlement such that they are willing to participate in it. These settlements have an important role to play in the telecommunications sector in South Africa and explain ICASA's performance to a significant degree.

REVIEW OF INSTITUTIONAL FRAMEWORK

Various flaws observed in the telecommunications sector regulatory framework provide a partial explanation for ICASA's relatively poor performance against the Brown et al. (2006) criteria, summarised in Table 1 below (Hawthorne, Bonakele & Cull, 2014). Key among these are the ownership of regulated entities by the state and the policymaker (formerly the Department of Communications, now the Department of Telecommunications and Postal Services) having shareholding responsibility for these regulated entities. This undermines the independence of the regulator. ICASA's independence is also undermined in other ways, including through performance monitoring of councillors by the Minister and the absence of power of ICASA to appoint experts without ministerial approval, where experts are not in ICASA's accepted budget. While the competition authorities, which are not directly linked to regulated entities, have intervened in the sector, they have done so only in relation to specific products and markets where ex post evaluation of conduct has been possible.

There are also significant problems with the independence of ICASA in respect of funding and appointments by the line ministry. ICASA relies on approval of its budget by Parliament; the line minister plays an important role in the appointment of councillors. However, ICASA is not able to appoint foreign consultants without ministerial approval. Best practice is for head of state to appoint regulatory decision-makers, economic regulators to be funded through industry levies and regulated entities to pay for the necessary consultants to provide expertise on regulatory decisions (Brown et al., 2006). It may also be appropriate for Parliament to make such appointments as an arms length institution.

Furthermore, there is no common appeal authority for economic regulators in South Africa. While the competition authorities have dedicated appellate bodies, ICASA's decisions are appealed to the High Court, which means fewer appeals (because outcomes are uncertain), and therefore less accountability for ICASA. There are other gaps in the regulatory framework, or regulatory 'governance' regime, including a lack of regulation of the quality of broadband services, ICASA's lack of information-gathering powers and the unwieldy size of the ICASA Council, which makes decision-making difficult. The open access regime and other aspects of regulation employed in the ECA disproportionately impose onerous regulatory obligations for small new entrants relative to the likely harm that these entrants could cause.

A summary of the assessment of regulatory governance against the Brown et al. (2006) governance criteria is shown in Table 1 below:

TABLE 1: SUMMARY OF ASSESSMENT OF REGULATORY GOVERNANCE FOR THE ECONOMIC REGULATION OF THE TELECOMMUNICATIONS SECTOR IN SOUTH AFRICA

Standard	Comply with standard?	Key problems identified	Do the amendment acts remedy the problem?
1. Legal framework	Yes		
2. Legal powers	Partially	ICASA does not have sufficient legal powers to obtain information.	No
3. Property and contract rights	Yes		
4. Clarity of roles in regulation and policy	Partially	The MOU between ICASA and the competition authorities has not been updated since the ECA was put in place. ICASA must consider ministerial policies and policy directions.	No
5. Clarity and comprehensiveness of regulatory decisions	No	The ECA is not clear as to whether ICASA must conduct a market enquiry before setting tariffs for interconnection and facilities leasing matters.	No
6. Predictability and flexibility	Partially	ICASA often does not follow through with regulation making processes and reversed its decision after political pressure in respect of the Vodafone / Vodacom transaction. See also discussion under Proportionality.	No
7. Consumer rights and obligations	Partially	ICASA's consumer protection rules do not set out what consumers are responsible for. And while quality of voice services is dealt with, quality of broadband services is not. ICASA has not established a consumer advisory panel.	No
8. Proportionality	No	ICASA has fixed maximum fines that are not linked to the magnitude of the contravention. The ECA's 'open access' principles for interconnection and facilities leasing are too wide and catch all licensees, which is disproportionate for small licensees relative to the harm they could cause.	Partly: ICASA may exempt licensees from facilities leasing and interconnection regulations.
9. Regulatory independence	No	There is no independent investigation required prior to removal of decision makers. Brown et al. (2006) recommend three to five comissioners; ICASA has nine. ICASA Council members and the Competition Commissioner and Deputy Commissioners are appointed by line Ministers, not the President or Parliament, and their terms of service may be changed while they are in office. While staff are offered reasonable means of career progression, there is no track for specialists to progress outside of management structures. ICASA may not employ experts outside of its approved budget without ministerial approval. ICASA may not issue i-ECNS licences without a Ministerial policy direction. State ownership of Telkom limits ICASA's independence. ICASA councillors are accountable to the Minister of Communications (in addition to Parliament) for their performance.	Partly: ICASA may employ foreign experts but must seek funding approval from the Minister if additional funds are required. Best practice is to allow ICASA to fund experts. ICASA councillors will be collectively measured on their performance

Standard	Comply with standard?	Key problems identified	Do the amendment acts remedy the problem?
10. Financing of regulatory agencies	No	Funding is generally not raised through special levies from regulated entities. There is no rule that prohibits government cuts in spending unless they apply consistently to all agencies. There is no allowance for authority to have the regulated entity fund the costs of consultants. State ownership of Telkom reduces government's incentives to fund ICASA.	No
11. Regulatory accountability	No Partial	Both ICASA and the competition authorities' processes can be very slow, taking years (and in some cases more than a decade) to finalise. These authorities also do not seek outside expert advice on their performance. Regulated entities do not regularly appeal ICASA's decisions. See discussion above under 'proportionality' regarding the inability for ICASA to intervene in a proportionate and targeted manner.	Partly: ICASA Amendment Act reduces time periods in which ICASA must publish findings
12. Regulatory processes and transparency	Partial	ICASA does not have a case management system to preserve confidential information and facilitate provision of access to documents that are public in terms of the ECA. ICASA in some instances enters into private negotiations with regulated entities instead of conducting transparent proceedings.	No
13. Public participation	Yes		
14. Appellate review of regulatory decisions	No	There is no dedicated appellate body for ICASA's decisions to be appealed to.	No
15. Ethics	No	There are no prohibitions on a variety of ethical problems set down in legislation and there are no requirements for most regulatory personnel to disclose their financial interests.	Partially. An ICASA Code of Ethics to be developed.

Informal institutions also play an important role in the regulatory system for telecommunications in South Africa. These are best explained in the context of actual decisions by ICASA, as discussed below.

The significant problems with the regulatory framework led to the prediction that ICASA's performance, measured in terms of market outcomes, is likely to be poor. This is evaluated in the sections that follow by means of evaluating outcomes in markets for voice and broadband services.

CASE STUDY I: REGULATORY INTERVENTIONS IN MARKETS FOR VOICE SERVICES

REGULATORY INTERVENTIONS (2009-2014) AND THEIR POSSIBLE CONSEQUENCES

REGULATORY INTERVENTIONS

ICASA has intervened in several areas in markets for voice services. First, ICASA introduced number portability (ICASA, 2005) and prohibited network locked handsets, which enables easier switching between operators. Subsequently, ICASA reduced maximum call termination rates by 68% between March 2011 and March 2013, from ZAR1.25 (during peak hours) to ZAR0.40 (for peak and off-peak calls) (ICASA, 2010a). ICASA allowed new entrants and smaller operators, including Cell C and Telkom Mobile, to charge 10% more than this, a form of asymmetrical rate regulation. More recently, it attempted to further reduce these rates, setting ZAR0.10 as the maximum that

THEORETICAL AND EMPIRICAL RESEARCH ON THE IMPACT OF CALL TERMINATION RATE REDUCTIONS

The theoretical impact of call termination rate reductions is ambiguous. Laffont, Rey and Tirole model competition between networks and suggest that the call termination rate that operators would choose collusively and the optimal rate that a regulator should set depends on the competitive setting and regulatory context (Laffont, Rey & Tirole, 1998a, 1998b). The key insight from their model is that operators that compete on retail voice usage prices choose a high call termination rate in order to limit competition by making retail price reductions costly. Where the call termination rate is high and an operator reduces its retail prices, customers on that operator's network would make more outbound calls relative to inbound calls. This would result in greater interconnection expenses for the operator, reducing its retail prices. Foreseeing this outcome, operators do not reduce their retail prices where call termination rates are high. Operators would thus choose a high call termination rate in order to generate and sustain this collusive outcome.

Operators will likely choose a relatively benign low call termination rate where they compete using fixed monthly rental fees (two-part tariffs) rather than usage prices. This is because reducing fixed fees does not encourage more outbound calls, which means that operators cannot use the call termination rate to limit retail price competition. Operators are also more likely to privately choose a more benign call termination rate where their networks are symmetrical in size. This is because if there was a new entrant (ie networks were not symmetric in size) then incumbent operators would choose a high call termination rate and offer low on-net voice usage prices (if this were allowed) in order to make it attractive to belong to a large network (ie generate network effects) and thus exclude the new entrant. Networks will also tend to choose a lower call termination rate where their fixed costs are high, which makes attracting new customers expensive, and where the substitutability between networks is low, which means that lowering retail voice usage prices does not result in more customers.[1]

Kongaut and Bohlin (2012) provide a useful summary of the empirical research into the impact of mobile call termination rates on retail prices and access to services largely in developed countries (2012).[2] The results of these studies are contradictory. For example, Genakos and Valletti (2011) found that call termination rate reductions increased retail prices as a result of a 'waterbed effect'. The same authors more recently found that this 'waterbed effect' had disappeared over time (Genakos & Valletti, 2014). However, Kongaut and Bohlin (2012) found that call termination rate reductions have led to decreases in retail prices, while Veronese and Pensendorfer (2009) found no relationship between MTR reductions and retail prices.

In summary, where there are new entrants, where pricing is based on usage fees (linear pricing), fixed costs are low. Where substitutability is high, which more closely characterises the South African market, operators select a high call termination rate in order to maintain high retail prices and exclude new entrants.[3] This suggests that, theoretically at least, call termination rates may have been set too high prior to ICASA's intervention. This means that ICASA's call termination rate reductions should result in lower prices for consumers, discussed next.

MARKET OUTCOMES: VOICE PRICES, QUALITY AND ACCESS

VOICE PRICES

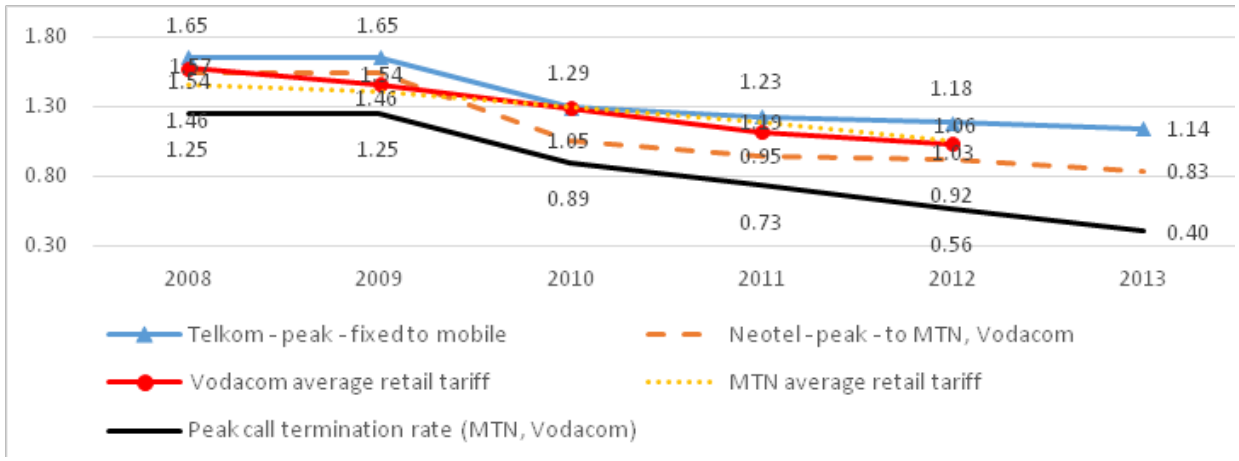
Over the same period that the call termination rate reductions were implemented (2008-2013), retail prices for voice services on average fell significantly, although they did not fall by as much as call termination rates did. While the peak call termination rate for MTN and Vodacom fell by 68% between 2008 and 2013, Vodacom's retail prices fell by 34% between 2008 and 2012, and MTN's prices fell by 27% between 2008 and 2012 (see Figure 1 below). The effect on fixed to mobile prices was similar: Telkom's retail fixed to mobile prices fell by 31% between 2008 and 2013 and Neotel's prices fell by 46% over the same period. While retail prices did not decline by as much as the call termination rates did, they nonetheless declined significantly. ICASA's call termination rate intervention can therefore be argued to have been a success.

1 In general, there is less incentive to choose a high call termination rate where operators do not compete using retail voice usage prices.

2 Many of these studies tend to focus on retail prices for mobile voice services. Mobile call termination rates also impact on retail pricing for fixed-line voice services, however. It stands to reason that, whatever the 'waterbed effect' in markets for mobile services, whereby prices for other retail mobile services increase after an MTR reduction (at least according to some evidence), prices for fixed-line voice usage services in all likelihood declined as a consequence of the MTR reductions. This is because the fixed operators' input costs declined and fixed operators did not experience the same magnitude of call termination rate reductions for their own networks that mobile operators experienced.

3 An important departure from the Laffont, Rey and Tirole models (1998a, 1998b) is that many people in South Africa own more than one SIM card (Hawthorne et al., 2014), which means that operators compete for call volumes rather than for customers. This means that the call termination rate should have less of an impact on competition. Nonetheless, in the face of new entry, incumbents have an incentive to choose a high call termination rate and charge low prices for on-net calls, in order to make it unattractive to join the new network. Furthermore, asymmetry between fixed and mobile call termination rates means that operators were able to disadvantage the fixed-line networks significantly through setting high mobile call termination rates and earned substantial call termination revenues. Telkom's initial fixed to mobile rate cut was particularly pronounced due to the terms of its interconnection agreement with Vodacom at the time, which required that Telkom had to reduce its retail prices if interconnection prices fell (Vodacom, 2009).

FIGURE 1: MOBILE CALL TERMINATION RATES (PEAK), AVERAGE MOBILE RETAIL PRICES AND PEAK FIXED TO MOBILE PRICES (ZAR / MINUTE)

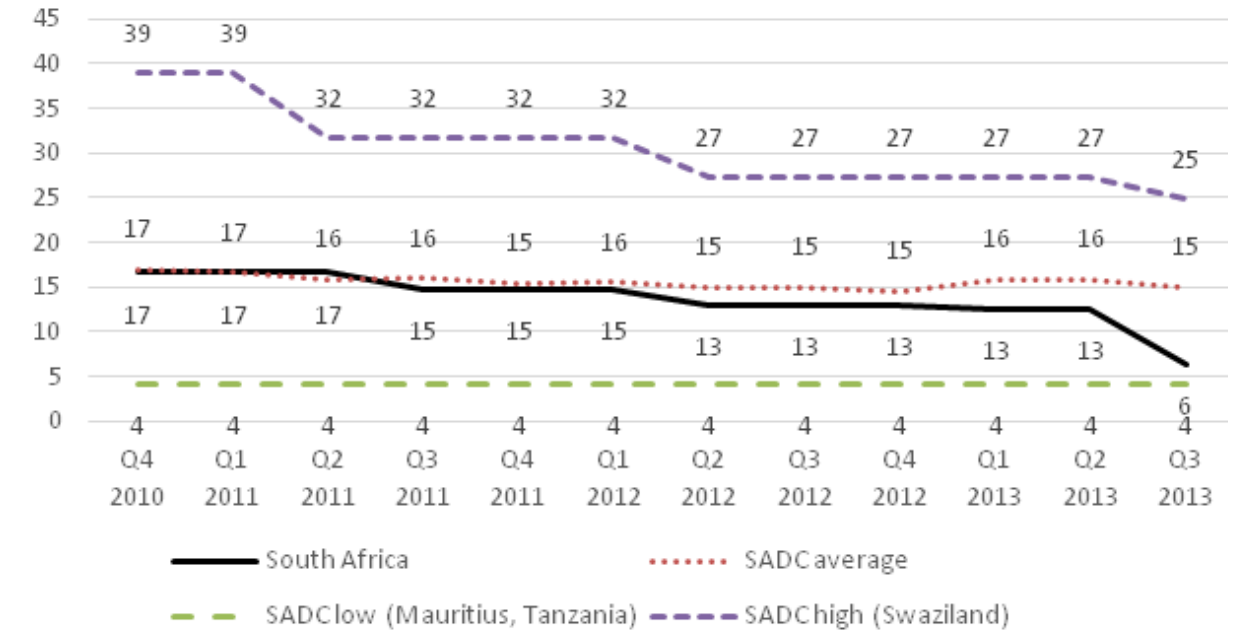


Source: Analysis of data from MTN (2005-2013) and Vodacom (2005-2013).

Note: Vodacom financial data corresponds to the calendar year prior to the year in which the financial results were reported, due to Vodacom's financial year ending in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported).

As a consequence of reduced retail prices, South Africa now ranks among the countries with the lowest retail prepaid rates in the Southern African Development Community (SADC) region (see Figure 2 below).

FIGURE 2: LOWEST AVAILABLE SADC PREPAID PRICES (USD), OECD USAGE BASKET (2010-2013)

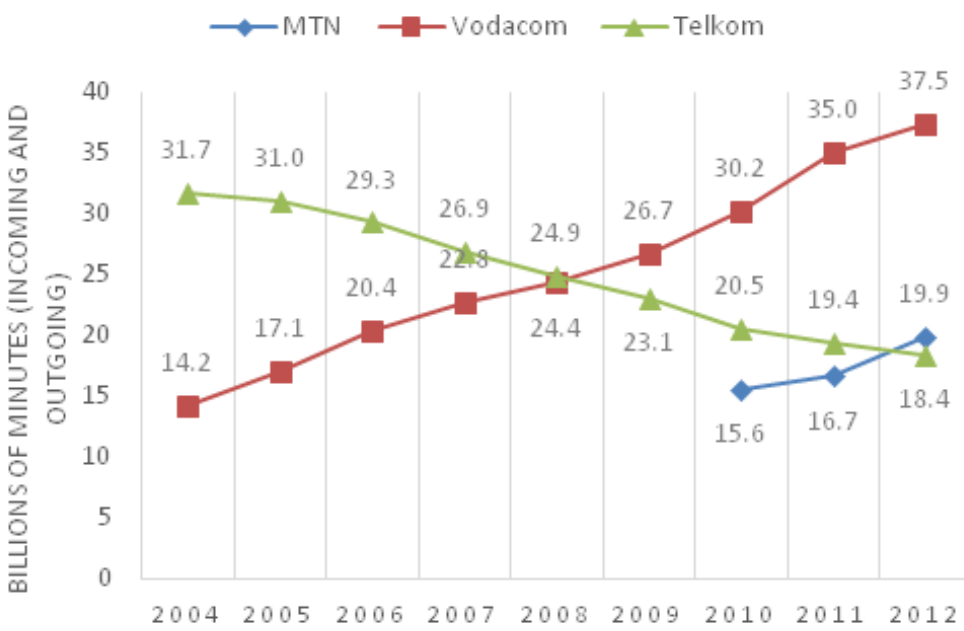


Source: Analysis based on data prepared by Research ICT Africa (2013).

Note: that the relative purchasing power of the USD in each of these countries could be adjusted for as an alternative means of comparison.

Furthermore, the usage of mobile networks grew significantly after the call termination rate reductions (see Figure 3 below). This has arisen partly due to subscriber growth. Both increased usage and subscriber growth are due at least in part to lower retail prices for voice services.

FIGURE 3:MTN, VODACOM AND TELKOM MINUTES OF USE (BILLIONS, 2004-2012)



Source: Analysis of data from MTN (2005-2013) and Vodacom (2005-2013).

Note: Vodacom financial data corresponds to the calendar year prior to the year in which the financial results were reported, due to Vodacom's financial year ending in March (their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported).

These gains for consumers were not at the expense of reduced operator investment in networks (Hawthorne et al., 2014). They were also not at the expense of reduced quality, discussed next.

VOICE QUALITY

It is important to assess whether lower voice prices (and higher usage) have been achieved at the expense of quality. ICASA issued regulations 'setting out the minimum standards for end user and subscriber service charters' in 2009 (ICASA, 2008). These regulations require that service availability is 95% over a six-month period and that dropped calls must not exceed 3% over the same period. An initial quality of service report was prepared by ICASA in 2011 on the basis of drive test results (ICASA, 2011b). This report revealed that dropped call rates in particular were very high and exceeded the 3% target for MTN, Vodacom and Cell C. The report carried disclaimers that the tests conducted were not representative and were 'merely indicative', and the results were contested by the mobile operators (Mawson, 2011). Whatever the validity of the 2011 report, by 2013 the dropped call rate had improved significantly, at least on the Vodacom network for Johannesburg and Pretoria; and the MTN and Cell C networks were compliant in Pretoria (ICASA, 2013). The call setup success ratio measure met or exceeded ICASA's target for most operators in most regions over both periods. This suggests that voice call quality has improved (or at least has not declined) in the Gauteng region over time.

The data shows that voice prices have decreased, usage has increased and quality (at least in Gauteng) has improved as a result of ICASA's call termination rate intervention. The impact of lower prices and higher quality on access to voice services is discussed next.

ACCESS TO VOICE SERVICES

Access to voice services and coverage also increased over the period of the call termination rate reductions. All of the mobile networks increased their subscriber bases over this period: between 2009 and 2012, the number of MTN subscribers grew from 18.8m to 25.4m (MTN, 2005-2013), while the number of Vodacom subscribers grew from 19.7m to 28.9m between 2010 and 2012 (Vodacom, 2005-2013). Cell C grew its subscriber base from 6.9m to 10m subscribers between 2009 and 2012 (Cell C, 2005-2013), while Telkom Mobile grew its subscriber base from 0.5m in 2010 (when it entered the market) to 1.5m in 2012 (Telkom, 2005-2013). While some of this growth is due to subscriptions for machine to machine communications (such as vehicle tracking), overall subscriber growth has been significant.

Growth in access to mobile services is confirmed by survey evidence. Statistics South Africa (StatsSA) reports that household access to cellphones was 88.9% in 2011 (StatsSA, 2012a), compared to 72.9% in 2007 and 32.3% in 2001 (StatsSA, 2007). There is very little variability in access to a cellphone between provinces: the lowest availability is 81.1% in the Northern Cape and the highest is 93.8% in Gauteng. Note however, that the Statistics South Africa questionnaire was structured such that if any one person in a household owned a cellphone, the household was deemed to own a cellphone. This means that while household access to cellphones was almost 90%, access to cellphones by the

Gillwald, Moyo and Stork (2013) arrived at similar results from a survey of households for access to cellphones (84.2%). World Wide Worx (2012) estimates that there are approximately 40m unique users of cellphones in South Africa, and cellphone penetration is therefore approximately 80%. This is less than what StatSA (2012a) and Gillwald et al. (2013) estimate. This is because, for example, StatsSA (2012a) suggests that 88.9% of households own a cellphone but not that each person within those households has a cellphone. The AMPS surveys (SAARF, 2005-2013) confirm the relatively high rate of cellphone penetration shown in the census (StatsSA, 2012a) and in Gillwald et al. (2013): cellphone penetration has grown from 67% of the adult population in 2007 to 86% in 2013.[1]

The significant growth in cellphone penetration in South Africa during a period in which call termination rates declined is in contrast to the findings of Veronese and Pensendorfer (2009) and Cunningham, Alexander and Candeub (2010), who found that higher call termination rates result in a greater number of subscriptions, theorising that higher termination rates encourage investment and therefore more connections. This outcome is also in contrast to Dewenter and Kruse (2010) who found no relationship between mobile diffusion and call termination rates.

Lower voice prices and higher usage have therefore not come at the expense of reduced access to voice services; indeed, access has increased. Measured in terms of market outcomes for voice services, it can therefore be argued that ICASA has been ast least partly successful in regulating voice prices. Possible reasons for this success emanating from the institutional framework in South Africa are discussed next.

ICASA'S CALL TERMINATION RATE INTERVENTIONS IN THE CONTEXT OF THE INSTITUTIONAL FRAMEWORK IN SOUTH AFRICA

Informal institutions may have played an important role in ICASA's success in markets for voice services. The new 'settlement', in terms of lower call termination rates and lower voice prices was made possible by a range of factors reflecting the holding power and the relatively high entrepreneurial ability of the incumbents, which means that they would need to rely less on government protection as proposed by Khan (2010).

The mobile sector is fragmented in that there are four different operators, each of which has relatively little holding power (at least relative to the fixed-line incumbent). Furthermore, two of the mobile operators are relatively smaller than the dominant operators, benefit from low call termination rates, and were 'bought off' with asymmetrically higher call termination rates. The transition to lower call termination rates was also staggered over time with a glide path, which reduced the potential negative impact of the intervention and opposition to it. Finally, the entrepreneurial capabilities within the mobile sector are strong and globally competitive, which reduces their incentive to seek government protection from competition.

This institutional setting therefore facilitated pro-competitive reform, which resulted in lower prices, greater usage and greater access to voice services for consumers. ICASA has been less successful in regulating broadband services, discussed next.

CASE STUDY 2: ON REGULATORY SUBSTANCE: INTERNET SERVICES

LOCAL LOOP UNBUNDLING (LLU)

LLU IN SOUTH AFRICA

ICASA has not intervened as actively in the supply of Internet services as in voice services. LLU has not been implemented, and ICASA has not assigned spectrum available for broadband (discussed below). LLU entails a fixed-line incumbent providing open access to its network for third parties to provide services over it. This intervention is implemented in order to foster competition, allow for greater innovation, lower prices and encourage better quality broadband services.

LLU has not been implemented despite the Minister of Communications having made a policy decision to implement LLU (DoC, 2007). The deadline for this implementation was the end of 2011. Subsequent to the 2007 Ministerial policy decision to implement LLU, the regulator (ICASA), the Parliamentary Portfolio Committee on Communications (PPCC),[2] and the Department of Communications (DoC) appear to have been focused on voice services and call termination rates in particular where economic regulation of the sector is concerned. In 2010, the then Minister of Communications, Roy Padayachie, announced that LLU would be implemented by November that year (McLeod, 2010). ICASA did indeed publish a draft framework document for LLU, followed by a findings note, after hearings held late in 2011.

The Parliamentary Portfolio Committee on Communications (PPCC), however, opposed the rapid implementation of LLU in a budget review of the Department of Communications and, while finding that the regulator should implement LLU, the PPCC found that the Minister should review its policy direction[3] and ICASA should complete a regulatory impact assessment (RIA) before implementing LLU (PPCC, 2011).

1 This does suggest though that cellphone penetration is not 100%, and that more than five million adult South Africans still do not have access to a cellphone.

2 PPCC in this article refers to the portfolio committee for communications prior to establishment of two separate committees for the telecoms and postal, and the broadcast and communications mandates.

3 Although it was in fact a policy decision, and not a policy direction.

Minister Padayachie's successor, Minister Dina Pule, seems to have left the matter there. Her adviser, Roy Kruger, believed that LLU would harm Telkom and would not benefit South Africans (Wilson, 2013a). Minister Pule's successor, Minister Yunus Carrim, also appears to have been in favour of delaying LLU and appears to have intervened with ICASA to delay the publication of LLU regulations (MyBroadband, 2013). Minister Carrim's spokesperson, Siya Qoza, explained that an RIA should be undertaken before LLU is implemented (Wilson, 2013b). The PPCC has not debated LLU in at least the previous 18 months (interviews with PPCC MPs), suggesting that it was not a priority for the PPCC.

ICASA has not implemented LLU despite a dispute successfully brought by Neotel against Telkom (Neotel v. Telkom) and numerous false starts in the implementation of LLU regulations (Hawthorne et al., 2014). This inactivity is contrary to the activist stance of the competition authorities. For example, the competition authorities limited Telkom's ability to extend its market power in markets for fixed-line data services by prohibiting the Telkom / BCX merger (Hawthorne et al., 2014). The competition authorities also implemented a limited form of functional separation of Telkom's upstream (wholesale) and downstream (retail) activities through a settlement agreement with Telkom (Hawthorne et al., 2014). This settlement agreement, however, has not been sufficient to give rise to LLU. Unbundled local loops were not available from Telkom at the time of writing. The desirability of implementing LLU in light of international experience is discussed next.

THE IMPACT OF LLU IN OTHER COUNTRIES

LLU has been challenged theoretically and empirically. Economic theories associated with the Chicago School suggest that input foreclosure of an upstream input (fixed access lines in this case) in order to favour the downstream operations (Internet services) of a vertically integrated upstream monopoly is unlikely (see Carlton, 2008 and Town of Concord, Mass v. Boston Edison Company): Why could a monopolist not simply extract its monopoly profit upstream and leave downstream firms to compete as fiercely as possible in the resale of the upstream monopoly input? Furthermore, where input foreclosure does occur it would be good for consumers, due to the elimination of double-marginalisation (one monopoly profit is earned by the vertically integrated monopolist instead of two: one margin earned on the monopoly input and further margins earned by downstream firms).

Nevertheless, there are a number of reasons why the Chicago School theories about input foreclosure might not hold (Motta, 2004). The first is that the vertically integrated upstream monopolist might avoid regulation upstream, where the price of the monopoly input is regulated and the monopoly profit therefore cannot be extracted upstream. A further anti-competitive incentive for input foreclosure is the credibility problem faced by a monopolist facing multiple downstream buyers reselling the monopolist's product with whom the monopolist interacts sequentially: each buyer refuses to accept the monopoly price because the monopolist has an incentive to offer a discount to the next buyer, which will undercut the first buyer's resale price. A further theory of harm to competition is that downstream firms may in the medium to long term enter the monopoly upstream market, or will provide custom for new upstream entrants. Foreclosing downstream rivals from the market therefore prevents entry upstream. Monopolists therefore do have incentives under these circumstances to foreclose downstream rivals, which can result in harm to consumers.

The empirical evidence on the impact of LLU is also unclear. While a full literature review of the impact of LLU is beyond the scope of this article, the arguments for and against LLU are worth illustrating briefly. Hausman and Sidak (2005) found that LLU did not significantly improve competition and broadband penetration in a number of developed countries where it was implemented, largely due to the presence of inter-modal competition between cable and copper networks. Other studies, including the Berkman Centre (2010) report and Nardoto, Valletti and Verboven (2013), found that LLU and open access policies generally (in the case of the Berkman Centre report) led to better outcomes for consumers, including lower prices and better quality, even where inter-modal competition exists. LLU is still in place in most EU countries and is likely to be in place for the foreseeable future (Ecorys, 2013).

South Africa does not have inter-modal competition to the fixed-line incumbent from cable networks, and rival fixed-line networks built by new entrants have a limited reach. This means that Hausman and Sidak's (2005) findings may not be applicable to South Africa. Furthermore, the Berkman Centre (2010) report and Nardoto et al. (2013) suggest that the lack of implementation of LLU may result in higher broadband prices and lower quality in South Africa. It is difficult, however, to separate out the effects of regulatory inaction on LLU in terms of market outcomes (prices, quality and access) from regulatory inaction on spectrum, discussed next.

SPECTRUM ASSIGNMENT

In 2010, ICASA (2010b, 2010c) issued invitations to apply (ITA) for spectrum in high demand bands, which are bands that can be used for access networks to provide broadband services to large numbers of customers for the 2.6 GHz and 3.5 GHz bands.[1] These ITAs were subsequently withdrawn by ICASA in order to allow it to re-evaluate the design of the bands in light of developments in technology and in order to obtain expert advice on auctions (ICASA, 2010d).

Subsequently, in 2011 the Department of Communications (DoC) released draft policy directions for electronic communications services in high demand spectrum (DoC, 2011), which proposed combining the licensing of the 800 MHz (digital dividend) band and the 2.6 GHz bands. The reason for this is that the 800 MHz band is suited to providing wider coverage and therefore facilitates deeper penetration of broadband into rural and other under-

1 These ITAs were issued in terms of the high demand radio frequency spectrum licensing regulations (ICASA, 2010b).

serviced areas. The 2.6 GHz band is better suited to providing greater bandwidth in densely populated areas that have high demand. The two bands therefore complement each other and should be licensed together. The policy also called for a wholesale open access network, new entrants, universal service and the promotion of broad-based black economic empowerment (BBBEE)[2].

At the end of 2011, ICASA released its draft 800 MHz and 2.6 GHz spectrum assignment plan for assignment of combinations of spectrum in these two bands, as well as the relevant ITAs (ICASA, 2011a). This draft plan included some of the DoC's recommendations, including the construction of an 'open access network'. The draft ITAs included a proposal for a spectrum park, where spectrum would be available on a shared basis and would be self-managed by users of the spectrum. Wholesalers in this model would not have been allowed to offer retail services. This assignment plan and set of ITAs were subsequently withdrawn by ICASA, pending a ministerial policy direction on spectrum assignment (Ellipsis, 2012). As at the time of the publication of this article, spectrum in high demand bands had not been assigned by ICASA. Similarly to LLU, therefore, ministerial interference in ICASA's processes to assign spectrum has contributed to a delay of more than three years and has compromised broadband quality in South Africa.

There is no theoretical or empirical debate on the assignment of spectrum: the more spectrum assigned for broadband, the better the outcome for consumers. The impact of ICASA's inaction on spectrum assignment and LLU are discussed next.

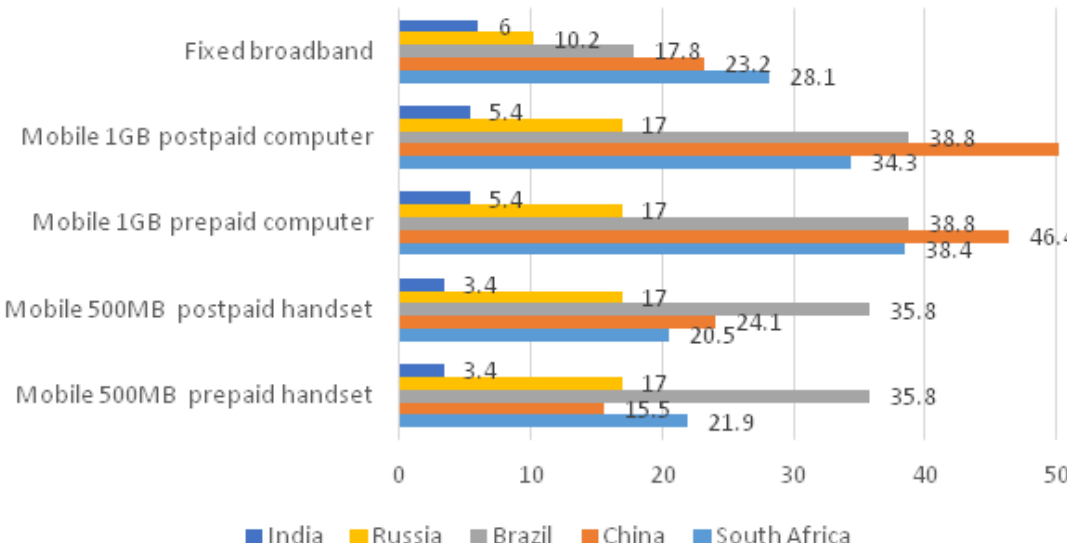
OUTCOMES OF REGULATORY INACTION IN MARKETS FOR INTERNET SERVICES

BROADBAND PRICES

South Africa's broadband prices are high by international standards, and this is particularly the case for fixed broadband (see Figure 4 below). South Africa's fixed broadband prices are significantly higher than prices in Brazil, Russia, India and China, which, including South Africa, form the BRICS group of countries. South Africa's mobile broadband prices are significantly higher than prices in Russia and India but they are in line with or lower than prices in Brazil and China.

This suggests that there are problems in markets for broadband services, with respect to fixed-line broadband in particular. This suggests that ICASA's inaction regarding LLU and spectrum is harming consumers.

FIGURE 4: BROADBAND PRICE COMPARISONS (USD, MONTHLY BASKET) (ITU, 2012)



Source: Analysis of data from ITU (2009-2013).

Note: The price of 1GB of mobile, postpaid computer data is in fact USD181.1 in China. The scale of the graph was limited to USD50 to preserve the scale of differences between broadband prices.

BROADBAND QUALITY

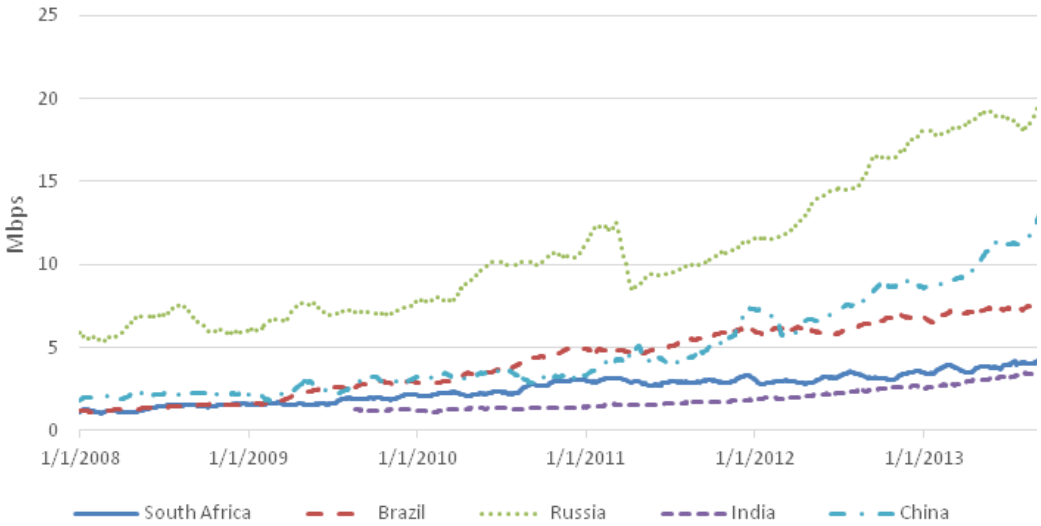
South Africa is far behind Brazil, Russia and China in terms of available broadband speeds and this divergence is growing wider over time. Russia has always had significantly higher speeds than South Africa. Brazil and China had roughly similar speeds to South Africa in 2008 but have significantly higher speeds than South Africa in 2013, according to data collected by Ookla (2013) (see Figure 5 below).

2 Together with this draft policy direction, the DoC released draft policy directions on exploiting the digital dividend, which included among other things a proposal for ICASA to investigate the use of television white space technologies (DoC, 2011).

While South Africa has consistently had higher average broadband speeds than India, India is catching up to South Africa. South Africa's average download speed is 4.54 Mbps, and South Africa ranks at number 119 in terms of download speeds globally. South Africa's speeds are significantly lower than the EU (21.34 Mbps), G8 (19.58 Mbps), OECD (19.57 Mbps) and APEC (15.75 Mbps) averages (Ookla, 2013).

South Africa therefore ranks among the highest priced BRICS countries for broadband and has extremely slow speeds when compared to other countries, including developing countries. This is a negative outcome of ICASA's inaction regarding LLU and assigning spectrum for broadband.

FIGURE 5: BROADBAND SPEEDS IN BRAZIL, RUSSIA, INDIA, CHINA AND SOUTH AFRICA (2008-2013)



Source: Analysis of Ookla Netindex (Ookla, 2013).

ACCESS TO THE INTERNET

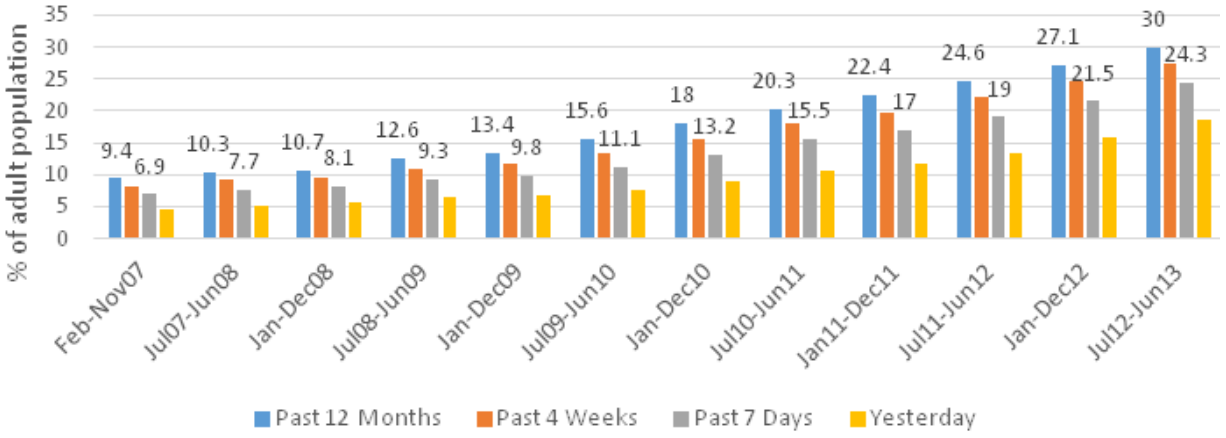
Internet access in South Africa is limited, at least partly due to high prices for Internet access and poor quality. According to the Census 2011, 35.2% of households had access to the Internet and 64.8% of households did not have access to the Internet in 2011 (StatsSA, 2012a).[3] This is an improvement from the 2007 Community Survey, which found that only 7.2% of households had access to the internet (StatsSA, 2007). In 2011, 8.6% of households accessed the Internet from home, 16.3% used a cellphone, 4.7% of households accessed the Internet from work and 5.6% from elsewhere (StatsSA, 2012a).

Access to the Internet is likely to be overstated in the Census data, however. For example, Gillwald et al. (2013) find significantly lower Internet penetration among households (19.7%) than the Census does (35.2%). Gillwald et al. (2013) do find nonetheless that Internet penetration among individuals is 33.7%. The key problem with the Census data is that the fact that one person in a household has a Wireless Application Protocol (WAP) enabled feature phone (ie very limited Internet access) does not mean that the entire household has access to the Internet. World Wide Worx (2012), for example, estimates that there were 8.5 million Internet users in South Africa in 2011, and that Internet penetration was therefore approximately 17% in 2011. The World Wide Worx methodology counts the number of active subscriptions, rather than shared access to the Internet (though World Wide Worx does account for shared Internet access at work).

The South African Audience Research Foundation's All Media Products Survey (AMPS) shows similar results to those of World Wide Worx, which suggests lower Internet penetration than that suggested by the census results (SAARF, 2005-2013) (see Figure 6 below). While 30% of survey respondents said that they had accessed the Internet in the last 12 months, only 24.3% had accessed the Internet in the past seven days, which suggests a significant degree of intermittent Internet access (see Figure 6 below). This is significantly lower than the 35.2% household Internet penetration shown in the Census. Nonetheless, the significant growth in Internet access is consistent with Gillwald et al. (2013), World Wide Worx (2012) and StatsSA (2012a).

3 Households were asked the following (Question H13A): 'How does this household mainly access the Internet? The possible responses were: From home, cellphone, work, elsewhere or no access to the Internet.

FIGURE 6: INTERNET USE BY SOUTH AFRICAN ADULTS (AMPS, 2007-2013)

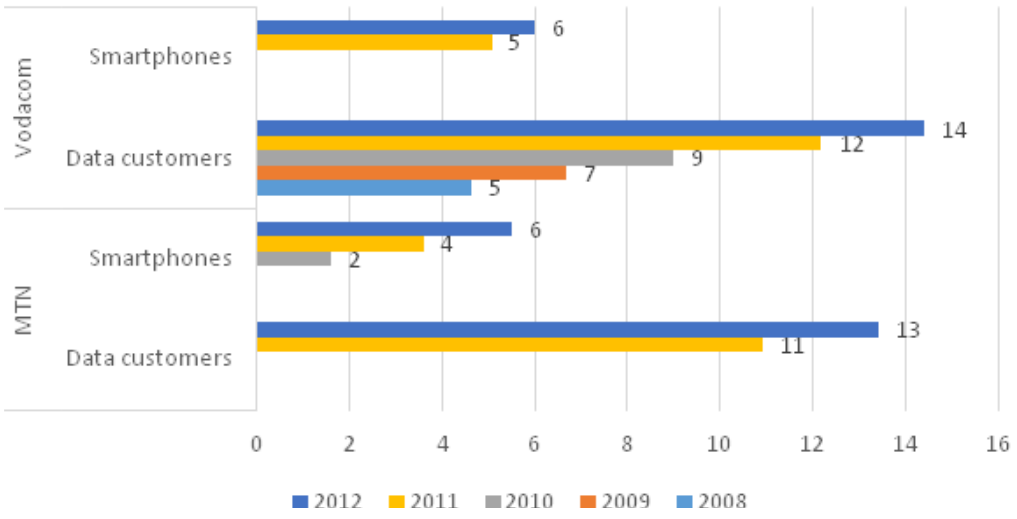


Source: All Media Products Survey (SAARF, 2005-2013)

It is noted that there is considerable variance in Internet access and coverage among provinces. While 46.4% and 43.7% of households in Gauteng and the Western Cape respectively have Internet access, only 24.1% and 24.3% of households in the Eastern Cape and Limpopo respectively have access to the Internet (StatsSA, 2012b).

The overall number of data customers and smartphones in the market increased rapidly between 2008 and 2012 (see Figure 7 below). While a significant number of data subscriptions are used for machine to machine applications, such as for vehicle tracking, the number of data connections suggests that the Internet penetration reported by the Census 2011 and World Wide Worx (2012) might be understated significantly. For example, Vodacom and MTN between them had 23 million data subscriptions in 2011, which increased to over 27 million data subscriptions in 2012.

FIGURE 7: DATA CUSTOMERS, 3G DEVICES AND SMARTPHONE PENETRATION (MILLIONS)



Source: Analysis of data from MTN (2005-2013) and Vodacom (2005-2013).

Note: Vodacom financial data corresponds to the calendar year prior to the year in which the financial results were reported, due to Vodacom's financial year ending in March. Their data therefore reflects the previous calendar year more than it does the calendar year in which results are reported.

The available data suggests that while Internet access has grown significantly over the last decade, actual Internet penetration and use among South Africans is still limited. This is likely to be at least partly due to high prices for Internet access, as well as poor quality. Measured by these outcomes, ICASA has not performed well where broadband services are concerned.

LLU AND THE INSTITUTIONAL FRAMEWORK FOR TELECOMMUNICATIONS REGULATION IN SOUTH AFRICA

The poor outcomes for Internet access in South Africa are at least partly due to the institutional framework for regulation of the telecommunications sector, in respect of both formal and informal institutions (rules). Problems with the formal institutions are described above, and include a lack of regulatory independence for ICASA (including funding, decision-making and performance monitoring) and state ownership of operators. This creates a conflict of interest for the policymaker, the Department of Post and Telecommunications Services, which owns the operators and sets policies to regulate them.

Informal institutions in the telecommunications sector serve to further undermine reforms that would set South Africa on a higher growth path. The considerable political interference with ICASA's decision in respect of LLU reflects the role played by the informal institutional framework governing the telecommunications sector in South Africa. The implementation of LLU has been delayed by more than seven years as a consequence of these informal rules. Such a lack of implemention reflects Telkom's holding power in respect of resistance to reform, derived at least in part from government's significant shareholding. Telkom's entrepreneurial capabilities, which are an important determinant of the extent to which it would seek government protection (Khan 2010), are also weak. This means that ICASA would have to expend considerable effort to implement pro-competitive reforms in the fixed-line sector in South Africa. The Competition Commission has been similarly constrained by Telkom's holding power, particularly in respect of transitioning towards an open access fixed-line network, in that it has delayed by eight years the final settlement regarding anti-competitive conduct relating to a refusal to supply access to its network (The Competition Commission v. Telkom SA).

The successful implementation of LLU therefore relies strongly on weakening Telkom's holding power, while at the same time increasing its entrepreneurial capabilities so that it does not have to seek protection from competition. One means of achieving this would be the sale of the government's stake in Telkom to a strategic investor with strong entrepreneurial capabilities. Such an opportunity presented itself with the potential sale of government's stake in Telkom to KT-Corp of South Africa, ultimately blocked by government (Gedye, 2012).

CONCLUSION AND RECOMMENDATIONS: ICASA HAS SUCCEEDED IN REGULATING VOICE BUT NOW NEEDS TO FIX BROADBAND

The regulatory system for telecommunications in South Africa is characterised by a poor formal institutional framework, including ICASA's lack of independence from the government. The informal institutions (rules) that govern the sector also limit its competitiveness. The fixed-line sector in particular is characterised by Telkom's considerable holding power (derived in part from state ownership) and poor entrepreneurial capabilities. The combination of these two factors results in Telkom seeking protection from competition, which ultimately results in a poorer growth path for South Africa, given the linkages between broadband expansion and economic growth.

As a result of this institutional framework, ICASA's performance in regulating the telecommunications sector can be assessed as mixed. It has successfully intervened in the voice services sector and has caused retail prices to fall significantly. This is at least partly due to the government's interests in bringing down call termination rates during the course of Telkom Mobile's entry into the market, and the comparatively strong entrepreneurial capabilities of the mobile incumbents, Vodacom and MTN, which operate on a global scale. Vodacom and MTN did not have sufficient holding power to stymie reform (they are not state owned like Telkom), and did not have as large an incentive to seek protection due to their considerable entrepreneurial capabilities. As a result of ICASA's call termination rate intervention, South Africa has among the lowest prepaid voice prices available in the Southern African Development Community (SADC) region. This has resulted in (or at least facilitated) significant expansion in access to voice services and increased voice service usage.

ICASA's track record in respect of Internet services is significantly weaker. ICASA has failed to implement local loop unbundling (LLU) and has failed to assign spectrum for broadband. The failure to implement LLU is due to Telkom's holding power, strengthened by state ownership, and Telkom's weak entrepreneurial capabilities, that cause it to seek protection from competition. While there is a debate as to whether LLU is good for consumers, assigning spectrum for broadband unambiguously facilitates greater broadband access, lower prices and better quality. The consequence of ICASA's inaction on spectrum is that South Africa has high prices for broadband services and slow speeds, when compared to its developing country peers.

Measured in terms of market outcomes, therefore, ICASA has performed well for voice services but has largely failed in performing its role where broadband services are concerned. ICASA therefore needs to shift its focus beyond voice services, where its work is largely complete, towards assigning spectrum and implementing LLU in order to improve broadband services so that South Africa can become more competitive relative to its peers, promoting broadband access and services across the economy and society.

In order to achieve this, the following actions are recommended:

a) In relation to market access and lowering barriers to entry:
   i. There should be greater access to spectrum for smaller operators on a local or community basis, particularly in respect of television white spaces.
   ii. LLU should be implemented in order to provide for a 'ladder of investment' for new market entrants. In order to bring about LLU, consideration should be given to selling government's stake in Telkom to a successful fixed-line operator from outside South Africa. Failing this, the government's stake in Telkom should be housed in a separate legal entity falling under the Department of Public Enterprises, rather than the Department of Telecommunications and Postal Services.
   iii. Telkom's copper local loop assets as well as its co-location facilities and related infrastructure should be separated from its downstream retail activities.

b) ICASA should make available as much spectrum as possible for broadband purposes. ICASA has previously identified 450 MHz of spectrum that could be used for broadband. ICASA should issue this spectrum in a period of six to 12 months.

c) In relation to ICASA's independence:
   i. ICASA should be allowed to employ experts outside of its approved budget without ministerial approval. ICASA should be given the authority to have the regulated entity fund the costs of consultants.
   ii. The requirement for ICASA to consider ministerial policies and policy directions should be removed as this undermines ICASA's independence and results in considerable delays.
   iii. ICASA's funding should generally be raised through special levies from regulated entities rather than through appropriations from Parliament, in order to make it more independent from government and political priorities.
   iv. A rule should be put in place that prohibits government cuts in ICASA's spending unless they apply consistently to all government-funded agencies.

d) In relation to the decision-makers at ICASA:
   i. The ECA should be further amended to ensure that an independent investigation is required prior to removal of decision-makers.
   ii. ICASA's nine Council members should be reduced to the number recommended by Brown et al. (2006), namely three to five Council members.
   iii. ICASA council members should be appointed by the President or Parliament, and their terms of service should not be changed while they are in office.
   iv. ICASA councillors should not be accountable to the Minister of Telecommunications and Postal Services and should instead be accountable to Parliament for their performance.

e) In relation to transparency and accountability of ICASA:
   i. ICASA should seek outside expert advice on its performance.
   ii. There should be a dedicated appellate body for ICASA's decisions to enable regulated entities to regularly appeal ICASA's decisions.

f) Consideration should be given to moving towards a bill and keep regime for call termination rates in South Africa. The mobile operators are focusing their investments on the rollout of data networks, which, to some degree, are at least, independent of markets for voice services. The introduction of bill and keep will facilitate competition and will result in lower costs of compliance for regulated entities and reduced complexity for the regulator.

Further research is needed on the extent and nature of fixed to mobile substitution in particular in South Africa, which would inform how LLU should be implemented. Further research is also required as to the economic impact of moving towards a bill and keeping regime in SA.

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