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Competitive dynamics of telecommunications markets in South Africa, Tanzania, Zambia, and Zimbabwe

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Abstract: Low levels of broadband penetration combined with poor quality of services present a challenge to growth and development in the Southern African Development Community (SADC). This paper performs a comparative analysis of the competitive dynamics of telecommunications markets in four SADC countries and relates this to outcomes for consumers. From a mobile perspective, a common theme is that while entrants have attracted subscribers, they have struggled to grow revenues and compete effectively due to tariff-mediated network effects and the high cost of building a network. Fixed markets are underdeveloped and highly concentrated. Access to fixed and mobile infrastructure is a challenge, in spite of regulations mandating access in most countries. Where mobile money has taken off, this has sometimes exacerbated network effects and enhanced the market power of incumbents, although the development of interoperability in some countries has had a positive impact. The findings suggest that regulation has often been ineffective in facilitating competition in telecommunications markets in SADC.

Key words: competition, fixed and mobile infrastructure, interoperability, Southern African Development Community, telecommunications

JEL classification: L1, L51, L96

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1 Background to the study

This working paper is the first in a series of studies under the theme of competition and regional regulation of services workstream of the Southern Africa—Towards Inclusive Economic Development work programme on regional growth for Southern Africa’s prosperity. It focuses on the telecommunications services sector due to the potential it holds to enable increased regional integration as well as growth and prosperity in Southern Africa. This paper considers the competitive dynamics of the telecommunications sector in selected countries in Southern Africa, including South Africa, Tanzania, Zambia, and Zimbabwe. The four case study countries reflect a range of experience in terms of market structure and competitive dynamics as well as policy and regulatory approaches which provides for interesting comparative analysis. The second paper compares the different economic regulatory approaches in the same countries (see Paolo and Robb 2020), while future work will consider the interconnection and regulatory alignment of the four selected countries. These papers aim to contribute to the body of knowledge on regional integration by identifying how the competitive dynamics, regulatory approaches and alignment of regulation in the telecommunications sector can influence the current state of regional growth in Southern Africa and promote growth in services trade.

1.1 Importance of telecommunications for growth and development

The importance of telecoms for growth and development is often discussed. In addition to facilitating communication and reducing transaction costs, increased investment and growth in telecoms have significant spill-over effects that can spur economic growth. Low-cost, high-quality telecommunications services improve productivity across the economy. There is also a direct impact as infrastructure deployed to construct telecommunication networks, such as cables and switches, leads to increased demand for goods and services.

From a regional integration perspective, there are further benefits to policies which encourage improved access to telecoms services. Trade is facilitated as the costs of sharing and obtaining information on products and services are reduced. This is acknowledged by the Communications Regulators’ Association of Southern Africa (CRASA), a body made up of regulators in the Southern African Development Community (SADC), whose mission is to ‘coordinate the harmonisation of communications regulation for the socio-economic benefit of SADC’ (Communications Regulators’ Association of Southern Africa 2019). Three key areas of emphasis for CRASA are harmonizing the allocation of radiofrequency spectrum, expanding broadband access, and reducing the cost of international call termination and roaming charges in the region (Communications Regulators’ Association of Southern Africa 2019).

Given the rapid uptake of mobile telephones in Africa, mobile telecoms services in particular have provided an opportunity to realize these advantages. At the end of 2018, there were around 456 million mobile subscribers in Sub-Saharan Africa, accounting for around 44 per cent of the population (GSMA 2019a). Around 239 million of these (23 per cent of the population) currently use mobile internet. Mobile telephony can bring about economic growth and development through five main channels: (i) reducing information asymmetries, coordination costs and increasing efficiency; (ii) increased communication, which raises productive efficiency in supply chain management of firms; (iii) creating new jobs from demand for mobile-related services; (iv) improved social interaction where there are shocks, which reduces a household’s exposure to risk; and (v) the development of mobile phone-based applications that improve the delivery of financial, agricultural, health, and educational services (Aker and Mbiti 2010).

Rather than travel to distant locations to acquire information, mobile telecommunications allow households and firms to acquire information on prices, products, and services more easily and cheaply. Firms are able to communicate to their suppliers and customers conveniently and almost immediately, allowing them to improve the efficiency of production. As the demand for mobile-related services grows, more employment opportunities are created, such as in selling airtime and in network building and maintenance.

In addition, the growth of mobile technology and introduction of smartphones sparked the development of a range of new and innovative services such as mobile money that enables users, even those not currently operating in the formal financial section, to transact using their mobile phone. More advanced services are offered in some countries offering savings, bill payment, and even credit services. It has been instrumental in increasing access to financial services in a number of countries in Africa. Additionally, mobile applications that connect farmers, improve agricultural opportunities, improve health and education services, and enable households and firms to borrow and save have arisen out of mobile technology.

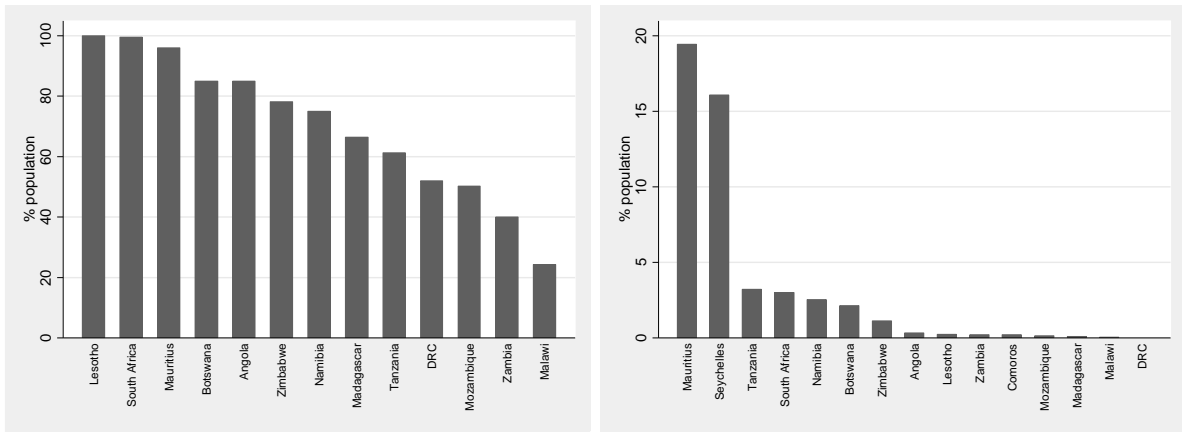
Importantly, mobile technology also facilitates the lowering of the cost of communicating and transacting between countries. This is an important facilitator of increased regional integration, cross-border transfer of knowledge, innovation, and growth in trade. The spread of mobile technology all over the continent makes mobile technology a key channel by which regional integration can be achieved.

With the proliferation of mobile phones, mobile broadband usage has grown rapidly, and fixed-line services tend to form less of a focus for policy makers and regulators. However, fixed-line broadband provides significant additional advantages that make it an important complement to mobile broadband, particularly given the finite nature of spectrum for mobile broadband and as the data-intensity of usage continues to grow.

1.2 State of telecoms development in SADC

Several SADC countries perform relatively well in terms of the extent of 3G penetration (Figure 1). Lesotho, South Africa, and Mauritius had close to 100 per cent 3G penetration in 2019 and Botswana and Angola both enjoyed over 80 per cent penetration. All countries except Zambia and Malawi had a penetration rate over 50 per cent. This of course is not the same thing as access, and the price of data and access to broadband-enabled devices may be a further barrier to uptake. However, from a coverage perspective, most countries have achieved over 60 per cent 3G coverage. Fixed-line coverage on the other hand is extremely poor. Only Mauritius and the Seychelles (both small countries) have fixed-line penetration over 15 per cent and the rest of the countries (including South Africa) have penetration rates under 4 per cent.

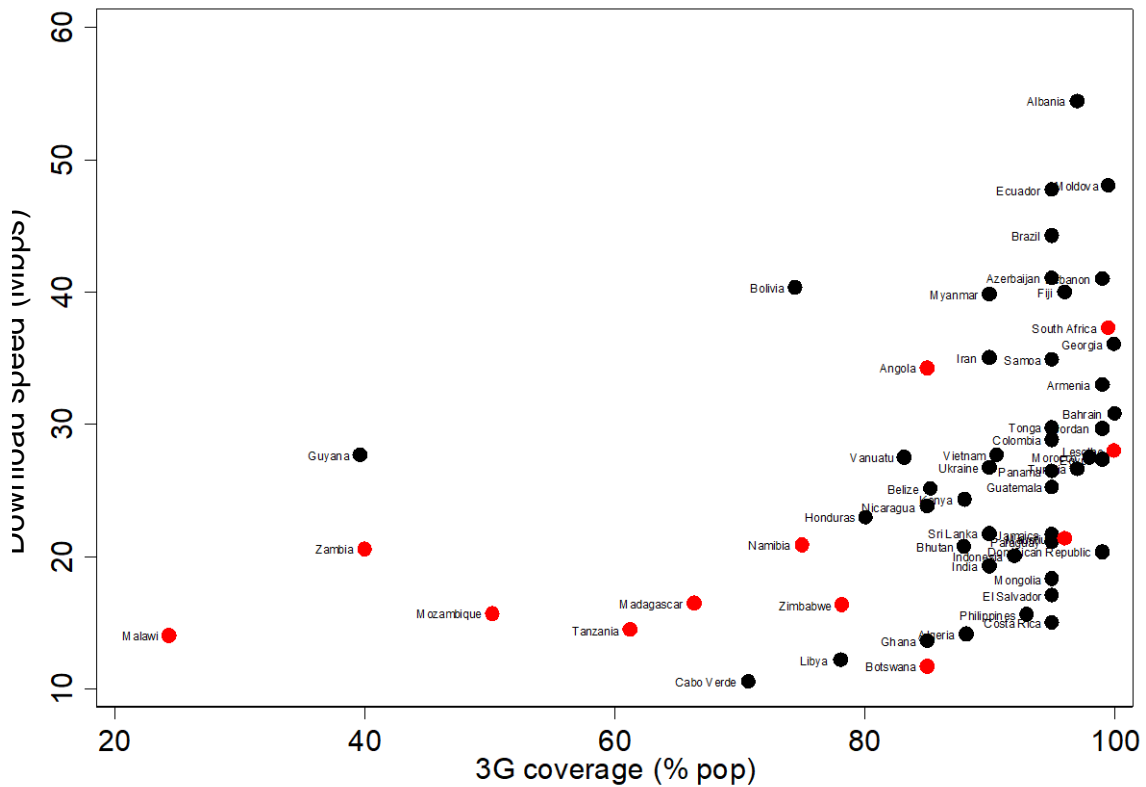
Figure 1: 3G and fixed-line penetration by SADC country, 2019 and 2017



Source: authors' compilation based on World Bank (2019) and GSMA (2019b).

The GSMA Mobile Connectivity Index ranks countries in terms of a range of indicators related to the key enablers of mobile internet adoption, including infrastructure, affordability, consumer readiness, and content and services (GSMA 2019b). Compared with the group of countries performing in the mid-range of the index, SADC countries (with the exception of South Africa) perform poorly in terms of 3G coverage and download speeds (Figure 2).

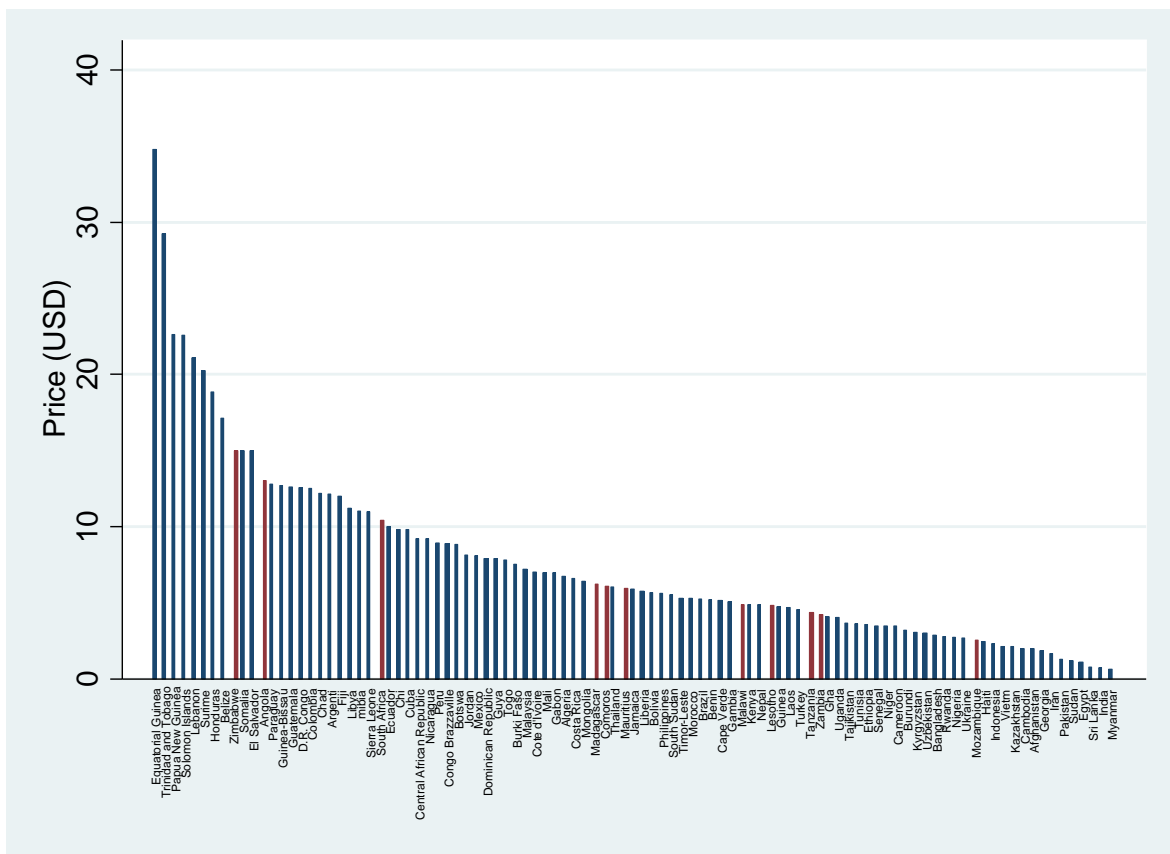
Figure 2: 3G coverage versus download speed, SADC and GSMA mid-range countries, 2019



Source: authors' compilation based on GSMA (2019b).

From an affordability perspective, the price of 1 GB of data varies dramatically across SADC. Figure 3 illustrates the prices of selected SADC countries in comparison with a range of countries monitored by the Alliance for Affordable Internet (2019). Mozambique had the lowest price of the SADC countries for 1 GB in 2018, with Tanzania and Zambia also being at the lower end of the spectrum. Zimbabwe and Angola are the most expensive, followed by South Africa. Data packages in most of the SADC countries are significantly more expensive than comparator countries such as India, Nigeria, Rwanda, and Ethiopia.

Figure 3: Price of 1 GB, A4AI countries, 2018



Source: authors' compilation based on Alliance for Affordable Internet (A4AI) (2019).

The discussion above has illustrated that while mobile coverage levels are improving, the SADC region performs poorly in terms of mobile speeds and pricing. Mobile services, when benchmarked with other regions, are expensive and of poor quality. Fixed-line coverage is exceptionally low. Of the case study countries, Zimbabwe is of particular concern as its data prices are high while quality is poor. Zambia and Tanzania enjoy lower prices but have low speeds and coverage levels.

Therefore, a significant gap in access to telecoms services remains in the region. This paper and the corresponding paper by Paolo and Robb (2020) on regulation in SADC will explore the extent to which competition and regulation can be better aligned and made more pro-competitive in order to greatly expand access to telecommunications services in SADC. While mobile broadband is typically emphasized in policy and regulation in the region due to historically low levels of fixed infrastructure and services, fixed access is also important as discussed above, particularly for high-volume use and for small and medium-sized enterprises. In addition, as services become increasingly converged and data-driven, fixed services can provide an important competitive constraint to mobile operators in concentrated mobile markets. We see this trend already in some of our case study countries as discussed later in this paper.

1.3 Outline of the report

In this report, we consider the state of competition in telecoms markets in four SADC countries: South Africa, Tanzania, Zambia, and Zimbabwe to understand whether a lack of competition is part of the reason for the poor performance of the region in terms of prices, quality, and coverage. The analysis is based on publicly available information and interviews conducted with key stakeholders in each country, including sector regulators, competition authorities, and operators.

For each country, we first look at the mobile sector, we consider the market structure in each country, and we examine the level of competition in retail markets through considering the price of voice and data services and the quality of data services. We consider the impact of call termination rates on competition in voice services. We also discuss trends at the infrastructure level in terms of investment in sites, concentration in site ownership, and the extension of coverage to unserved areas. Mobile markets are typically dominated by one or two large players, with the exception of Tanzania which has three large operators and a fringe of smaller players.

We also consider mobile money in each country, particularly to understand the impact of competition dynamics in mobile money on competition in the market for mobile network services. In some countries, the growth of mobile money seems to have cemented the dominance of the incumbent operator by inducing further network effects and customer loyalty, while in others it has proved a means for smaller operators to grow their market share and provide more effective competition to the incumbent.

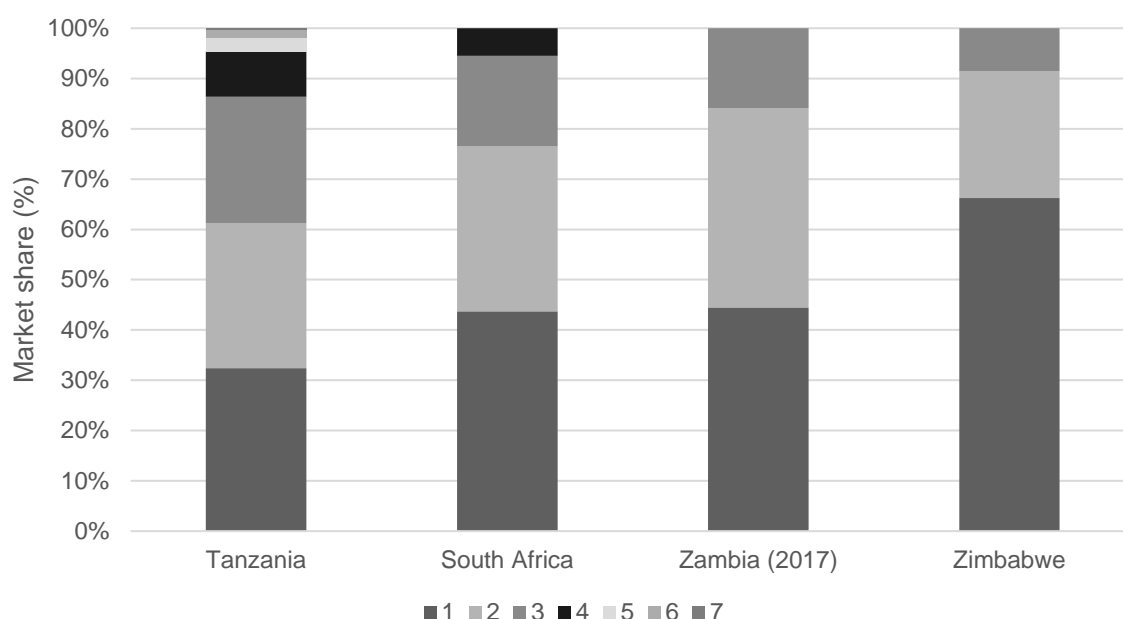
Finally, we consider fixed markets including competition for the provision of international bandwidth, national backhaul, and wholesale services, as well as competition in retail markets, especially competition for broadband services provided by internet service providers (ISPs). In most countries, less information was available on the fixed sector, perhaps because it is much smaller, and regulators are more focused on monitoring and intervening in mobile markets. Apart from South Africa, none of the countries have a large number of fixed subscribers and services are generally restricted to urban areas and are quite expensive.

The remaining sections of this paper are set out as follows. Sections 2–5 present analysis on each theme, drawing on the experience of individual countries and comparing them with one another. Section 6 draws together emerging themes from case studies that are explored further in Paolo and Robb (2020).

2 Market structure

Although market structure is not necessarily determinative of the level of competition in a market, factors such as the number of competitors in the market and the presence of one or more dominant players can certainly have an impact on competition. Tanzania has the largest number of mobile operators of the case study countries, with seven operators at the time of writing, although some are very small (Figure 4). At the other end of the spectrum, Zimbabwe's mobile market is highly concentrated with the largest operator (Econet) accounting for over 60 per cent of subscribers and two smaller operators. Zambia also has only three operators but is dominated by two (MTN and Airtel). South Africa has two large operators (Vodacom and MTN) and two smaller operators.

Figure 4: Market share of mobile market by subscribers, case study countries, 2018



Source: authors' compilation based on regulator and company quarterly and annual reports (Tanzania: TCRA 2014–19; South Africa: see footnote 2; Zambia: Zambia Ministry of Transport and Communication 2018; Zimbabwe: POTRAZ 2014–19).

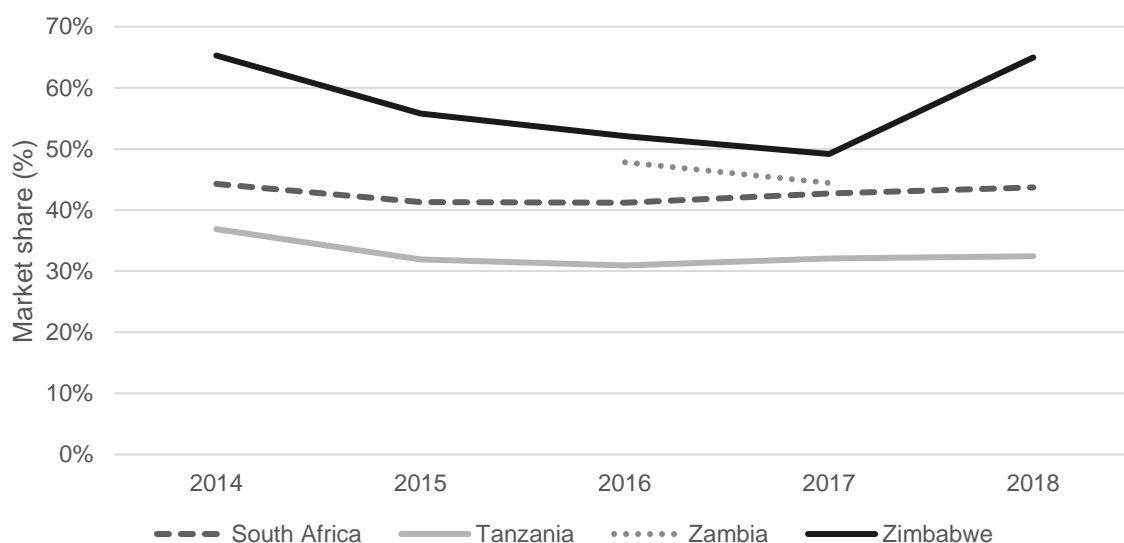
It may appear that all the countries apart from Tanzania are rather uncompetitive with only four or even three operators. However, this is far from unusual in telecoms markets that typically involve economies of scale and network effects, both of which make it difficult for small players to compete effectively. In mobile and fixed markets, the high cost of rolling out networks means that there will only be a few large market participants. For example, in 2018, there were 29 European countries with three or fewer mobile operators compared with 19 with four or more (GSMA 2018).

Possibly a more interesting indication of the state of competition in mobile markets is to look at how the share of the largest operator changes over time. While the largest operator has the highest share of subscribers in Zimbabwe (Figure 5), across all four case study countries, this share has stayed fairly high and remarkably stable over time. Even in Tanzania, where there are seven mobile operators, the share of the largest operator has remained between 31 and 37 per cent over the five-year period 2014–18, increasing slightly from 2016 onwards. This reflects the fact that there is strong incumbency advantage in mobile markets, which makes it difficult for entrants and smaller rivals to compete with large, established operators. The number of operators in a market and their shares of subscribers do not tell the whole story from a competition perspective.

In Tanzania, between 2014 and 2018 there were typically seven or eight mobile operators in the market, but three operators had many more subscribers than the others (more than 8 million each). Vodacom was the leading operator in terms of subscribers throughout the period, closely followed by Airtel and Tigo. Only one of the smaller operators has shown an ability to expand and grow subscribers. Halotel has grown strongly from its entry in 2015 and reached around 4 million subscribers by 2018. Halotel operates in a specific niche, targeting rural areas with low-cost products and services, which may explain its success (Anyanzwa 2019). However, data from the

regulator¹ show that the share of voice minutes is significantly smaller than the share of subscribers. This suggests that it has struggled to translate strong subscriber numbers into revenue.

Figure 5: Market share of largest operator, case study countries, 2014–18



Source: authors' compilation based on regulator and company quarterly and annual reports (Tanzania: TCRA 2014–19; South Africa: see footnote 2; Zambia: Zambia Ministry of Transport and Communication 2018; Zimbabwe: POTRAZ 2014–19).

In South Africa, despite Cell C's participation in the mobile market for close to 20 years and Telkom's for a decade, the structure of the mobile market remains dominated by two large players (Figure 4). While Cell C and Telkom have gained market share, Vodacom and MTN together still hold almost 80 per cent of the market. There are also mobile virtual network operators in the market but together they held less than 2 million subscribers as at the end of 2018 (Bekker 2019). Rain, a data-only provider, entered the market in 2019 and quickly gained subscribers due to its low-priced data bundles. However, it does not offer traditional voice and SMS services. The duopoly structure of the market is still more evident when market share by revenue is considered. Vodacom holds about 52 per cent market share in both mobile and data revenue whereas MTN has 33 per cent market share in mobile revenue and 29 per cent in data revenue.² Cell C only has 11 per cent market share in mobile revenue and 13 per cent in data revenue in 2018. Cell C is yet to be profitable and in 2018 experienced a ZAR 1.27 billion loss (*BusinessTech* 2019). Telkom's market shares in terms of mobile services revenue and mobile data revenue remain below 10 per cent.

In its submissions to the Competition Commission of South Africa's (CCSA) data market enquiry, Cell C highlighted a number of barriers to its growth including the first mover advantages enjoyed by Vodacom and MTN (Cell C 2018). Cell C claims that it experienced high interconnection rates following a sharp increase from MTN and Vodacom just before Cell C's launch. Cell C argues that by the time asymmetric mobile termination rates (MTRs) were implemented in 2010, nine years after Cell C launched, the market share enjoyed by Vodacom and MTN was entrenched and difficult to erode. Cell C also claims that its growth continues to be restricted due to the poor quality of national roaming it experiences from its competitors and that this affects its ability to

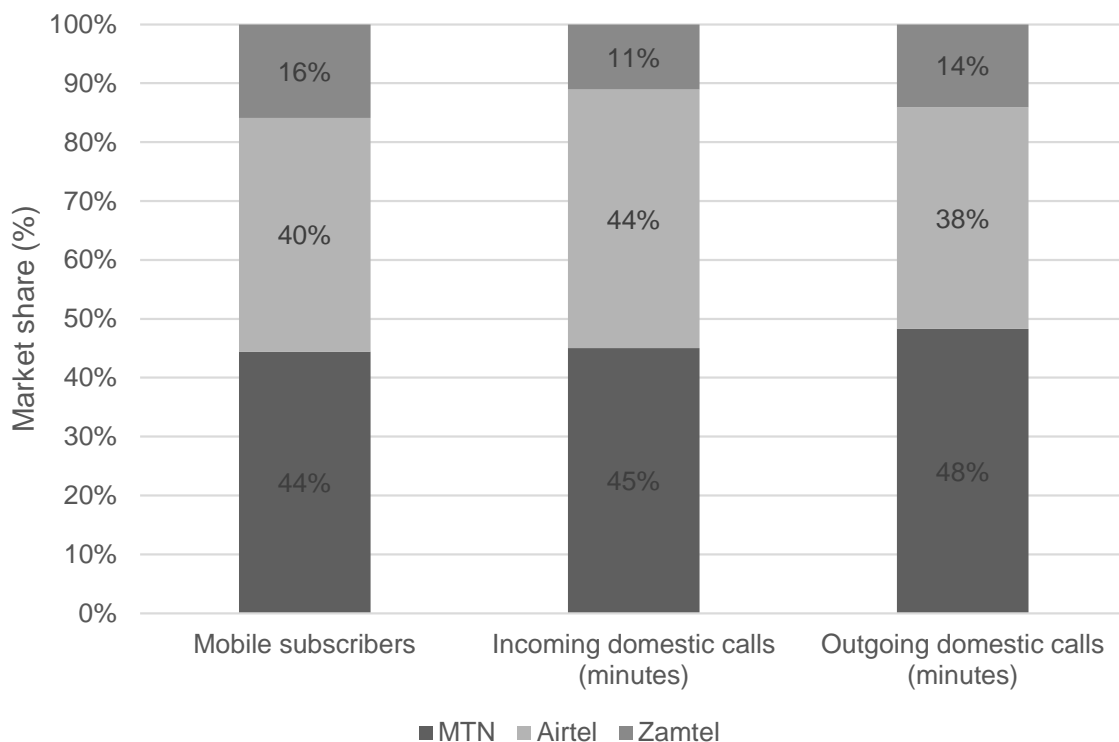
¹ See TCRA (2014–19) for regulator annual and quarterly reports.

² Calculated using operator annual reports (see Vodacom 2014–19; MTN 2014–19a; 2014–19b; Telkom 2014–19; Cell C 2017; Blue Label Telecoms 2019; for Cell C 2014–15 data, see Tarrant 2016).

attract and maintain high-value post-paid customers. Finally, it raised as a concern its lack of access to and the high cost of suitable radio sites. These factors may be an impediment to greater competition in the South African mobile market.

Zambia’s mobile market is made up of three players: MTN, Airtel, and Zamtel. MTN and Airtel have a combined market share of over 80 per cent (Figure 4). Zamtel’s market share in terms of subscribers grew from 10 to 15 per cent between 2016 and 2017 as a result of a large increase in subscribers from 1.2 million to 2.1 million. However, its share in terms of incoming and outgoing call traffic is lower at 11 and 14 per cent, respectively (Figure 6). This suggests that its growth in subscriber numbers has not been matched by a growth in call traffic, indicating that although it has attracted subscribers, Zamtel has struggled to compete for usage and revenues.

Figure 6: Mobile market shares, Zambia, 2017



Source: authors’ compilation based on Zambia Ministry of Transport and Communication (2018).

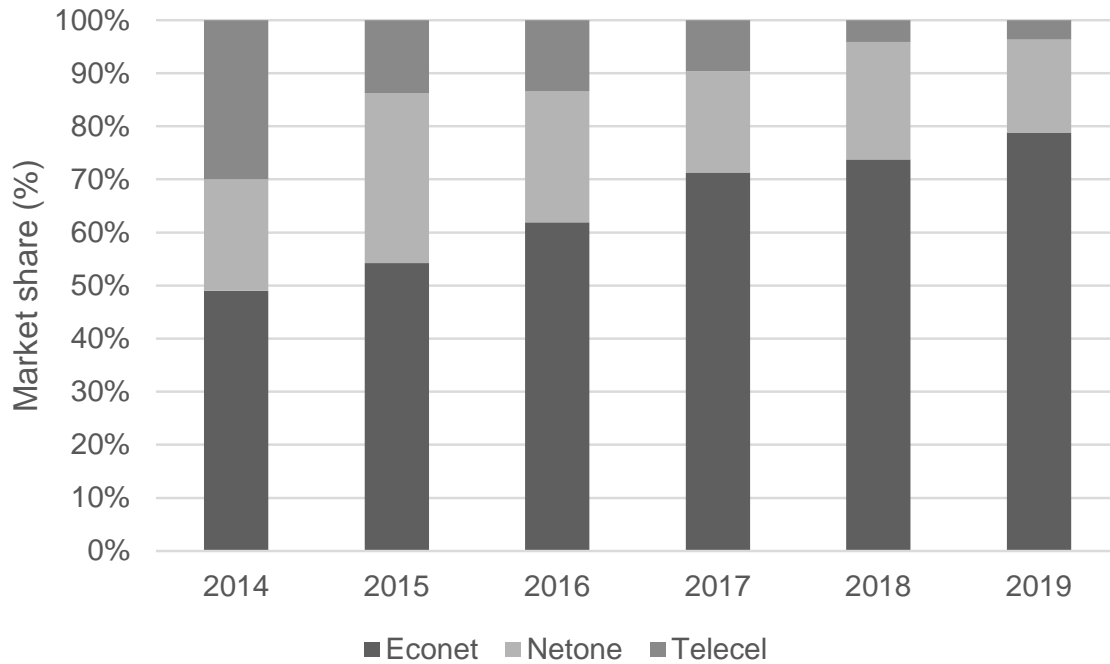
A fourth mobile operator, Uzi, has been licensed by the regulator and is due to enter the market in 2019 at the time of writing. It is planning to build a 4G network only,³ so will likely only compete for customers with smartphones with 4G technology. As discussed later, this prospect may have already stimulated competition in terms of the rollout of mobile broadband infrastructure. However, this will not provide additional competition for traditional voice and SMS services and may struggle to grow in terms of revenues, particularly outside urban areas.

Two of the three operators in Zimbabwe, NetOne and Telecel, are majority owned by the government. As discussed, Econet is by far the largest operator and its market share in terms of subscribers has grown since 2017, approaching 70 per cent in the first quarter of 2019. Telecel’s market share declined between 2014 and 2019, likely due to having its license cancelled by the

³ Interview with ZICTA, 9 September 2019.

government in 2015 and reinstated in a high court ruling (Nhundu 2015). Since its acquisition by the government, it has struggled to maintain levels of investment in infrastructure. In terms of voice traffic, Econet’s dominance is even more apparent (Figure 7). Its share of mobile voice traffic has grown from 49 per cent in 2014 to 79 per cent in 2019. Meanwhile, Telecel’s share has declined from 30 to 4 per cent. Another possible explanation for the growing strength of Econet is provided by the telecoms regulator in its 2018 annual industry report, where it explains that the dominance of Econet’s mobile money product, Ecocash, may also be driving Econet subscriber loyalty (POTRAZ 2018).

Figure 7: Market shares for mobile voice traffic, Zimbabwe, 2014–19



Source: authors’ compilation based on POTRAZ (2014–19).

The evidence presented in this section suggests that although the mobile markets in the four case study countries have very different market structures in terms of subscriber market shares, all have in common persistently high and stable market shares of the largest one or two operators. In addition, expansion by smaller players appears to be more difficult in terms of winning revenues and voice minutes compared with merely winning subscribers. This suggests a high prevalence of multi-homing (where customers take a new SIM card from a smaller operator but continue to use a larger operator as well) and that network effects are still important in entrenching the position of the largest operators. Other factors such as interconnection rates and infrastructure competition may also play a role as discussed later in the paper.

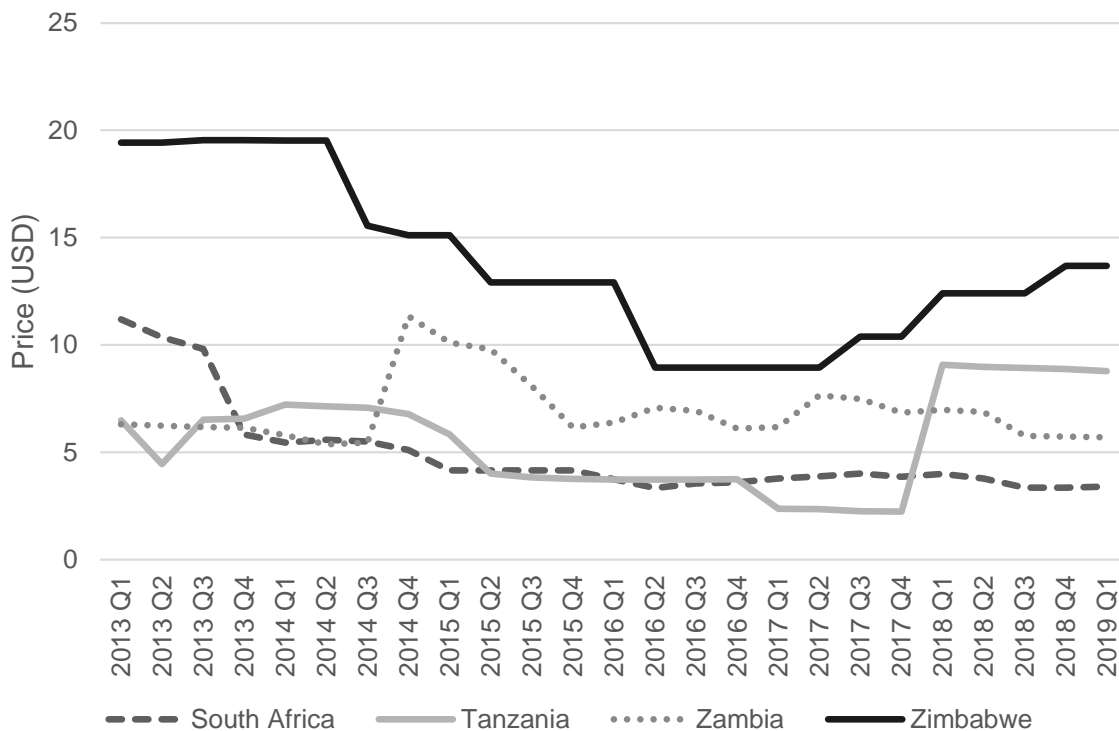
3 Price and quality

3.1 Voice prices

Voice prices in the case study countries vary substantially, with Zimbabwe the most expensive by far and South Africa at the cheapest end of the spectrum in 2019 (Figure 8). In Zimbabwe and South Africa, prices significantly reduced between 2014 and 2019, although Zimbabwe saw some increases in price from 2017 onwards as costs have increased and the regulator has allowed

increases in regulated maximum tariffs. In Tanzania and Zambia, prices have been more volatile and even increased sharply at times.

Figure 8: Price for cheapest mobile voice product, case study countries, 2014–19



Note: the cheapest mobile voice product is 30 calls and 100 SMS per month prepaid.

Source: authors' compilation based on Research ICT Africa (2019).

There is a regulated maximum on-net voice tariff in Zimbabwe, set by POTRAZ using a long-run incremental cost plus (LRIC+) methodology.⁴ This rate is extremely high at around US\$0.15 per minute in 2018. In comparison, in South Africa, the prepaid voice tariff charged by the largest operator, Vodacom, in 2020 was ZAR 0.79 per minute (on-net or off-net) or around US\$0.05 per minute. Operators are free to discount from this tariff so the real effective tariff may be much lower. However, as illustrated in Figure 8, Zimbabwe’s tariffs are about 50 per cent higher than the next cheapest of the four countries (Tanzania) and three times higher than the cheapest country (South Africa). Prices are, therefore, extremely high in spite of regulation. Call termination rates have been declining over time as in the other countries, but again are still considerably higher than any of the other countries. High call termination rates can dampen competition in concentrated mobile markets by allowing incumbents to benefit from tariff-mediated network effects [this is discussed in more detail in Paelo and Robb (2020)].

Number portability has not been enforced in Zimbabwe; however, a form of informal number porting takes place where subscribers are often offered the same six end digits to their telephone number if they move to a new network so that only the prefix has to change.⁵ This is possible as there are still a large number of available telephone numbers in Zimbabwe. In addition, multi-simming is very common and consumers switch between networks to take advantage of different

⁴ Email from POTRAZ, received 19 September 2019.

⁵ Interviews with POTRAZ and NetOne, 12 September 2019.

deals.⁶ Therefore, smaller operators can also try to attract traffic by offering low on-net prices.⁷ As shown, however, this has not been very successful for Telecel and NetOne so far.

Voice prices in Tanzania declined significantly from a peak in early 2014 until late 2017 before rising sharply in early 2018. According to data from the regulator, interconnection rates, which had slowly but steadily been declining in Tanzania, fell sharply in January 2018 from TZS 26.96 to TZS 15.6 and this led to a decline in the differential between on-net and off-net pricing. The increase in 2018, therefore, is surprising but this may be accounted for by a change in the contents of the voice basket being tracked. In its interim results announcement in late 2018, Vodacom Tanzania makes reference to the 42 per cent reduction in call termination rates and to a corresponding 75 per cent increase in minutes included within bundles, resulting in a decline in the effective price (see Vodacom 2018). We believe that this is likely to be an error in the data, and that voice prices in Tanzania have indeed continued to decline following the termination rate reduction.

According to data from the regulator, headline voice prices in Zambia declined significantly from 2014 to 2016 and off-net call rates declined faster than on-net call rates, causing them to converge to similar levels in 2016.⁸ This may have been due to reductions in the regulated call termination rates that have been on a declining glidepath from ZMW 0.25 per minute in 2012 to ZMW 0.11 per minute from March 2019.⁹ For a period from 2014 to 2016, Zamtel, the smallest operator, was permitted to charge a higher termination rate (ZMW 0.25 per minute vs. ZMW 0.2 per minute for MTN and Airtel), but from 2016 onwards this asymmetry fell away. Asymmetric call termination rates are typically time-limited to give later entrants an opportunity to grow before being standardized.

From 2017 onwards, headline voice prices rose and the differential between off-net and on-net prices re-emerged. Both subsequently remained stable until early 2019. Where incumbent networks offer deep discounts for on-net calls (due to high call termination rates), this makes it more attractive to belong to the large network. Therefore, the increased price difference between on-net and off-net calls is a concerning development as it suggests that competition for voice services is not effective and it may explain why the growth of Zamtel's voice traffic has not been as strong as its growth in subscribers. Figure 8 illustrates that the situation in terms of the cheapest prepaid bundle is slightly different, as this did fall in 2018 after an increase at the beginning of 2017, but in the first quarter of 2019, the price was at a similar level to 2013, suggesting that competition has not been effective at driving down voice prices. The duopolistic market structure is exacerbated by a high on-net/off-net price differential as well as by the geographic dimensions of competition, which will be discussed later.

Prices for mobile voice products in South Africa fell dramatically between 2014 and 2016, which has been shown to be at least partly a result of call termination regulations (Hawthorne 2018). This has resulted in South Africa having the lowest prepaid voice prices of the four countries by some margin. The success of this regulatory intervention is dealt with in greater detail in Paelo and Robb (2020). Nonetheless, as noted above, smaller players still struggle to compete sustainably.

⁶ Interview with NetOne, 12 September 2019.

⁷ Interview with NetOne, 12 September 2019.

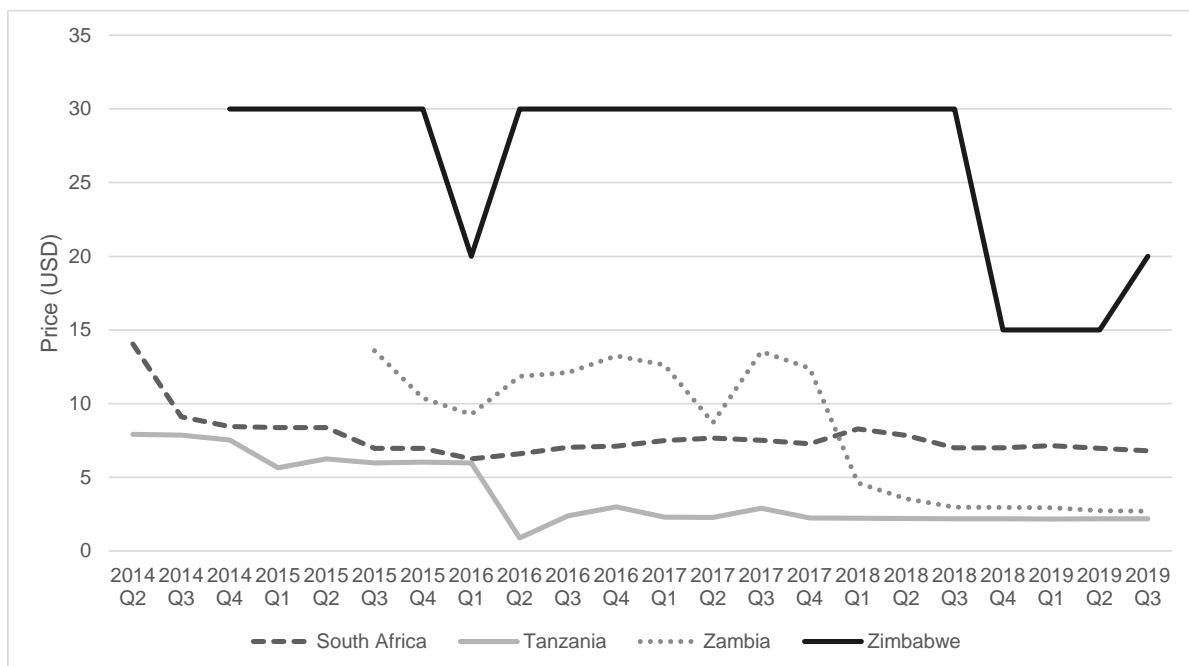
⁸ This section is based on data from ZICTA (2020).

⁹ Interview with ZICTA, 9 September 2019 and ZICTA (2020).

3.2 Data prices

Data prices have fallen since 2014 in all the case study countries (Figure 9). Again, Zimbabwe has the highest prices, with the cheapest prepaid 1 GB bundle at around US\$20 in 2019. There are regulated maximum prices for mobile data in Zimbabwe the same as voice tariffs, but these appear to be extremely high. The cost of 1 MB of data was capped at just over US\$0.06 per MB in 2018, which corresponds to an extremely high rate of US\$60 per 1 GB. At the time, the price of the cheapest 1 GB bundle in Zimbabwe was US\$30, suggesting that at least some volume discounts are being provided. Nevertheless, this is still the highest out of the four case study countries by quite some margin. Zimbabwe is a relatively high-cost environment due to the economic difficulties it has experienced in recent years; however, data prices are nearly three times those in South Africa and around eight times those in Tanzania. This suggests that neither competition nor regulation has been effective at driving down mobile data prices in Zimbabwe.

Figure 9: Cheapest prepaid 1 GB bundle, case study countries, 2014–19



Source: authors' compilation based on Research ICT Africa (2019).

In South Africa, data prices fell throughout 2014 and 2015 before beginning to rise and plateauing from 2016 onwards. In recent submissions to the CCSA enquiry, the incumbent players largely attribute the lack of a steeper decline in data prices from 2016 onwards to the lack of spectrum and high-cost factors.¹⁰ In addition to the lack of spectrum the small players contend that the high prices are due to the lack of competition in the sector. If long-term evolution (LTE)-only operator, RAIN, is included, the cheapest 1 GB bundle in South Africa in 2019 would be much cheaper at about US\$3.30. RAIN has been an important source of competition in terms of data prices but does not have a full-service network.

In Zambia, data prices started to fall significantly in late 2017. Mobile operators attributed the steep decline to increased mobile penetration and higher number of data subscribers (Malakata 2018). There are substantial economies of scale in building a mobile broadband network, and so increases in the volume of usage can lead to large declines in price, at least until such time as

¹⁰ See Vodacom and MTN data enquiry submissions (Competition Commission South Africa 2018).

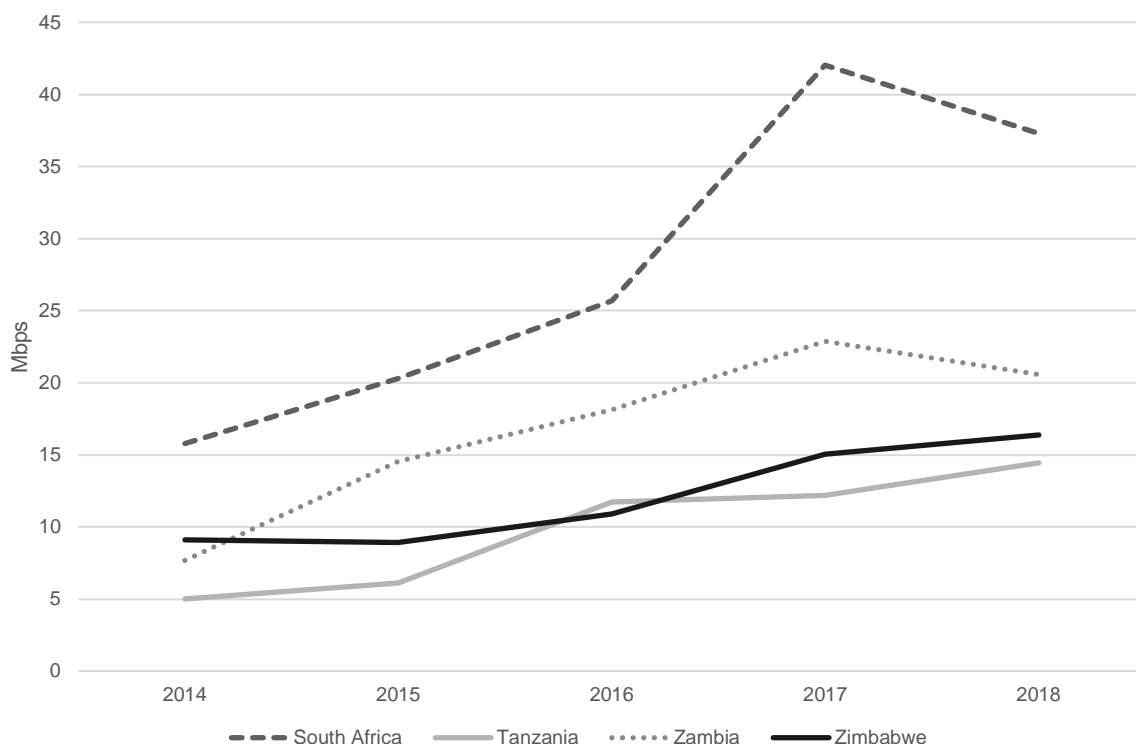
spectrum constraints are reached. Zambia was starting from a low base in terms of data volumes so had significant economies of scale to realize. This decline continued, although at a slower pace, throughout 2018 and 2019. As noted above, stakeholders considered that the imminent entry of a new data-only provider may have stimulated greater competition in respect of data prices, and it was also suggested that mobile operators are facing increasing competition for data services from ISPs, particularly in urban areas such as Lusaka.

Finally, in Tanzania, the price of the cheapest 1 GB bundle has fallen substantially from around US\$8 in 2014 to US\$2 in the first quarter of 2019, making it the cheapest of the case study countries. The large number of operators in Tanzania appears to have resulted in competitive data prices; however, according to a survey by Research ICT Africa (2017), 30 per cent of Tanzanians use the internet and only 57 per cent own a mobile phone. The survey found that two of the reasons for poor uptake of internet services are the high cost of smartphones and high tax rates on telecommunications services. In addition, the quality of services provided in Tanzania is very poor, as discussed in Section 3.3.

3.3 Quality of data services

It is interesting to consider the quality of data services as well as the price, as these tell quite a different story. While relatively expensive compared with Tanzania and Zambia, data services in South Africa operate with much higher speeds, likely due to greater investments by operators in rolling out 4G networks. In 2018, the average download speed in South Africa was around 37 Mbps compared with around 20 Mbps in Zambia and around 15 Mbps in Zimbabwe and Tanzania (Figure 10). This highlights that looking at prices alone does not give the full picture, since download speeds are also very important to customers, particularly for data-intensive uses such as streaming video or video calling. On a more positive note, download speeds increased dramatically in all four countries between 2014 and 2018.

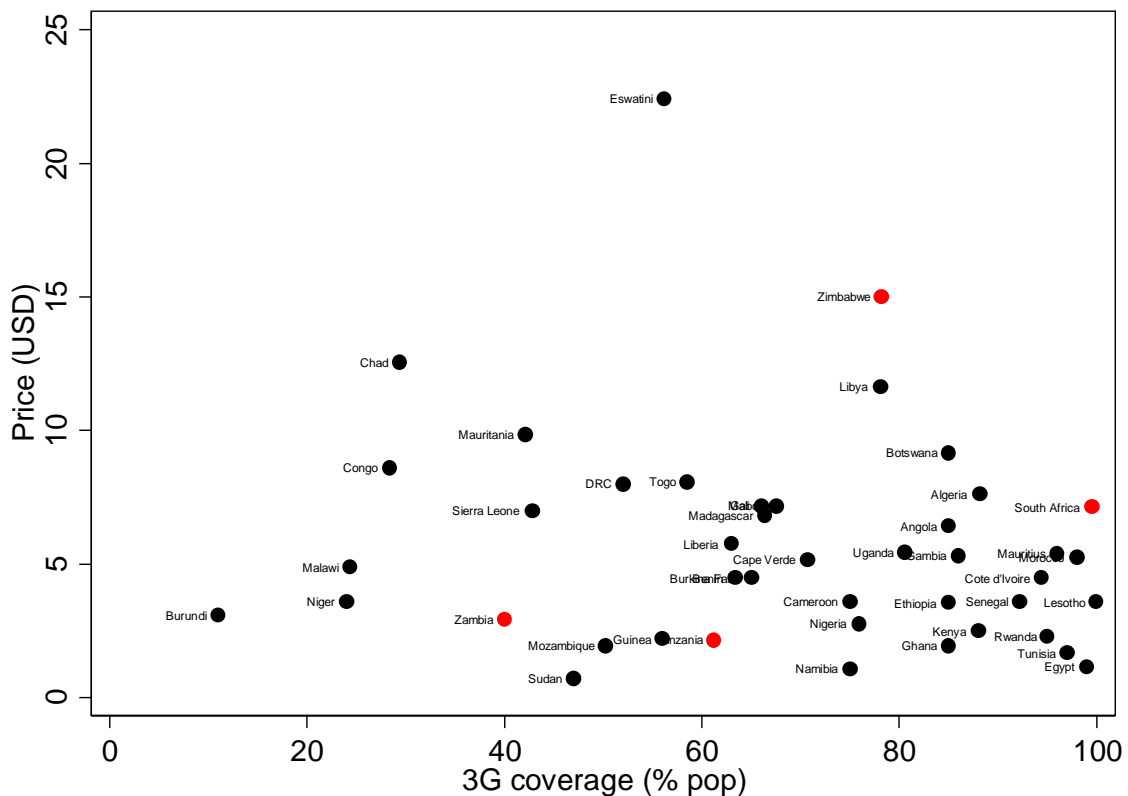
Figure 10: Average download speeds, case study countries, 2014–18



Source: authors' compilation based on GSMA (2019b)

If we consider data prices and 3G coverage for all African countries, the case study countries perform quite differently from one another (Figure 11). Zimbabwe has reasonable coverage but is the second most expensive country in Africa for 1 GB data. South Africa has excellent (near 100 per cent) 3G coverage and is in the mid-range of prices but enjoys high-quality (high-speed) services as shown. Zambia and Tanzania have very poor coverage levels and lower speeds, but data rates are also cheap.

Figure 11: Price of 1 GB vs. 3 G coverage, African countries, 2018–19



Source: authors' compilation based on GSMA (2019b) and Research ICT Africa (2019).

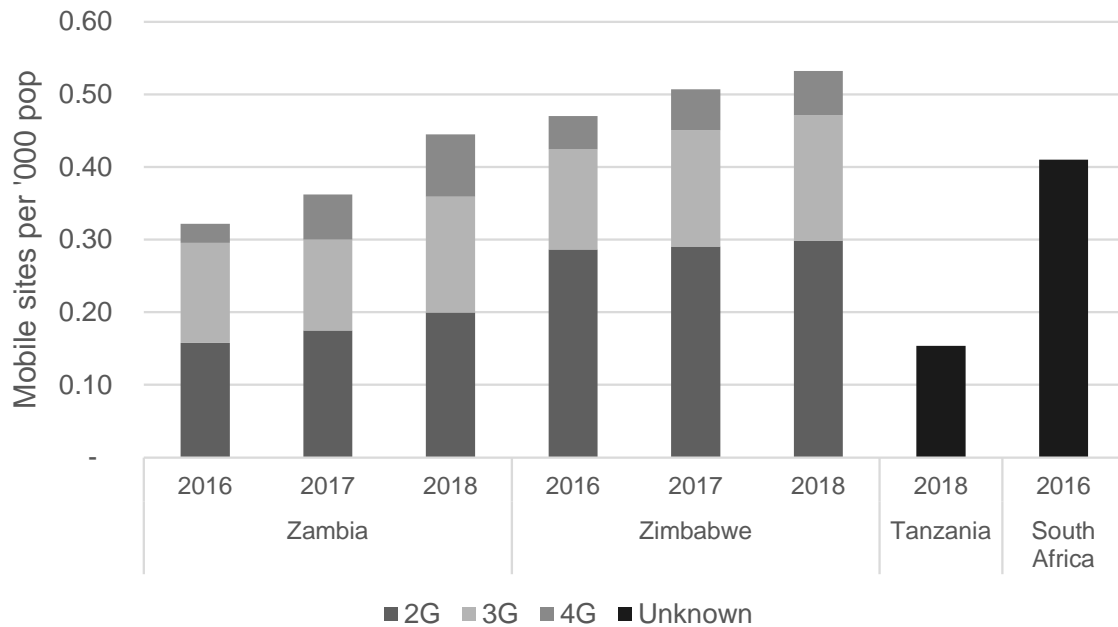
This analysis suggests that the challenges faced in the different countries are quite different. In South Africa, operators have invested in rolling out high-quality broadband networks, but competition has not been able to drive prices down as low as in other countries. This suggests that affordability is an issue in South Africa. In Zambia and Tanzania, access to services is more of a problem, with low 3G coverage rates and relatively low speeds. Services may be cheap, but only a portion of the population has access to them and how to encourage greater infrastructure investment is therefore a key issue. In Zimbabwe, prices are stubbornly high and quality mediocre, suggesting that competition is not effective and investment in rolling out networks has been inadequate. The following section deals with infrastructure investment in greater detail.

4 Infrastructure

The number of mobile sites in Zambia and Zimbabwe increased between 2016 and 2018 (Figure 12). Measured in terms of sites per 1,000 population, Zimbabwe had the most sites in 2018, but Zambia's increased quickly from a low base and Zambia also had substantially more 4G sites. Data

on sites are not publicly available in Tanzania and South Africa, but from press estimates, it seems the number of sites in Tanzania is extremely low. This explains the poor coverage levels in Tanzania. South Africa had quite a large number of sites in 2016 and, since then, operators have been rolling out new infrastructure to support high-speed mobile broadband, so this was likely to be quite a bit higher by 2018.

Figure 12: Sites per 1,000 population, case study countries, 2016–18

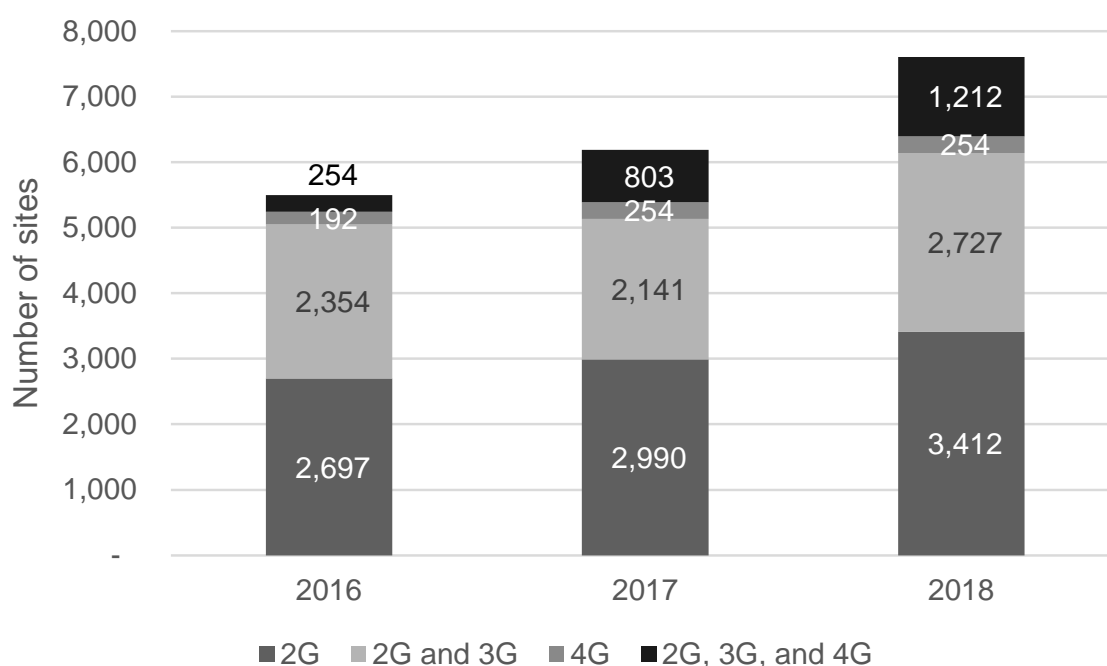


Source: authors' compilation based on regulator quarterly and annual reports (Zambia: Zambia Ministry of Transport and Communication 2018; Zimbabwe: POTRAZ 2014–19; Tanzania: Olingo 2018; South Africa: Statista 2016).

The number of mobile sites in Zambia has grown significantly from around 5,500 in 2016 to around 7,600 in 2018 (Figure 13). Over the same period, the number of 4G sites increased from 446 to 1,466. This may indicate that competition is driving investment and improvements in technology. In particular, the potential entry of Uzi's 4G network may have prompted the other MNOs to invest pre-emptively in their own 4G networks.

A key competition issue with respect to sites is that the two incumbent operators have sold off the majority of their towers to IHS, a large African tower company. IHS acquired 100 per cent of MTN's 710 towers in 2014 (IHS Towers 2014) and 929 of Airtel's in 2015 (Osmotherly 2014). It, therefore, owns more than half of the 2,759 towers in Zambia. This may have positive and negative effects on competition. As a non-vertically integrated tower company, IHS should be inclined to supply co-location services to all operators on equal terms, as opposed to the incumbents who may have an economic incentive to treat their own operations more favourably. An independent operator should also have an incentive to lease to as many operators as possible in order to maximize revenues from the infrastructure. On the other hand, the concentration of such a large proportion of towers in the hands of one competitor could lead to higher prices that smaller operators may have little option but to pay in areas where alternative infrastructure does not exist and would have to be built from scratch. While MTN and Airtel are likely to have made favourable arrangements for the lease of space on the towers when concluding the sale agreements, this could present a challenge for smaller operators.

Figure 13: Sites by technology, 2016–19



Source: authors' compilation based on ZICTA (2020).

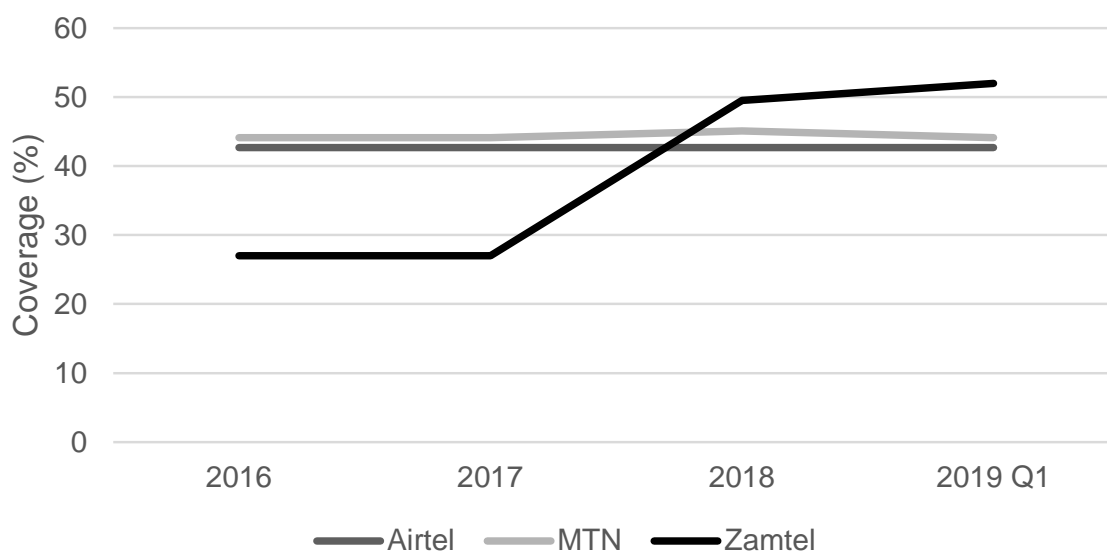
Coverage levels have remained fairly stagnant for MTN and Airtel, in spite of the growth in sites shown (Figure 14). This suggests that any sites added by the two incumbent MNOs have aimed at increasing capacity and improving quality in areas of existing coverage rather than rolling out into new areas. There are many parts of the country where only MTN or Airtel have coverage and no national roaming agreements have been implemented in Zambia, meaning that consumers in these areas only have one option in terms of mobile network. This may have the effect of dampening the extent to which MTN and Airtel compete with one another on price nationally and may represent another reason why voice prices have not declined as much as data prices.

In recognition of the fact that non-urban areas of the country may not be viable locations for commercial investment in sites, the Zambian government has implemented a programme to roll out sites in rural areas through Zamtel. The programme began in 2017 and the intention is to build 1,009 towers that should achieve 100 per cent population coverage.¹¹ So far, 424 of the new sites are operational, accounting for the large increase in Zamtel's coverage between 2017 and 2019 (Figure 14). The intervention may assist in providing competition to IHS for co-location services; however, the sites are likely to be located in areas where there are no existing towers since the intention is to expand coverage levels. In addition, 204 sites have been built using funds from the universal access fund.¹² These sites are maintained by ZICTA and can be used by any operator.

¹¹ Interview with ZICTA, 9 September 2019 and ZICTA (2020).

¹² Interview with ZICTA, 9 September 2019 and ZICTA (2020).

Figure 1: Coverage by operator, 2016–19



Source: authors' compilation based on ZICTA (2020).

In Zimbabwe, Econet has the highest number of mobile base stations for each mobile technology and has grown its site portfolio from around 3,400 to almost 4,900 between 2015 and 2018. Telecel has not grown its base stations significantly between 2015 and 2018 and has only invested in 17 LTE base stations. NetOne, on the other hand, has grown its site portfolio from around 1,800 to around 2,800 sites between 2015 and 2018 and has added a significant number of 3G and LTE sites. However, Econet continues to dominate mobile infrastructure in Zimbabwe.

POTRAZ issued infrastructure-sharing regulations in 2016 that mandate the sharing of infrastructure, including base stations, where sharing is technically and economically feasible (POTRAZ 2016). Operators must respond to a sharing request within 14 business days and applicants can lodge a dispute with POTRAZ for adjudication if they are unhappy with a response. In theory, this should make it easier for smaller operators to roll out their network in new areas. In practice, however, sharing remains relatively limited. The sharing that does take place is usually through a pairing arrangement, where operators effectively swap a site of their own for one of their competitor's.¹³ This is naturally an advantage to Econet as the largest operator and makes it more difficult for the smaller operators to gain access to existing sites, as they have a smaller portfolio of sites to offer in return. Nonetheless, none of the smaller operators indicated that they have lodged a complaint with the regulator around sharing. In addition, we understand that no national roaming agreements exist in Zimbabwe, suggesting that in areas where NetOne and/or Telecel do not have a site presence, consumers have limited options in terms of mobile services. Similar to Zambia, this likely explains Econet's continued dominance in mobile voice services.

Tanzania's operators have also divested many of their towers to independent tower companies. In 2013, Vodacom sold 100 per cent of its 1,149 towers to Helios Towers Tanzania on the basis that it would lease back the infrastructure subject to a long-term contract (Wakama 2013). In 2019, Helios Towers owned 3,650 sites in Tanzania and, according to its website, it had a market share of 68 per cent in 2018 (see Helios Towers 2019). Again, this concentration of sites in the ownership of one company could raise competition concerns as it may give Helios Towers the ability to

¹³ Interviews with Telecel and NetOne, 12 September 2019.

charge high prices for access, particularly in areas where there are limited alternative towers available. Helios Towers reported that it had a tenancy ratio of 2.18 for its towers in Tanzania in 2018 (see Helios Towers 2019), indicating that sharing is taking place. However, like in Zambia, the large operators may be at an advantage in negotiating access on reasonable terms, particularly if they have done so as part of an agreement to sell infrastructure to Helios Towers. This could, therefore, present a barrier to entry and expansion for smaller operators in future.

There is not much publicly available information on the ownership of mobile sites in South Africa, although, as noted, operators have been active in rolling out LTE networks offering high-speed mobile broadband. In terms of population coverage, South Africa performs well, as discussed. As of 2018, 3G coverage was almost 100 per cent while 4G coverage was 86 per cent, up from 53 per cent in 2015 (ICASA 2019).

Site sharing is common in South Africa, unlike in the other case study countries, but there have been suggestions that this is not functioning optimally and that access to sites is still a barrier to expansion for smaller players. The Independent Communications Authority of South Africa (ICASA) published a discussion document on its market enquiry into mobile broadband services in 2019, and it raised access to sites as an area of concern (ICASA 2019). It cites the concerns of smaller operators, who claim that incumbents take a long time to consider and approve co-location requests, offer poor positioning on masts to smaller players, and charge high prices for access. The report also notes that the market for site ownership is extremely concentrated, with MTN and Vodacom together accounting for just under 70 per cent of available sites, and that the situation is worse in non-metro areas. In all, around half the municipalities in the country have a dominant operator from a sites perspective.

Access to sites is a challenge for smaller operators in all case study countries. The required investment to roll out new sites is substantial, particularly in rural areas and leasing space on existing sites can be difficult and expensive. This is an impediment to effective competition as will be discussed later in the paper.

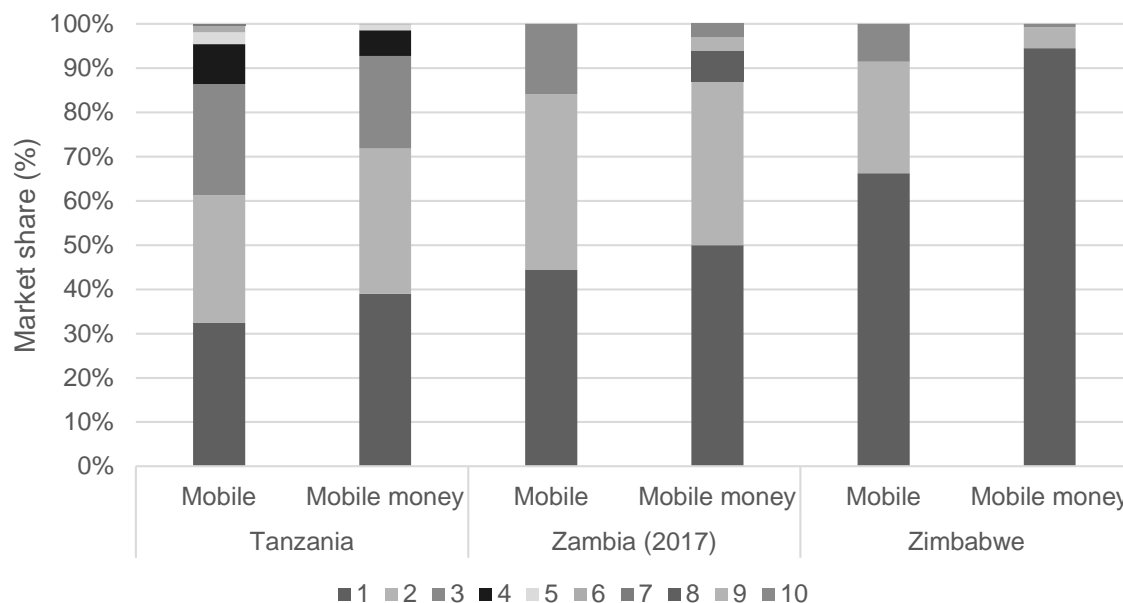
5 Mobile money

The development of mobile money has added a new dynamic to competition in mobile markets in some countries. Where mobile money has grown and become an important means of transacting for a large proportion of the population, it has often been mobile operators who have driven the rollout and adoption of the service. Although it is a different offering to other mobile telecoms services, mobile money reinforces the network effects and switching costs that are inherent in mobile markets, particularly where there is one large operator or where one operator is able to establish an early lead in terms of mobile money subscribers. Much like with traditional voice services, mobile money markets are characterized by network effects, because the more people that are on the same network, the more people a subscriber can transact with. This is particularly the case because when mobile money products first develop, there may be no, or limited, interoperability between networks. This encourages consumers to stick with large providers so that they can transact as widely as possible.

This reinforcing effect is evident when we compare the market shares in mobile and mobile money markets in the case study countries where mobile money has become widespread (Figure 15). In three of these countries, the market shares of the largest mobile operators are higher in terms of mobile money subscribers than if we consider traditional mobile subscribers. Zimbabwe, with the most highly concentrated mobile market is the most extreme example. Econet has a share of over

65 per cent in the mobile market but over 90 per cent in the mobile money market. In Zambia, MTN has a share of 42 per cent in the mobile market and around 50 per cent in the mobile money market. Tanzania's two largest operators, Vodacom (32 per cent) and Tigo (29 per cent), have made the biggest inroads into the mobile money market (39 and 32 per cent, respectively).

Figure 15: Market shares (mobile and mobile money subscribers), Tanzania, Zambia, and Zimbabwe, 2018



Source: authors' compilation based on regulator quarterly and annual reports (Tanzania: TCRA 2014–19; Zambia: Zambia Ministry of Transport and Communication 2018; Zimbabwe: POTRAZ 2014–19).

There are three mobile money services in Zimbabwe, Ecocash, Telecash, and OneMoney (rebranded from One Wallet in 2017), each provided by one of the main mobile operators, Econet, Telecel, and NetOne, respectively. In terms of active subscribers, Econet has the highest market share of 98 per cent although recent reports put their market share at 99.2 per cent as of June 2019,¹⁴ making it a virtual monopoly in the provision of the service. Econet's dominance in the sector is bolstered by the unstable macroeconomic environment. The country has experienced cash and foreign currency shortages as well as inflationary pressures that have forced the public to be dependent on electronic money (RBZ 2017b, 2018). As a result, a significant portion of transactions take place using mobile money, particularly because the majority of the population in Zimbabwe remains wary of the use of banks following the period of hyperinflation experienced in 2008 (Ngwenya et al. 2018; Sibanda 2019). As the vast majority of mobile money users in Zimbabwe are Ecocash subscribers, Ecocash has become a form of currency in Zimbabwe.¹⁵

Telecash experienced a drop in market share between 2014 and 2018 from 8 to 1 per cent following its acquisition by the government of Zimbabwe in 2016 (Karombo 2016). Possibly due to the macroeconomic situation and the fact that the government of Zimbabwe already owns another mobile operator, very little investment has been directed towards Telecash to allow it to invest in the marketing and development of its mobile money platform necessary to compete effectively.¹⁶

¹⁴ Interview conducted with POTRAZ, 12 September 2019.

¹⁵ Interview conducted with Telecel, 12 September 2019.

¹⁶ Interview conducted with Telecel, 12 September 2019.

Additionally, Telecash has lacked stable management required to grow the product (see Karombo 2019; Sandu 2019).

Interoperability across mobile money platforms is yet to be implemented despite the specification in the Reserve Bank of Zimbabwe's (RBZ's) 'Guidelines for Retail Payment Systems and Instruments' that all payment system operators have interoperable systems (see RBZ 2017a).¹⁷ All mobile money providers are interoperable with banks through the Zimswitch payments platform, but it is not yet possible to send money directly from an Ecocash wallet to a Telecash wallet for instance.¹⁸ Subscribers can send money across networks but the cash must be withdrawn at an agent of the sender's network. The government requested mobile operators to implement interoperability in early 2018 (Karombo 2018), but at the time of writing, they had not yet complied.¹⁹

The smaller operators also claim that Econet has exclusive agreements with agents and coerces its agents to refuse to provide services to the other players. This is despite a directive by the RBZ that declared that agents may offer services to multiple mobile money providers (see RBZ 2014). Because the RBZ requires substantial evidence of coercion before it can intervene to penalize Econet, no definitive step has been taken to prevent this conduct. However, the telecoms regulator asserts that there is no agent exclusivity and agents are free to, and often do, provide services of more than one mobile money provider.²⁰ Concerns have been raised in Zimbabwe, particularly following recent technical difficulties on the Ecocash network, that too high a proportion of transactions are concentrated within the ecosystem of one provider (*The Herald* 2019). Mandated interoperability between mobile wallets may be one solution that the regulator and central bank should explore to alleviate this and allow for greater competition.

Mobile money services were first introduced in Zambia as early as 2002 but growth lagged that in other African countries. As of 2015, only 1.1 million of the adult population (14 per cent) made use of mobile money services (Financial Sector Deepening Zambia 2015). However, growth since then has been significant (Figure 16). In 2014, only about 2 per cent of mobile money accounts were active. This grew to 44 per cent by the end of 2018 or 4.3 million (UNCDF 2019).

The volumes and value of mobile money transactions have also grown substantially from 2016 onwards (Figure 17), more than doubling in value terms between 2018 and 2019.

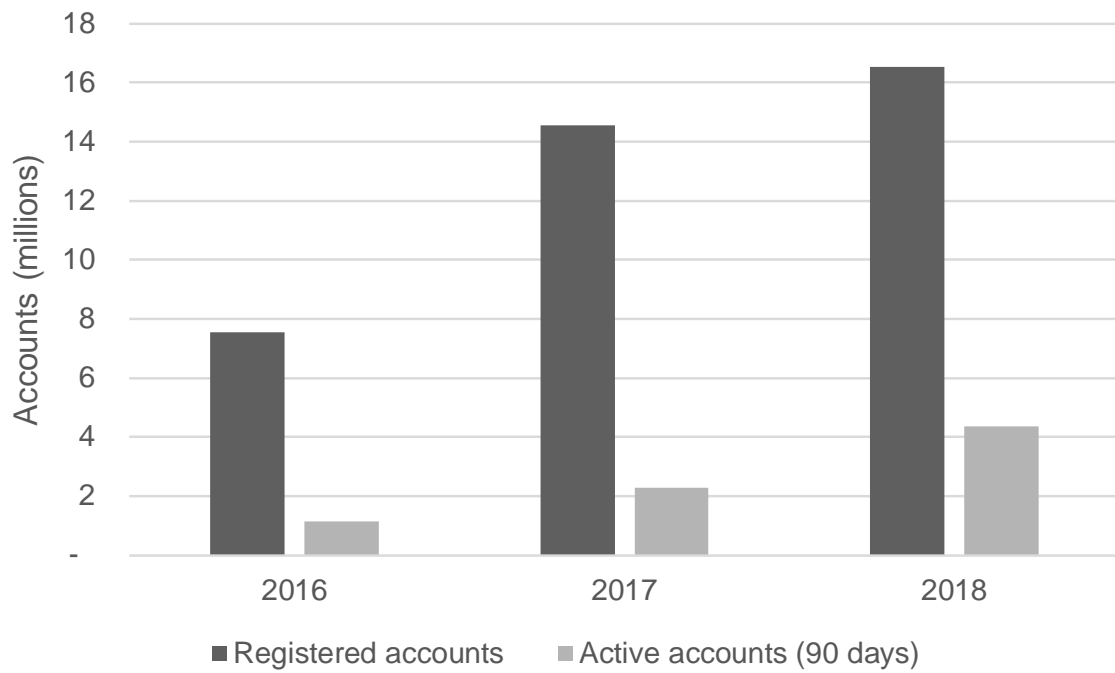
¹⁷ Interview conducted with NetOne and Telecel, 12 September 2019.

¹⁸ Interview conducted with Telecel, 12 September 2019.

¹⁹ Interview conducted with POTRAZ, 12 September 2019.

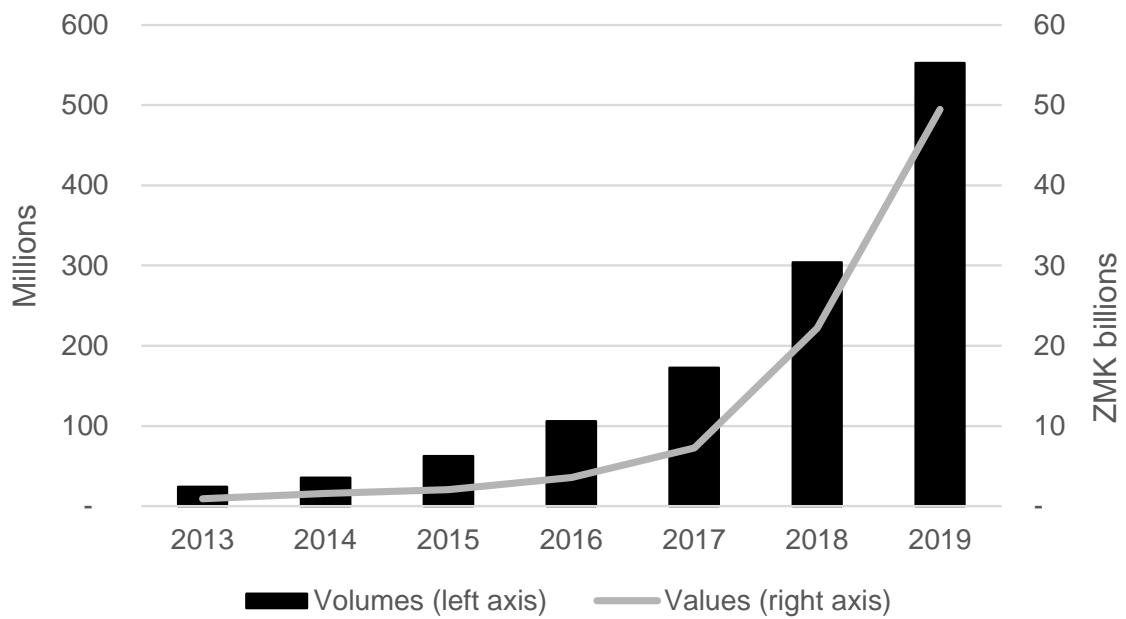
²⁰ Interview conducted with POTRAZ, 12 September 2019.

Figure 16: Mobile money accounts in Zambia, 2016–18



Source: authors' compilation based on UNCDF (2019).

Figure 17: Mobile money volumes and values in Zambia



Source: authors' compilation based on Bank of Zambia (n.d.).

In terms of usage, MTN is the most popular mobile money provider with a market share of 50 per cent (Figure 15). Airtel entered the market in 2011 while MTN mobile money launched in 2012, but MTN's significant investment into its distribution network allowed it to grow its market share in the mobile money space (Tiwari and Wagaki 2016). As mobile money grew in popularity, so did MTN's market share, not just in mobile money but in the mobile market as well. Because it was cheaper to send money to customers on the same network and because MTN had the more extensive agent network, customers began to acquire MTN SIM cards in order to make use of mobile money. Airtel has since made efforts to grow its agent network, which has contributed to its position in mobile money strengthening.

There are some smaller players in Zambia, most notable among them are Zoono (7 per cent) and Xapit (3 per cent). Zoono is a mobile financial services platform independent of the banks and mobile operators. Xapit is the mobile banking platform of Zambian National Commercial Bank (Zanaco), the largest commercial bank in Zambia. It is unusual among Zambia's banks as its mobile banking product is aimed at delivering services to underserved clients and it has rolled out an agent network in support of this (IFC 2017).

Concerns of competition have arisen in the Zambian mobile money sector. In 2014, MTN was accused of refusing Zoono access to its unstructured supplementary service data (USSD) platform, a necessary facility for the provision of mobile money services. MTN was fined the equivalent of 2 per cent of its annual turnover (ITU 2017). Unlike similar markets in Sub-Saharan Africa, the agents in Zambia are largely exclusive (Tiwari and Wagaki 2016; Bank of Uganda 2017). This matters because the substantial cost associated with the recruitment and development of an agent network can form a significant barrier to entrants because the success of a mobile money service depends on the extent of the agent base. The exclusivity, however, may have in the short term incentivized the operators to invest in the deployment of agents across the country, thereby providing the necessary investment required for the growth of mobile money. In the long term, however, agent exclusivity could form a barrier to entry and competition necessary to create dynamic rivalry in the sector.

With regard to interoperability, a new National Financial Switch (NFS) was launched in Zambia in June 2019, with the aim of interconnecting different payment streams such as point-of-sale, ATM, and mobile payments (Cenfri 2019). The first phase of the NFS project was implemented in 2018 and 2019 and connected banks and their ATMs to the switch. The second phase is intended to connect mobile payment providers and enable interoperability between mobile money wallets of different providers, as well as between mobile wallets and bank accounts (Cenfri 2019).

The mobile money sector in Tanzania grew substantially between 2012 and 2018, with subscribers almost tripling from about 8 million active subscribers to 23 million active subscribers (Table 1), leading to an increase in penetration from 35 per cent of the adult population to 79 per cent. The average number of transactions per subscriber has also increased substantially, while the average transaction value has remained roughly similar throughout, suggesting that the total volume and value of transactions has grown dramatically. Operators have increased their agent network at an even faster rate, as the average number of subscribers served by each agent has dropped from 80.7 to 48.2 at the same time as the number of active accounts has nearly tripled.

Table 1: Trends in Tanzania mobile money sector

	2012	2013	2014	2015	2016	2017	2018
Active accounts (millions)	7.9	11.0	13.9	19.0	17.0	19.4	23.3
Active account penetration for adult population (%)	35	48	58	77	62	68	79
Average no. of transactions per active subscriber	69.4	90.6	90.3	73.0	92.8	106.3	115.2
Average value of transactions (TZS, thousands)	31.8	28.9	32.7	34.0	36.5	32.9	30.3
Average no. of subscribers per agent	80.7	71.8	58.1	70.1	45.9	45.3	48.2

Source: authors' compilation based on Bank of Tanzania (2020).

There are six mobile money providers in the market, with 92 per cent of the market (measured in terms of subscribers) held by Vodacom M-Pesa (39 per cent), Tigo Pesa (32 per cent), and Airtel Money 21 per cent). Later entrants TTCL, Ezy Pesa, and Halopesa are yet to gain substantial market share, although Halopesa has been the most successful with 6 per cent.

Unlike the other countries considered in the study, Tanzania has had wallet-to-wallet interoperability in the mobile money sector since 2014. The move towards interoperability was driven by operators themselves and is based on bilateral agreements between the four players that opted in—Tigo, Airtel, Zantel, and Vodacom (CGAP 2015). The interoperability is not just between the mobile money wallets but also between mobile money wallets and bank accounts. In 2018, interoperability was extended to additional players. Halotel credits this in part to facilitating substantial growth in transactions (Donkin 2019). The move increased the number of agents that could process Halotel transactions from 10,000 to 155,000. A remaining challenge, however, has been the implementation of cross-border interoperability to enable the easy transfer of cash between operators and banks in different countries in the region. There have been delays in acquiring approvals for this service from the regulators.²¹

The mobile money sector in South Africa has been largely unsuccessful despite several attempts from the major mobile operators to launch the product (FinMark Trust 2017). Mobile money services were first introduced in South Africa in 2010 by Vodacom in partnership with Nedbank (Hawthorne et al. 2014). It was relaunched in 2014 in partnership with Bidvest, but this was closed off in 2016 when there was little uptake of the product. MTN similarly attempted to launch its mobile money service in 2012 in partnership with Pick 'n Pay and Boxer Stores but this too was closed down in 2016 after acquiring only 140,000 subscribers.

In 2019, research found that of 91 digital platforms in South Africa, only 2 were able to be accessed via USSD whereas the remainder required a browser or mobile app to access (Cenfri 2019). Only 11 per cent of digital platforms allow payment via mobile money in South Africa compared with 57 per cent in Tanzania and 36 per cent in Zambia. This suggests that the ability of unbanked South Africans to participate in the digital economy is extremely limited.

The failure of mobile money in South Africa has been linked to strict regulation of the financial sector. Only banks are able to issue e-money, the definition of a deposit limits the ability to offer mobile payments without partnership with a bank and the structure of the national payment system creates barriers for non-bank participants (FinMark Trust 2017). This forces mobile operators to partner with banks in order to provide a service that increases cost and stifles innovation (FinMark Trust 2017). Another possible reason for the poor uptake in South Africa is that a large proportion of the population is already banked and there are also a number of competing channels for domestic remittances, which in other countries have been an important part of the use case for mobile money (FinMark Trust 2017).

²¹ Interview conducted with Vodacom, 17 September 2019.

The South African Reserve Bank has signalled that it may be inclined to change the rules to facilitate greater adoption of mobile financial services. Proposals have been made for amendments to the National Payment System Act to allow non-banks to issue e-money and perform clearing and settlement of transactions without needing to partner with a bank (South African Reserve Bank 2018). In the meantime, MTN has launched a new product, MoMo, in early 2020 that is aimed at the unbanked and offers USSD functionality (McLeod 2019). This time, MTN has partnered with Ubank that has a strong footprint and brand in rural areas, which may help to drive greater uptake.

Additionally, the Payments Association of South Africa is leading efforts for an interoperable system that would enable participants in the payment system to transfer and receive money seamlessly within SADC.²²

6 Fixed

As discussed, telecommunications markets are often subject to network effects and substantial economies of scale, which tend to favour first-movers and make it difficult for later entrants to grow and compete effectively. Historically, fixed-line services were a natural monopoly, where only one operator could profitably provide services due to the high cost of last-mile infrastructure. In most countries, one monopoly (often state-owned) operator built out a fixed-line telephone network that later provided the infrastructure for internet services (i.e. asymmetric digital subscriber line, ADSL). Regulation was imposed as a means to replicate the outcomes of a competitive market and to ensure that the monopoly operator did not exploit its market power to the disadvantage of consumers. In Europe and many developed countries, regulators have since forced incumbents to open up their networks to rivals through policies promoting access such as local loop unbundling, in order to make space for entry and competition in the fixed-line sector.

This has happened to a lesser extent in SADC countries, partly because fixed-line infrastructure, particularly the last mile to homes and businesses, was not rolled out to nearly such a large extent in the first place. In spite of this, Zambia and Zimbabwe are experiencing strong growth in fixed-line subscribers (although from a low base). The introduction of fibre has brought additional competitors into the market in competition with the incumbent fixed-line operator in each country. Prices are generally falling. In three of the case study countries,²³ however, concerns have been raised about the concentration of ownership of key infrastructure in the hands of large vertically integrated operators. Interestingly, these operators are not always the historic monopolist (as has been the case in many examples of anti-competitive behaviour internationally), but increasingly newer entrants who have built positions of dominance through recent investment in infrastructure. This poses a challenge for regulators in the region.

Competition in South Africa's fixed-line sector has followed the most typical trajectory of any of the case study countries. The infrastructure level remains highly concentrated with Telkom (which is more than 50 per cent government-owned) owning the majority of the national fibre network in the country (Table 2). Telkom has twice been investigated by the CCSA due to complaints of anti-competitive conduct. In 2012, the Competition Tribunal found that Telkom had abused its dominance by leveraging its upstream monopoly in the facilities market to benefit its own

²² Interview conducted with Vodacom, 17 September 2019.

²³ South Africa, Zambia and Zimbabwe.

subsidiary in the competitive value-added network services (VANS) market and that Telkom's conduct had caused harm to both competitors and consumers and impeded competition and innovation in the dynamic VANS market.²⁴ The Tribunal imposed an administrative penalty of ZAR 449 million on Telkom for this conduct.

Table 2: Estimated market share by national fibre, South Africa, 2018

Provider	Distance	Market share (%)
Telkom	75,000	73
Broadband Infraco	14,923	14
Liquid Telecom	3,000	3
Dark Fibre Africa	1,057	1
MTN	3,000	3
Vodacom	3,000	3
Fibreco	2,539	2
Total	103,019	100

Source: authors' compilation based on CCSA (2018a).

In the meantime, the Commission had been investigating a second complaint against Telkom and found that Telkom had again abused its dominance by engaging in a margin squeeze where it had charged prices for the wholesale services used by ISPs that left them unable to compete with Telkom's retail services. The Commission negotiated a settlement with Telkom which was confirmed by the Tribunal in 2013. This included an admission of guilt, a further penalty of ZAR 200 million, and structural and behavioural remedies.²⁵ These remedies aimed at preventing Telkom from pursuing similar conduct in future and ensuring that competitors are able to access the services they need from Telkom on equivalent terms to Telkom's own retail division. A major component of this was a functional separation between Telkom's retail and wholesale divisions and a transparent transfer pricing programme to ensure non-discriminatory service provision by Telkom to its retail division and ISPs. Finally, Telkom agreed to wholesale and retail pricing commitments for the next five years estimated to yield ZAR 875 million savings to customers. These decisions and the remedies associated with them were important in preventing Telkom from continuing to exclude its VANS and ISP rivals and thereby creating a more level playing field for competition (Mondliwa and Robb 2018).

A number of other developments paved the way for greater competition in the fixed-line sector in South Africa. A landmark case in the fixed telecommunications market in 2008, the Altech judgement, further served to level the playing field when the High Court of South Africa declared that Altech, a VANS provider, was allowed to self-provide its own telecommunications infrastructure.²⁶ This meant that rather than depend on Telkom or Neotel for access to essential infrastructure, VANS providers were permitted to set up and develop their own infrastructure. In 2015, Telkom created a new division to allow for more equitable wholesale access to its infrastructure called Openserve (van Zyl 2015). The price of international bandwidth has also fallen substantially following the introduction of new competing long-distance links (Mondliwa and Robb 2018).

Despite these pro-competitive developments, internet access providers (IAPs) have recently complained about the high price charged by Openserve (Telkom) for access to its IP Connect services that they need in order to be able to provide ADSL and fibre services to households using

²⁴ Competition Commission v Telkom SA Ltd (11/CR/Feb04) [2011] ZACT 39 (23 June 2011) (see SAFLII 2011).

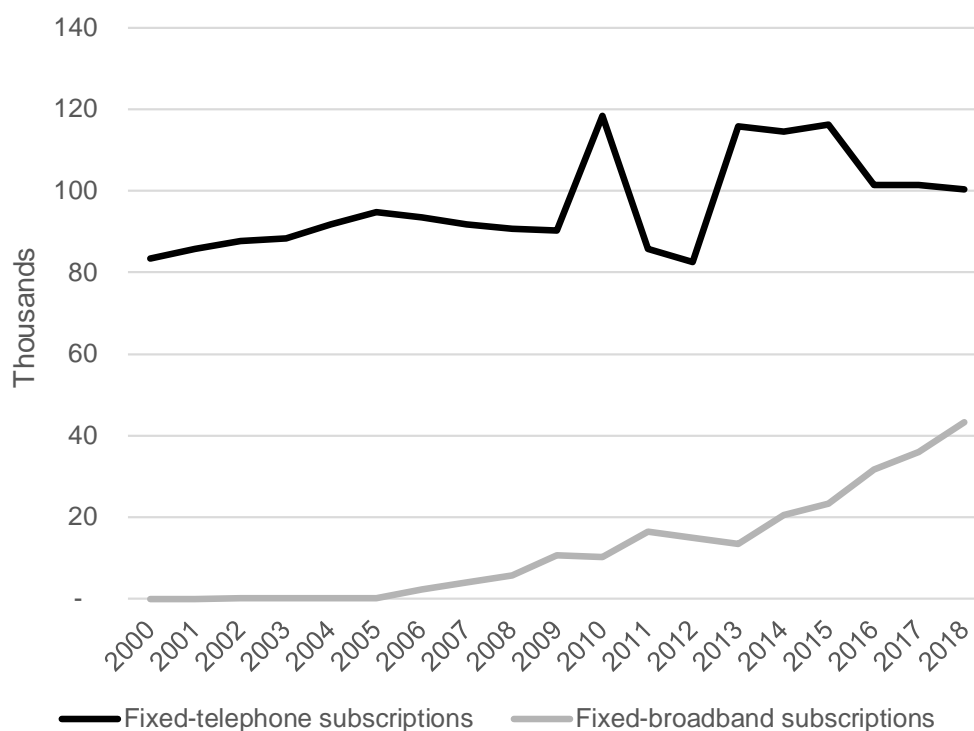
²⁵ Competition Commission v Telkom SA SOC Ltd (016865) [2013] ZACT 62 (18 July 2013) (see SAFLII 2013).

²⁶ Altech Autopage Cellular (Pty) Ltd v Chairperson of the Council of the Independent Communications Authority of South Africa and Others (20002/08) [2008] ZAGPHC 268 (29 August 2008) (see SAFLII 2008).

Openserve’s last-mile infrastructure.²⁷ Fixed internet providers at the retail level have complained that the IP Connect price charged by Openserve, at ZAR 175 per Mbps per month in 2018, is their single highest cost of distribution. They allege that this is especially high when contrasted with the ZAR 30 per Mbps charge for international bandwidth or the ZAR 7.30 per Mbps per month price that Automation Exchange charges for access to the Vumatel (a fibre network provider) last-mile fibre network.²⁸ Internet Solutions makes the point that access to Openserve’s IP Connect product is the main way that ISPs can provide broadband services to home and business users and that alternative networks, such as Vumatel, have limited coverage compared with Openserve’s ADSL and fibre network. These complaints suggest that there may still be some competition concerns in terms of wholesale access but the roll out of further competing last-mile fibre infrastructure by competitors such as Vumatel is likely to alleviate the concern to some extent.

In Zambia, growth in fixed-line telephone subscriptions has been largely stagnant while fixed-broadband subscriptions have experienced growth particularly from 2007 onwards (Figure 18). The adoption was supported by the introduction of ADSL fixed-broadband services by Zamtel, the government-owned incumbent.

Figure 18: Fixed-line subscriptions, Zambia, 2000–18



Source: authors’ compilation based on ITU (2018b).

The wholesale level is highly concentrated with only five main players: FibreCom, a subsidiary of the Zambia Electricity Supply Corporation (ZESCO), CEC Liquid Telecom (CEC), a subsidiary

²⁷ Presentations by Afrihost and Internet Solutions (see CCSA 2018b).

²⁸ Presentation by Internet Solutions (see CCSA 2018b).

of Liquid Telecom, and Zamtel, MTN, and Airtel (ZICTA 2015). Two companies, FibreCom and CEC own the majority of the fibre network in Zambia (ITU 2018a).²⁹

FibreCom, made use of its already laid electricity infrastructure to invest and distribute fibre for internet services. It has the most extensive fibre network coverage in the country, stretching to about 6,000 km and is present in the 10 provincial centres and surrounding districts of services in Zambia (ZESCO 2015). The networks have direct interconnections into Botswana, Malawi, Namibia, Tanzania, and Zimbabwe as well as access to global submarine cables. FibreCom is in the process of increasing its fibre networks between towns. CEC owns and operates about 700 km of optic fibre on power lines (see CEC 2018). CEC's fibre network stretches from Chirundu to Kasumbalesa, Lusaka to Sesheke via Livingstone, and Lusaka to Kazungula. It also owns metro links in major towns as well as fibre to the home and 4G LTE infrastructure in Lusaka. Liquid Telecom, CEC's parent company, is one of the largest independent fibre network providers in Africa with a network spanning 70,000 km across borders (see Liquid Telecom, n.d.). In 2014, Zamtel owned backbone fibre network spanning 2,048 km. MTN Zambia owned about 109.8 km of metropolitan fibre, managed in conjunction with Airtel Zambia within the capital city of Lusaka (ZICTA 2015).

At the downstream level in the provision of retail internet services, there is more competition. As of the first quarter of 2019, there were 16 ISPs (Table 3). Fixed internet penetration was still extremely low, however, although it had grown from 0.19 per cent in 2014 to about 0.25 per cent in 2019. Despite the large number of providers, the market remains highly concentrated with only four players, Zamtel, Africonnect (owned by Vodacom), Zamnet, and Microlink holding 90 per cent of the market share in 2017 (ITU 2018a).

Table 3: Internet service provision in Zambia

Internet Service providers	2014	2015	2016	2017	2018	2019 Q1
Number of subscribers	29,349	38,316	35,919	36,108	44,711	44,252
Fixed internet penetration per 100	0.19	0.25	0.22	0.22	0.26	0.25
Number of active ISPs	16	16	16	14	17	16

Source: authors' compilation based on ZICTA (2020).

All five of the players involved in the wholesale distribution of access are also active at the retail level of the supply chain. CEC, for instance, operates in the retail market through ISP, Hai Telecommunications (Hai). Hai became part of Liquid Telecom Zambia in mid-2019 (see Liquid Telecom 2019) which raised some competition concerns due to the combination of a large provider of wholesale access to fibre and an ISP active downstream. This gave rise to complaints from third-party providers who believed that this might affect their ability to access wholesale services from Liquid Telecom as they would now be competitors as well as suppliers.³⁰ The telecoms regulator also foresaw challenges with the acquisition as it would be difficult for it to monitor Liquid Telecom's pricing for wholesale services to third-party providers versus those to Hai.³¹ The competition authority, however, saw fit to approve the merger.

Between 2016 and 2018, internet subscriptions in Zimbabwe rose by 30 per cent. While the vast majority of subscriptions are mobile, subscriptions of leased lines, ADSL connections, very small aperture terminal (VSAT) connections, and active fibre links grew strongly over the three-year

²⁹ Interview conducted with ZICTA, 9 September 2019.

³⁰ Interview conducted with ZICTA, 9 September 2019.

³¹ Interview conducted with ZICTA, 9 September 2019.

period from 2016 to 2018 (Table 4), suggesting that fixed internet access is playing an increasing role in the market. A mobile operator described the convergence of services as a major trend in the industry.³²

Table 4: Active internet subscriptions in Zimbabwe, 2016-2018

	2016	2017	2018	% Growth
Mobile internet (3G LTE)	6,591,109	6,824,307	8,550,186	30
Leased Lines	1,048	2,351	2,026	93
ADSL	68,370	81,016	95,761	40
WiMAX	7,196	4,915	3,414	-53
CDMA	32,019	25,095	28,489	-11
VSAT	2,147	3,478	3,989	86
Active fibre links	19,698	31,455	39,377	100
Total internet subscriptions	6,721,947	6,972,617	8,723,242	30

Source: authors' compilation based on POTRAZ (2014–19).

The current licensing regime in Zimbabwe restricts the build and ownership of fixed-line telecommunications infrastructure to operators licensed as IAPs. ISPs are licensed indirectly through IAPs and may not compete at the infrastructure level. There are currently seven licensed IAPs, although only six are operational and only four have access to international bandwidth: Liquid Telecom, TelOne, PowerTel, and Dandemutande.³³ Liquid Telecom is a subsidiary of Econet Global, TelOne is the government-owned public switched telephone network (PSTN) operator, PowerTel is a subsidiary of ZESA, the Zimbabwe electricity utility, and Dandemutande is an independent company. POTRAZ intends to create a converged licensing regime in the near future that would open up the sector to new entrants and allow for the provision of converged services.

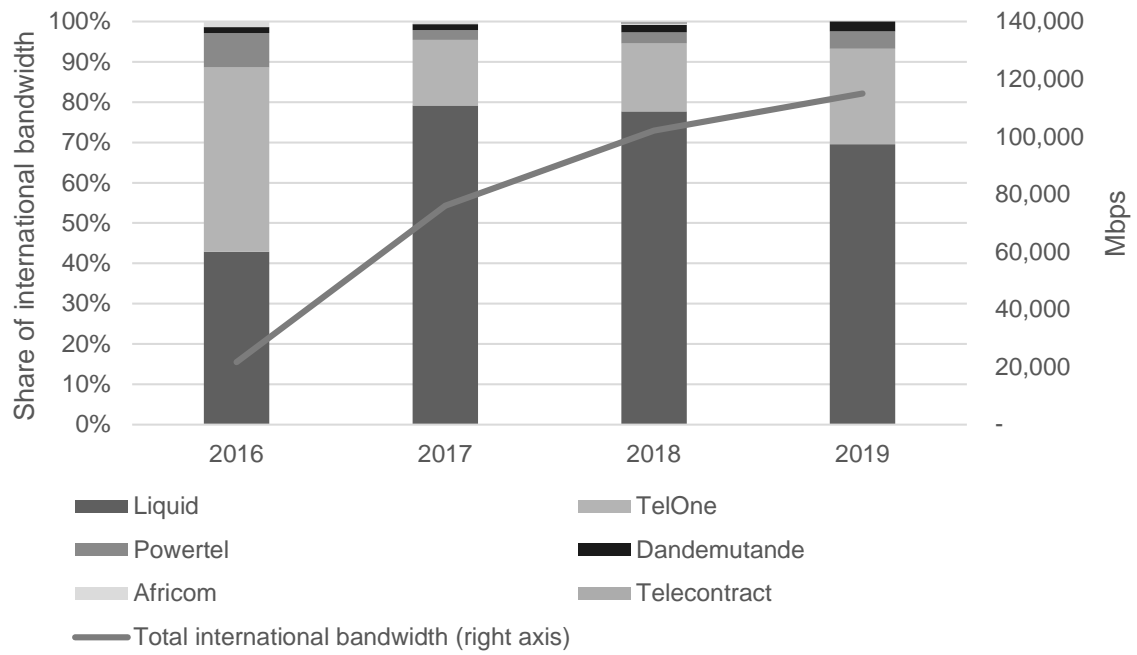
In terms of international bandwidth, Liquid Telecom expanded its capacity significantly between 2016 and 2017, growing its market share from just over 40 per cent to almost 80 per cent (Figure 19). Since then, TelOne has grown its capacity and hence its market share such that in the first quarter of 2019, Liquid Telecom had just under 70 per cent of the equipped international bandwidth, while TelOne had around 24 per cent. The other operators remained small throughout the period. There has been a massive expansion of international bandwidth available since 2016, which could lead to lower prices, particularly if there is excess capacity in the market. This was the experience of South Africa when substantial new international bandwidth came on-line (Hawthorne et al. 2016). However, the high market shares mean that Liquid Telecom and, to a lesser extent, TelOne have market power over international internet connectivity in Zimbabwe. Given that both are also present at the downstream ISP level, this may give them incentives to discriminate between their own downstream services and those of rivals.

At the IAP level, the market structure is slightly more competitive, with a larger number of players, although Liquid Telecom is by far the largest (Figure 20). While Liquid Telecom has maintained a revenue market share of close to 50 per cent or above since 2015, TelOne has grown in the market and had a share of 24 per cent in the first quarter of 2019. PowerTel's share has declined over time while the share of other smaller players has remained fairly consistent. These high-level market shares may mask other important competitive dynamics in particular sub-segments such as home versus business access, and so on. Dandemutande, for example, focuses on the enterprise sector.

³² Interview with NetOne, 12 September 2019.

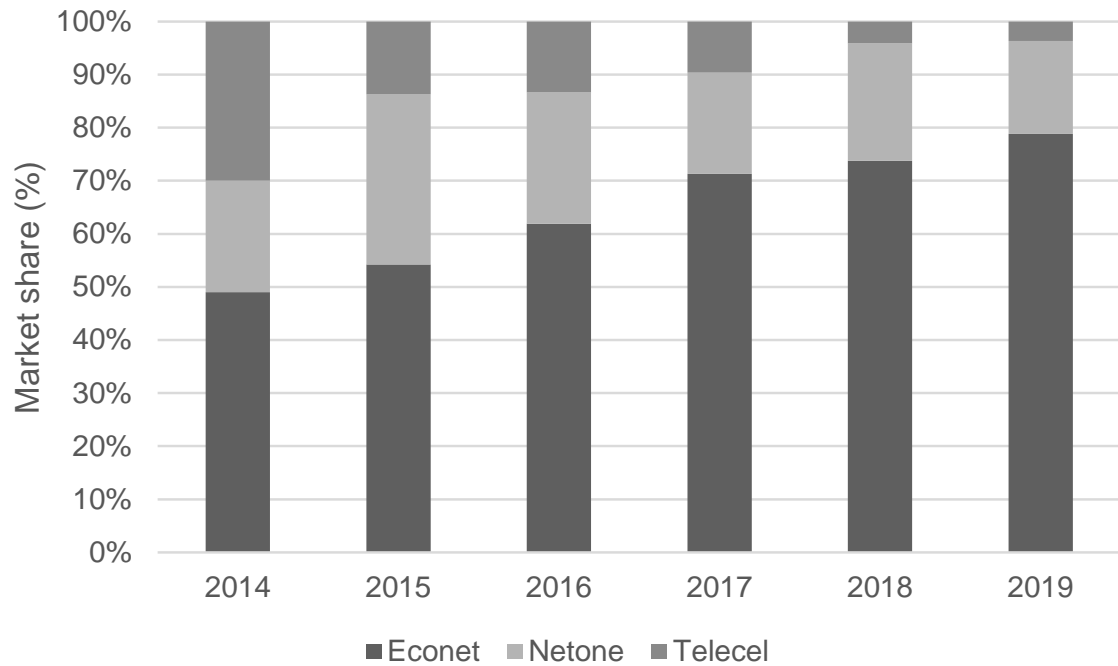
³³ Interview with POTRAZ, 12 September 2019.

Figure 19: International bandwidth shares and total Mbps, 2016–19



Source: authors' compilation based on POTRAZ (2014–19).

Figure 20: IAP market shares by revenue, 2014–19



Source: authors' compilation based on POTRAZ (2014–19).

The fixed-line sector in Tanzania is small and limited information was available regarding competition in the sector. The regulator explained that the sector has been in decline and there has been no new entry in the past five years.³⁴ The main provider is TCCL, which is the state-owned PSTN provider. Other providers include Simbanet, which focuses on the enterprise sector. Raha, owned by Liquid Telecom, is an ISP offering fibre, wireless, and satellite services.

7 Emerging themes

7.1 Mobile markets

Evidence from the case studies suggest that there have been some positive developments in respect of access to mobile services. The extent of 3G coverage has grown, the price of data and to a lesser extent voice prices have fallen, there have been some new entrants in the mobile markets, and in most countries at least one smaller operator has been able to significantly grow its share of subscribers. However, there remains substantial stickiness in terms of the share of large operators, and the experience suggests that it is extremely challenging for small players to make inroads in terms of voice minutes and revenues and to compete sustainably. This dynamic is apparent across all four case study countries and is exacerbated by the geographic distribution of subscribers and the high cost of rolling out networks to rural areas. In addition, in some countries tariff-mediated network effects driven by the differential between on-net and off-net prices are still limiting competition.

All countries have been steadily reducing MTRs in line with a cost-oriented approach. This appears to have led to increased retail competition in voice markets, although more so in some countries than in others. South Africa has seen substantial falls in mobile voice prices as termination rates have declined but the two largest operators have nonetheless managed to maintain high market shares. MTRs are still relatively high in Zimbabwe and voice prices appear to be extremely high, while the dominance of the largest operator has strengthened over time. The tariff regulatory regime may be having the perverse effect of dampening competition by providing a focal point for prices and undermining the incentive for operators to undercut one another, particularly given the capacity constraints experienced by the two smaller operators. Lower termination rates and abandoning maximum tariff regulation may be helpful in stimulating greater competition in Zimbabwe.

From an infrastructure perspective, there is a trend in the region towards the divestment of towers by mobile operators to specialist tower companies. This could be a positive development for infrastructure sharing and could make it easier for smaller operators to roll out new sites. Tower companies have an incentive to rent as much space on their towers as possible whereas incumbent operators face increased competition in the local area whenever they lease space to a smaller operator. However, in both Zambia and Tanzania, the majority of towers have been acquired by only one company. This raises concerns that the tower company will enjoy market power and be able to charge high prices for access. In addition, smaller operators may face higher prices than large operators, as the large operators are likely to have negotiated the terms of their access as part of the agreement to sell the assets. Concerns of this nature appear to have already arisen. This is therefore an issue for regulators to reflect on when considering future transactions. While Zambia and Tanzania have infrastructure-sharing regulations in place, a competitive market structure

³⁴ Email response from TCRA, received 19 September 2019.

would significantly alleviate the need for regulatory monitoring and intervention and is likely to lead to better outcomes.

Access to sites is a challenge for smaller operators in all case study countries. The required investment to roll out new sites is substantial, particularly in rural areas and leasing space on existing sites can be difficult and expensive. The limited rural footprint of smaller players limits the extent of competition in voice markets, as rural subscribers only have the option of using one or two large operators and this then lowers the incentive of the large players to lower prices if they are set nationally. Where there is still potential for large on-net and off-net price differentials (i.e. where call termination rates have not been brought sufficiently close to pure LRIC), this can lead to tariff-mediated network effects that make it much more advantageous to be on the large networks in order to be able to talk to family and friends in rural areas more cheaply. In addition, subscribers who value having access to a high-quality network throughout the country (which tend to be high-value subscribers) will tend to choose a large operator.

National roaming can mitigate these problems to some extent, but in most case study countries this does not take place currently, and even where it does, this results in incumbent operators controlling the quality of service provided by roaming operators. Multi-simming may also play a role, in that customers may use more than one network, but does not completely solve the problem as in the case of low on-net prices, they are likely to revert to a large operator for the majority of calls and merely use a smaller operator to take advantage of special deals. It is then difficult for smaller operators to continue to invest in their network as they face higher costs due to economies of scale and tend to attract lower-value customers.

From a mobile data perspective, prices have been falling across all four case study countries, likely as a result of increasing volumes and falling per unit costs as well as increased competition. Even though mobile markets have remained concentrated, competition in terms of data is increasingly provided by other providers such as data-only mobile operators and other ISPs offering fixed wireless, fibre, and satellite services. In South Africa, data-only provider Rain offers a market-beating mobile data package while in Zambia, where mobile data prices have fallen dramatically, the regulator noted that competition from non-mobile ISPs has been a factor in increased competition for data services. Regulators should aim to maximize such effects by providing a converged licensing framework and level regulatory playing field for different types of provider. In addition, measures to regulate over-the-top (OTT) providers should be considered cautiously, as these services in particular are an important part of the move towards converged data services that can provide more competition. Care should be taken not to dampen the adoption of OTT services by consumers through heavy-handed regulation.

7.2 Mobile money

As discussed, mobile money can be an important additional source of network effects in mobile markets, particularly where there is no full interoperability between mobile wallets. Mobile money penetration in Tanzania, in Zimbabwe, and, belatedly, in Zambia has been significant, with MNOs expanding services beyond money transfers to insurance, utilities, and bill payments as well as savings and credit.

In South Africa, however, as mentioned, mobile money has failed, partly due to stringent prudential legislation forcing mobile operators to partner with a bank to deliver services. This appears likely to change as the Reserve Bank has signalled its intention to amend legislation to allow non-banks to issue electronic money. Hopefully, this will lead to greater uptake and greater competition in the mobile money sector in South Africa.

In Zimbabwe, the 2008 financial crisis resulted in significant inflation and undermined trust in banks, which created a fertile environment for mobile money to flourish. Zimbabwe's experience shows how, where there is one dominant mobile operator, the introduction of mobile money can reinforce this dominance and lead to a highly concentrated mobile money market.

In Zambia, Airtel introduced mobile money before MTN, but MTN launched an aggressive investment campaign into mobile money, by recruiting and developing its agent network. This enabled MTN to grow, not just in mobile money but in the mobile market as well. Airtel has since made efforts to grow its agent network, which has contributed to its position in mobile money strengthening.

Tanzania has a relatively more competitive market structure in its mobile money market and was one of the first countries in Sub-Saharan Africa to implement interoperability between MNOs and between MNOs and banks. This appears to have been effective in enabling the growth of at least one smaller player (Halopesa). Interoperability has not been introduced in Zambia and Zimbabwe despite call from regulators, but in Zambia a project is underway to build a payment switch that will allow for wallet-to-wallet interoperability.

There is also movement towards creating a regional switch that will allow banks and some mobile money providers to operate in the region. The creation of such a platform is currently being spearheaded by the financial regulators in South Africa with support from the other countries in SADC. The main concern appears to be whether the interoperability is mandated by the regulators or whether it is allowed to take place via bilateral agreements between different players in the market. The former risks creating a monopoly platform that could ultimately result in high prices and less innovation. Creating a central switch that is open to all providers but allowing for other bilateral and multilateral solutions may be a better means of ensuring high-quality, cost-effective services in future.

7.3 Fixed markets

Three main themes emerge from our case studies in relation to competition in fixed markets. First, outside of South Africa, the fixed sectors are small and less of a priority area for regulators who consider mobile a more important area for intervening to improve access. However, this misses the valuable role that fixed services can play, particularly in terms of providing high speeds and high volumes of data at a lower cost. Increasingly, as services converge, a competitive fixed sector with numerous ISPs offering broadband products can provide competition to a concentrated mobile sector.

Secondly, competition concerns arising from vertical integration are a common theme from the case studies. Most countries have a dominant provider of fixed infrastructure and wholesale fixed services, which is also present in the downstream market for ISPs. In South Africa, a competition investigation and remedy forced the fixed incumbent, Telkom, to separate its wholesale and retail divisions in order to reduce its ability to discriminate against downstream rivals. In other countries, it is generally not the state-owned incumbent that dominates the fixed sector today, but rather a more recent entrant that has invested in building national and international infrastructure. Therefore, a cautious approach is required to avoid deterring further investment, but regulators should closely monitor the sector and respond to any complaints arising from competing ISPs around access and pricing. Vertical separation is a possible remedy for any competition concerns that may arise in this regard.

Finally, infrastructure sharing does not seem to be taking place in spite of infrastructure-sharing regulations being published in three of the four case study countries. This may be partly due to the

presence of a large dominant fixed IAP in each country and high levels of concentration in terms of international bandwidth and national connectivity. Dominant operators have little incentive to share with smaller rivals if it will enable them to compete more vigorously. In South Africa, operators have taken the fixed-line incumbent, Telkom, to court in order to try to force it to share its duct infrastructure. This is of less concern from a competition perspective if rivals respond by building duplicate infrastructure but may be concerning if it prevents them from rolling out to new areas and expanding their network.

7.4 Cross-border developments

A second theme arising from the study is the consolidation of segments of the telecommunications sector and the expansion of companies into multiple countries in the region. As mentioned earlier, MNOs have been divesting towers to specialist companies, of which a handful such as IHS, Helios, and ATC are present in various countries. In Tanzania and Zambia, Helios and IHS, respectively, appear to have acquired a number of towers. A similar trend is evident in Rwanda, Kenya, and Nigeria (MTN Group 2019). A more concerning trend, as noted, is that just one company has ownership of the majority of towers in a number of countries in the region. The regulators, however, appear not to have observed the pattern or do not consider this issue to be a concern.

In the fixed telecommunications market, Liquid Telecom appears to be growing quickly by developing its fibre network in the region. It is currently the largest fibre provider in Zimbabwe, the second largest in Zambia, and is making inroads into South Africa. It also has a presence in a considerable portion of the African continent. This contributes to the growing pattern of the same firms operating across the region, which has been common in mobile markets for some time thanks to firms like Vodacom, MTN, Airtel, and Tigo.

The increasing prominence of multinational companies in the region may assist in fostering greater regional integration and interoperability and possibly even in bringing down charges for cross-border telecommunications services.

Finally, this study has revealed very little evidence of harmonization of policy and regulatory approaches across countries. This is expanded on in Paelo and Robb (2020), but is a notable finding from the case study research. In addition, the lack of available information and data on telecoms markets in the four case study countries has been an impediment to a deeper analysis of some themes. There is a need for greater transparency with regard to key metrics of competition as well as regulatory interventions and their impact on competition.

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