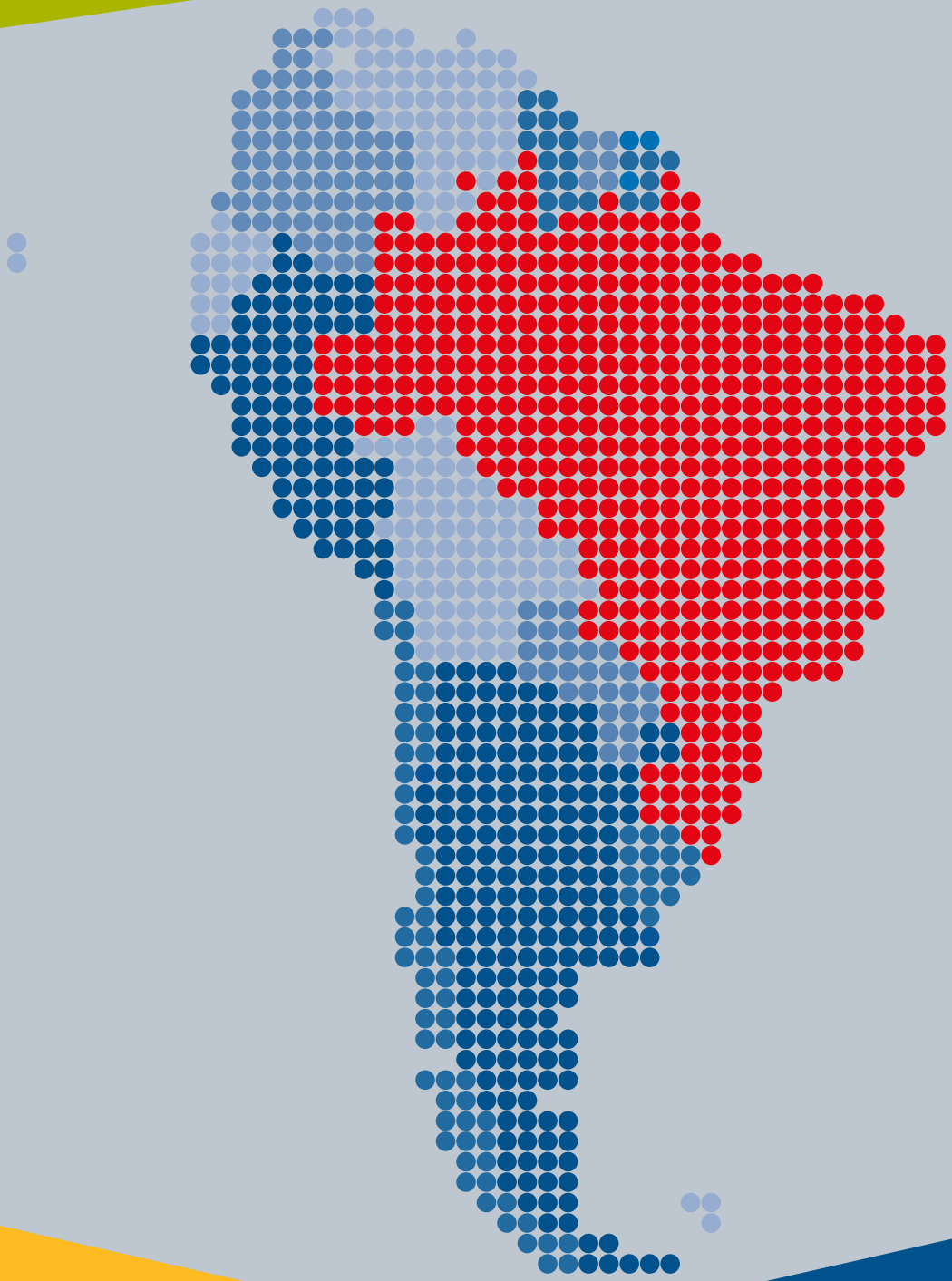
Digital inclusion and mobile sector taxation in Brazil



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APRIL 2016

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Deloitte contact
Davide Strusani
TMT Economic Consulting, London
dstrusani@deloitte.co.uk
www.deloitte.co.uk

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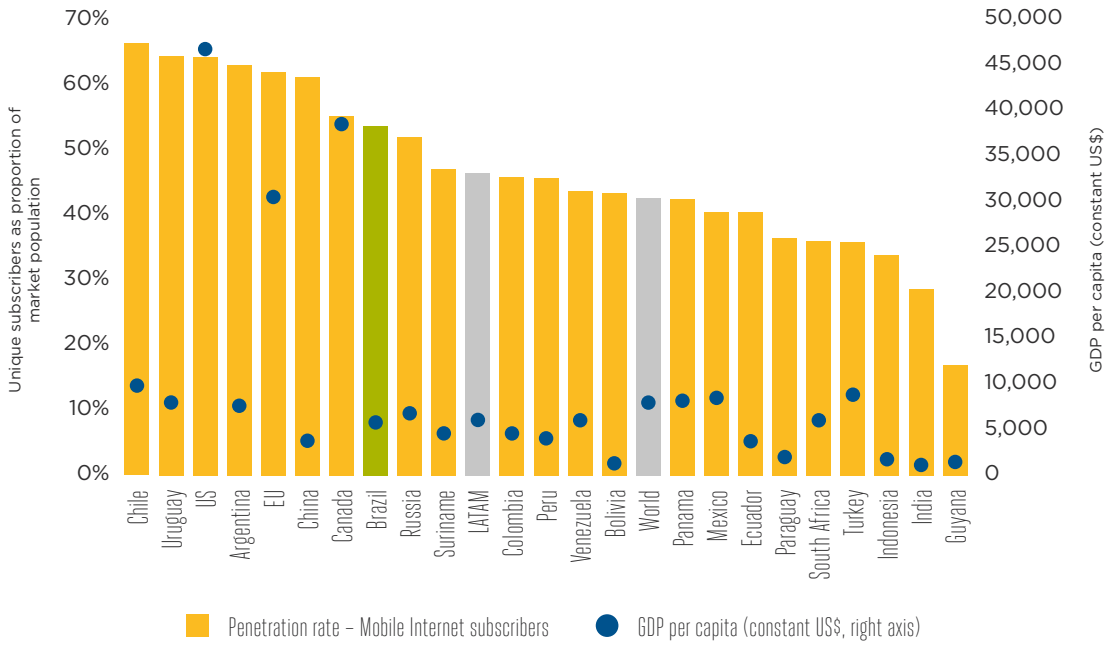
Mobile services today connect over 144 million people in Brazil

With mobile penetration in terms of unique subscribers standing at 69% in Q4 2015, Brazil is the largest mobile market in Latin America and the fifth largest in the world. Mobile internet has developed rapidly, with penetration of mobile internet subscribers at 54% in Q4 2015. This is higher than the averages of Latin America and BRICS countries.[1] However, when compared to developed markets, the gap in connectivity is yet to be closed.

Penetration rate of mobile internet subscribers and GDP per capita, 2015



Source: Deloitte analysis using GSMA Intelligence and World Bank data. GDP per capita data is for 2014 due to data availability constraints. Comparison is made for a sample of Latin American and BRICS countries, extended by Canada, Indonesia and Turkey, countries Brazilian operators use for benchmarking purposes.

Figure 1

1. The BRICS countries comprise the major emerging economies of Brazil, Russia, India, China, and South Africa.

Increased digital inclusion has the potential to support the government's development goals, promoting Brazil's economic recovery

The Brazilian economy has been in recession since the start of 2015 and the contraction is projected to continue into 2016.[2] Against this landscape, the mobile sector is a key contributor to the economy, with market revenues in 2015 amounting to BRL 65.6 billion or 1.1% of GDP.[3]

Connectivity can also foster long-run economic growth, stimulate innovation, entrepreneurial activity, and employment in the mobile sector as well as in the wider society. Compared to fixed-line connections, mobile provides a relatively cost-effective way of extending connectivity. An ITU study has found that doubling broadband speeds increases GDP growth by up to 0.3%.[4]

Affordability of voice and SMS constitutes a barrier to digital inclusion especially for the poorest

Despite a relatively broad uptake of mobile technology in Brazil, especially for mobile internet, gaps in usage and affordability of mobile services remain.[5]

- Traditional voice and SMS services[6] cost 2.3% of average annual income per capita, which is 9% higher than the Latin American average, and 14% of annual income for the poorest 20% of the population.
- Similarly, mobile broadband costs the poorest 20% of Brazilians 12% of income, which exceeds the 5% affordability threshold suggested by the Broadband Commission and ITU.[7]
- The cost of handsets further adds to the affordability barrier: a basic smartphone represents 4% of annual income of the poorest quintile while a premium smartphone represents approximately 21% of income.

Higher taxation on mobile compared to other standard goods and services risks limiting Brazil's overall economic growth

The Brazilian mobile sector is subject to a number of sector-specific taxes and regulatory fees levied both on consumers and operators:

- Mobile services are subject to higher sector-specific rates of ICMS, a value-added based State sales tax, ranging from 25% to 35%. The ICMS on standard goods and services ranges between 7% and 25%.
- Operator revenue taxes, such as FUST and FUNTTEL levies, apply exclusively to the mobile sector at 1% and 0.5% of gross revenue, respectively.
- Regulatory fees, such as the FISTEL fee on connections and stations, contribute to special taxation on the mobile sector, over and above taxation on other standard goods and services.

The positive impact of mobile internet and new technologies had been recognised by preferential tax treatment of these services, with the exemption of FISTEL fees for Machine to Machine (M2M) SIM

2. http://www.ibge.gov.br/english/estatistica/indicadores/pib/pib-vol-val_201503_7.shtm.
3. Deloitte analysis using data from the GSMA Intelligence.
4. ITU – Broadband Commission (2016): "Working together to connect the World by 2020".
5. Deloitte analysis using GSMA Intelligence and International Telecommunication Union, 2015: Measuring the Information Society, 2014 data, and data from GSMA Intelligence.
6. Traditional mobile services are defined as "a standard basket of mobile monthly usage for 30 outgoing calls per month (on-net/off-net to a fixed line and for peak and off-peak times) in predetermined ratios, plus 100 SMS messages", ITU (2015): Measuring Information Society 2015
7. The prices are taken from ITU (2015): Measuring Information Society 2015 report. They reflect retail prices, rather than other proxies of the price of mobile services, and detailed explanation of their construction is available on page 211 in the source document.

cards. On the other hand, while a Federal exemption from the PIS and COFINS taxes was initially granted to smartphones in 2013, despite the plans to extend it until 2018,[8] the exemption was eventually suspended in December 2015.

Mobile operators paid a total of BRL 27.2 billion in taxes and regulatory fees in 2014, which amounted to 48% of mobile market revenues. This is one of the highest proportions worldwide.[9] While former Brazilian Minister of Communications, Paulo Bernardo, described the taxation on the telecommunication industry as "excessive" in 2012, taxes remain the highest in the LATAM region.[10]

Taxation over and above that which applies to other standard goods and services is not fully aligned with the best practice principles of taxation that recommend taxation to be broad-based and to account for positive externalities. This creates a number of issues:

- **Reduced affordability:** sector-specific taxes and regulatory fees can be passed onto consumers either directly, through retail prices, or indirectly, through quality reductions. In fact, mobile taxes and regulatory fees amounted to BRL 240 per subscriber in 2014, which represents 5.9% of the average GNI per capita of the poorest 20%.[11]

- **Disincentives for investment:** sector-specific taxation reduces the returns on investment, potentially leading to inefficient investment decisions which could slow the development of the sector and delivery of the positive effects of mobile on the wider economy.

By transitioning to a tax system where mobile-taxes are reduced, the Brazilian government can promote digital inclusion and fiscal stability

A number of scenarios have been analysed which examine the impact of changes to mobile specific taxation on mobile penetration, economic growth and tax revenues. The analysis of these tax reform scenarios suggests that they have the potential to have the following impacts.[12]

- **The abolition of sector-specific FUST and FUNTTEL fees.** Under this scenario penetration is estimated to increase by 0.8% up to 2020, relative to the base case scenario of no tax change. Annual GDP growth over the period 2016-2020 could rise from 2.40% to 2.46%, a 2.6% increase.[13] In addition, the model estimates that the policy reform could reach tax neutrality in one year following implementation.[14]

- **The abolition of the sector-specific FISTEL Installation fee.** This reform has been estimated to have the potential to add up to BRL 29 billion to Brazilian GDP in 2020. Positive externalities, brought about by an additional 12.5 million connections, and lower taxation could incentivise additional economy-wide investment of up to BRL 5.2 billion in 2020.

Reform of sector-specific taxes and regulatory fees would potentially allow the mobile sector to increase its contribution to economic growth and government revenues. There are a number of areas for tax reform have that could support the mobile sector to further contribute to economic growth and government revenues over and above its current impact:

- **Reduce specific taxation of the mobile sector:** Those taxes and regulatory fees that are charged exclusively to the sector over and above general taxation may create economic distortions, potentially affecting service prices and investment levels. Reducing these sector-specific taxes has the potential to lead to increases in penetration and usage. By extending the user and tax base, reductions in taxation could have a neutral or positive impact on government revenues in the medium to long term. Phased reductions of sector-specific taxes and regulatory fees can represent an effective way for governments to signal their support to the connectivity agenda, to benefit from economic growth resulting from the reductions, and to limit short-term fiscal costs.

8. http://www.reuters.com/article/brazil-economy-taxbreaks-idUSL2N0QR1LA20140821#wUzbSIfZqadFhXcs.97
9. Based on a sample of 30 developing countries worldwide considered by GSMA/Deloitte (2016): "Digital inclusion and mobile sector taxation" (forthcoming).
10. http://www.marketwatch.com/story/brazilian-official-phone-taxes-are-excessive-2012-08-27.
11. Total tax payments estimated from operator data divided by total number of subscribers from GSMA Intelligence.
12. The potential effects of these reforms have been considered separately only and interaction between the policy reforms would need to be considered in order to calculate the potential cumulative effect. The introduction of all three reforms could be expected to reduce the impacts estimated.
13. This is a compound annual growth rate over the estimation period, i.e. 2016 to 2020, based on an IMF forecast.
14. The scenario analysis suggests tax neutrality could be achieved from the second year the change is implemented, and this assumes an immediate change in price and consumer behaviour. In practice, there are reasons to caution that this may take longer as consumers adjust their behaviours.

- **Facilitate the development of emerging services through supportive taxation:** The growth of mobile data and other innovative applications opens up the possibility for the sector to increase its economic value through a whole new generation of products and services ranging from health care services to education and finance. While this has already been recognised in regional exemptions of specific mobile broadband services from ICMS and in the Federal reduction in the FISTEL fees for M2M SIM cards, more could be done on the Federal level.

- **Streamline tax regulations, reduce complexity and reduce uncertainty over tax implementation:** The Brazilian taxation system is complex, relative to other systems in Latin America and in the BRICS group. The complexity translates into 2,600 hours required by a medium-size Brazilian company to comply with the tax legislation.[15] The administrative burden diverts financial and human resources from investment to compliance, thereby potentially distorting companies' investment decisions. Inefficient tax practices raise compliance costs for businesses. This may constrain innovation and competition, limiting the performance of the economy.

15. World Bank/PWC (2015): "Paying Taxes 2016".

1. The mobile industry in Brazil

Brazil is the fifth largest mobile market in the world with over 144 million subscribers and 278 million connections.[16] It is also the largest economy in Latin America (LATAM) and the seventh largest in the world.[17] The mobile sector is a key contributor to the economy, with market revenues in 2015 amounting to BRL 65.6 billion or 1.1% of GDP.[18]

The mobile market in Brazil is serviced by seven operators. The four largest are Vivo, Telecom Italia Mobile (TIM), Claro and Oi which provide almost 98% of total connections. With shares of 36%, 25%, 17%, and 15%, respectively,[19] together they account for 93% of market revenue. Other mobile operators include Algar, Nextel, and Sercomtel, making Brazilian mobile market the seventh most competitive mobile market in the world, based on standard industry benchmarks.[20]

This report assesses impacts of mobile taxation on digital inclusion in Brazil and how the government can promote economic growth and fiscal stability through supportive tax policies on the mobile sector. The analysis utilises an economic model of the Brazilian mobile sector and economy to examine a number of options for the government to transition to a tax structure where mobile is taxed similarly to other standard goods and services, in a way that promotes economic growth and protects the government's tax revenue position potentially even in the short-term.

- The remainder of this Section discusses digital inclusion in Brazil, its benefits and the barriers to greater connectivity.
- Section 2 describes the taxes levied on the mobile sector in Brazil, and the implications of these taxes for the mobile market and the wider economy. It also compares the taxes levied in Brazil with international benchmarks, including the Latin American region and the BRICS group,[21] and with best practice on taxation principles as recommended by leading international organisations such as the International Monetary Fund (IMF).
- Section 3 considers potential alternatives for rebalancing taxes on the mobile sector. These policies can support the government's information communications technology (ICT) goals, while increasing economic growth and productivity.
- Section 4 concludes, illustrating the contribution to fiscal stability of the policies presented in Section 3 and presents guidelines to align mobile taxes with taxation of other standard goods and services.
- The Appendix describes the economic model of the Brazilian mobile sector and economy that has been used in the analysis to estimate the impacts of rebalancing mobile sector taxes.

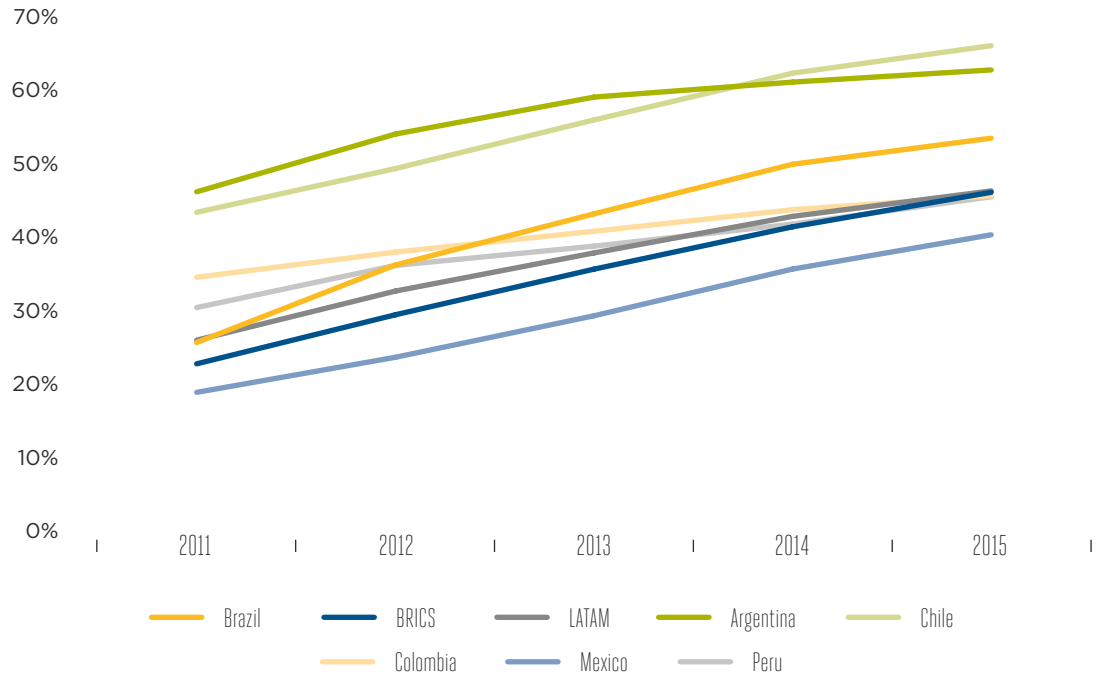
16. GSMA Intelligence, Q4 2015 data.
17. Measured by Gross Domestic Product (GDP) in current US$. World Bank, 2014 data.
18. Deloitte analysis based on data from the GSMA Intelligence.
19. GSMA Intelligence, 2015 data.
20. GSMA Intelligence, Herfindahl-Hirschman index for connections, 2014 data.
21. The BRICS countries comprise the major emerging economies of Brazil, Russia, India, China, and South Africa.

1.1 Mobile penetration in Brazil is relatively high but still lags behind the levels of developed countries

With mobile penetration of unique subscribers[22] standing at 69%, 65 million people in Brazil remain unconnected to mobile services.[23] Over the last five years, mobile penetration rates in Brazil have been growing steadily. In terms of connections and unique subscribers, penetration rates are equal to or higher than the regional and BRICS average.[24]

Mobile internet has been developing rapidly in Brazil, with penetration of mobile internet subscribers expanding from 25% to 38% between 2011 and 2013. This growth has put Brazil above LATAM average, as shown in Figure 2. After Chile, Argentina and Uruguay, the country is the fourth most penetrated mobile internet market in Latin America.

Penetration rates for mobile internet unique subscribers, 2011-15



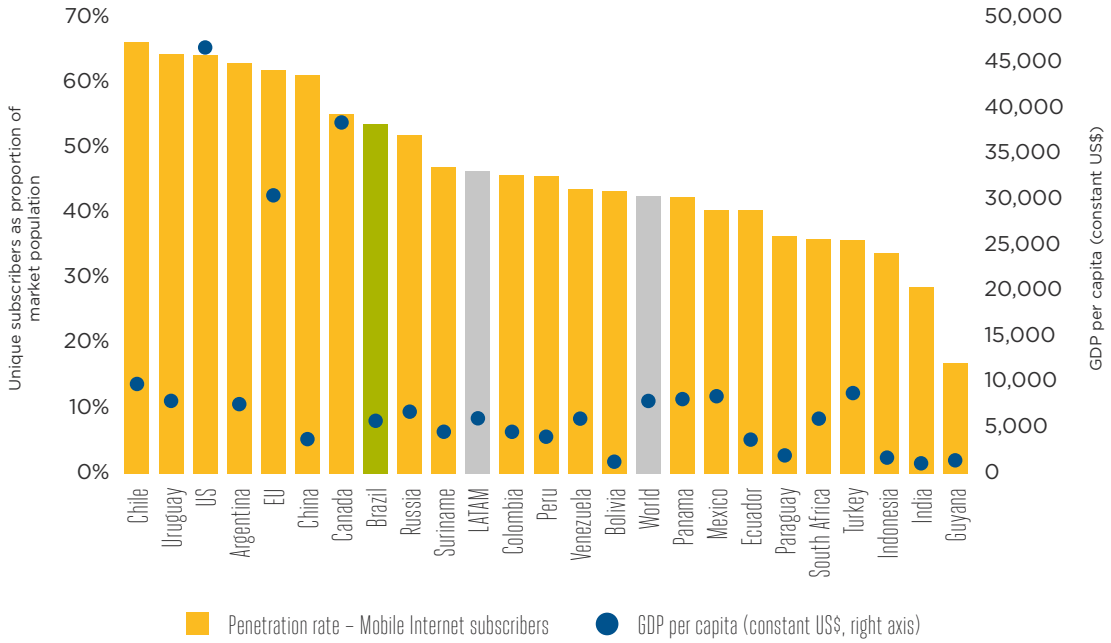
Source: Deloitte analysis using GSMA Intelligence data

Figure 2

Penetration of mobile internet subscribers in Brazil tops a group of countries with similar Gross Domestic Product (GDP) per capita as demonstrated in Figure 3. Penetration levels of traditional mobile services are aligned with the income of countries in the group.[25] Despite relatively high penetration, especially for mobile internet, the gap in connectivity between Brazil and developed economies of the United States (US) and the European Union (EU) is yet to be closed.

22. Market penetration in terms of unique subscribers is defined as the number of total subscribers at the end of the period, expressed as a percentage share of the total market population.
23. GSMA Intelligence, Q4 2015 data.
24. BRICS countries comprise major developing economies of Brazil, Russia, India, China, and South Africa.
25. The group includes Latin America and BRICS countries as well as Canada, Indonesia and Turkey.

Penetration rate of mobile internet subscribers and GDP per capita, 2015



Source: Deloitte analysis using GSMA Intelligence and World Bank data. GDP per capita data is for 2014 due to data availability constraints. Comparison is made for a sample of Latin American and BRICS countries, extended by Canada, Indonesia and Turkey, countries Brazilian operators use for benchmarking purposes.

Figure 3

Brazil has seen a fast development in next generation mobile technologies: with more than 11 million MachinetoMachine (M2M) connections, it is the fourth largest M2M market worldwide and a leading country in adoption of cellular M2M in Points of Sale terminals.[26] The market is estimated to grow by 27% in 2016.[27] This trend has been supported by a number of factors stimulating deployment of 4G technologies. High-speed 4G technologies support usage and development of high-usage M2M applications as they provide a higher data rate than older generations. The following factors are expected to contribute to the uptake of modern technologies in Brazil in coming years:

- Mostly municipal blocks of radio frequency bands were auctioned to mobile operators in December 2015 while the 700MHz spectrum (known as the Digital Dividend) was auctioned for high-speed mobile broadband services, such as 4G, in September 2014.[28]
- A collaboration agreement was signed by TIM, Ericsson, Huawei, and Nokia in August 2015, with the aim of expanding 4G coverage to 79% of the urban population.[29] Other operators' initiatives promote modern technologies in education,[30] transport,[31] and innovation.[32]
- Mobile internet and new technologies such as M2M have been benefitting from a preferential taxation treatment relative to basic mobile telephony in some Brazilian States.[33]

Two recent changes to the Brazilian regulatory landscape aim to foster investment further and to improve the quality of service.[34] These include:

- The Antenna Law, passed in April 2015, which requires mobile operators to share infrastructure in urban areas. The regulation is expected to reduce duplication of the mobile network antennae and foster investment in expanding next-generation networks.

26. GSMA (2015): "M2M in Latin America: the state of the market".
27. According to the GSMA Intelligence data.
28. GSMA (2015): "Global cellular market trends and insight – Q3 2015", GSMA/Deloitte (2012): "Brazil Mobile Observatory 2012".
29. GSMA (2015): "Global cellular market trends and insight – Q3 2015".
30. Embratel Claro Institute: https://www.institutoclaro.org.br/instituto-embratel-claro/.
31. Vivo's M2M initiatives: https://m2m.telefonica.com/blog/brazil-as-the-m2m-powerhouse-of-latin-america.
32. Oi and Nokia partnered to produce Latam's first LTE IoT lab providing innovative LTE-based solutions to enable machine-to-machine communications in Brazil. http://www.thefastmode.com/technology-solutions/6597-nokia-networks-oi-brasil-partner-to-set-up-first-lte-iot-m2m-lab-in-latin-america
33. Deloitte analysis. This is discussed in more detail in section 2.
34. Industry sources.

- In December 2015, a spectrum auction of radio frequencies in the 1.8GHz, 1.9GHz and 2.5GHz bands yielded BRL 762 million (US$ 234 million).[35] Opening these blocks, which are mostly municipal, to mobile telephony complements the Antenna Law, and resulting improvements in broadband and radio taxi coverage are expected to increase 4G service provision in key urban regions in the country.

1.2 Mobile services are a key driver of social and economic development in Brazil

Positive effects of mobile and digital inclusion on the wider economy have been extensively researched.[36] The World Bank, for example, recently indicated that *"[d]igital technologies [such as mobile] are transforming the worlds of business, work, and service delivery. These advances are making the leading parts of the economy and society more productive"*.[37]

In the context of the Brazilian economy, which has been in recession since 2015[38] with a further slowdown of 1% in real terms estimated for 2016,[39] mobile services may prove to have as yet unrealised potential and be an important source of innovation, productivity gains and growth. As a demonstration of this, despite the recessionary outlook and economic uncertainty, the Brazilian telecommunications industry remains attractive to foreign investors.[40]

The Brazilian government recognises the role of digital inclusion in social and economic development: it has launched a number of programmes, described in more detail below and aimed at stimulating the uptake of mobile technologies. Considering the recessionary economic outlook for Brazil for 2016, exploiting the positive spillover impact of the mobile sector has the potential to stimulate economic recovery. The benefits of digital inclusion, which these schemes aim to achieve, include:

1. Mobile services promote digital inclusion and the growth of a knowledge-based economy

Digital inclusion means that the benefits of information communications technologies (ICT) should be available to all, regardless of location or socioeconomic status. Mobile services provide a cost-effective way of achieving digital inclusion and, by facilitating the exchange of ideas and information, can support a move towards a knowledge-based economy.

The World Bank has stated that the movement towards a knowledge-based economy should be the aim of all governments, as knowledge becomes increasingly crucial to preserving national competitiveness.[41] It identifies four pillars of knowledge-based economies, one of which is information infrastructure, with technology such as mobile phones required to facilitate effective communication and the dissemination and processing of information.

2. Mobile services enhance productivity, innovation and social development

The World Bank's most recent World Development report states that *"digital technologies [comprising the internet, mobile phones, and related technologies] help businesses become more productive; people find jobs and greater opportunities; and governments deliver better public services to all."*[42]

35. http://www.mobileworldlive.com/featured-content/home-banner/brazil-raises-190m-in-spectrum-auction/?utm_campaign=MWL_20151221&utm_medium=email&utm_source=Eloqua.
36. World Bank (2012): "Maximising Mobile"; McKinsey & Company (2012): "Online and Upcoming: The Internet's impact on aspiring countries."; Goyal, A. (2010): "Information, Direct Access to Farmers, and Rural Market Performance in Central India." in American Economic Journal: Applied Economics, Vol. 2, pp22-45; Aker, J.C. and Mbiti, M. (2010): "Mobile Phones and Economic; Development in Africa", Journal of Economic perspectives, Vol. 24, pp207-232; Qiang, C.Z.W, Rossotto, C.M. (2009): Economic Impacts of Broadband, in Information and Communications for Development 2009: Extending Reach and Increasing Impact, World Banks, Washington D.C., pp35-50; Jensen, R. (2007): "The Digital Provide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector," in The Quarterly Journal of Economics, Vol. 122, pp879-924.
37. World Bank (2016): "World Development Report 2016 – Digital Dividends".
38. http://www.ibge.gov.br/english/estatistica/indicadores/pib/pib-vol-val_201503_7.shtm.
39. http://www.imf.org/external/pubs/ft/weo/2015/02/pdf/text.pdf.
40. http://www.ft.com/cms/s/0/247bf6fe-d3e2-11e4-99bd-00144feab7de.html#axzz3xaTffz20.
41. World Bank, The four pillars of a knowledge-based economy, 2009.
42. World Bank (2016): "World Development Report 2016 – Digital Dividends".

The 'digital dividends', that is to say returns on digital investments, of growth, jobs and services are achieved by lowering information and transaction costs for firms, individuals, and the public sector. This promotes innovation, boosts efficiency and increases inclusion as people get access to new services.

By enabling businesses and government to deliver their services faster, and at a lower cost, mobile services can increase productivity across the Brazilian economy. They can reduce transaction costs, making it less costly for Brazilian companies to conduct everyday business operations and supporting their expansion. Through wider effects on the economy, this can help to increase living standards and improve Brazil's international competitiveness.

Mobile services also create opportunities for investment, innovation and employment in the mobile sector and in a variety of other jobs that form part of the mobile ecosystem, such as equipment providers, workers in the network engineering and maintenance industry, and providers of related business services.

Mobile can also enable more effective delivery of public services and support social development. In particular, mobile and internet communication offers an effective means of bringing healthcare and education services to remote and under-served areas, through m-Government initiatives and mobile applications.

Many initiatives have been launched in Brazil and around the world that harness the potential of mobile. These initiatives, which often take the form of mobile applications, support and encourage innovation, productivity and entrepreneurial activity as well as social development, promoting economic growth and competitiveness in Brazil. In addition to initiatives run by operators, which were mentioned above, examples of Brazilian mobile applications include:

- **Whitebook**[43] is a medical application designed to help doctors find suitable treatment methods and substances. It is available for free with a base of about 60,000 registered practitioners.

- **Enem Quiz**,[44] a mobile education app, guides students in preparation for the national secondary school ENEM exams. It features a database of practice tests and learning video materials, covering a range of subjects. Upon subscription, it marks students' answers and helps them to improve their skills by tracking their performance.

- **Colab**[45] encourages active citizenship by enabling people to report issues related to urban areas to the local government. Users can upload photos, share suggestions for improvements, and keep track of the progress of their queries.

- **Turismo Acessivel**,[46] created by the Brazilian Ministry of Tourism, provides individuals with physical disabilities with disability-specific information on the ease of access of tourist attractions in the country. Its database includes, for example, museums and shops and targets tourists as well as residents.

- **Apontador**[47] is a free mobile guide to services and tourist locations in Brazil. It includes a ranking system based on reviews of registered hotels and restaurants. It is estimated to be used by one in five Brazilians with an internet access and its website interface registers about 16 million entries a month.

3. Mobile services promote long-run economic growth

A number of studies have already highlighted the economic growth potential of mobile, in particular:

- In Latin America, the mobile industry is estimated to have contributed additional 4.1% of Gross Domestic Product (GDP) or US$ 242 billion in 2013.[48] This translates in more than 1 million direct employment opportunities in the region and about 1.3 million indirect jobs in 2013.[49]

- Based on the most recent data available on economic contribution, mobile operators in Brazil are estimated to have provided an overall GDP contribution of US$ 18 billion in 2011. This was an increase of 30% compared to 2008.[50] The mobile communications industry employed more than 250,000 full-time equivalent employees in 2011, 16% of which were employed directly by mobile operators. The remaining 210,000 employment opportunities resulted indirectly from the expansion

43. More information available at: http://whitebook.com.br/.
44. More information available at: http://enemquiz.com.br/.
45. More information available at: http://www.colab.re/.
46. More information available at: http://www.turismoacessivel.gov.br/ta/.
47. More information available at: http://www.apontador.com.br/sobre.
48. GSMA (2014): "Mobile Economy, Latin America".
49. Ibid.
50. GSMA (2012): "Brazil Mobile Observatory".

of the mobile sector, for example hardware manufacturers, software developers or retailers.

- Studies by the GSMA and the World Bank have estimated that a 1% increase in mobile penetration could lead to an increase in the GDP growth rate of 0.28% in developing countries, while a 1% increase in mobile penetration in developing countries can lead to an increase of up to 0.112% in the GDP growth rate over the longer term.[51]

- The World Bank has found that in developing economies, such as Brazil, every 10% increase in broadband subscriber penetration[52] increases economic growth by 1.38%.[53] Further studies have supported this positive effect and even found that doubling broadband speeds increases GDP growth by up to 0.3%.[54]

- A 2012 GSMA/Deloitte/Cisco study has found that an increase in 3G usage has significant economic benefits.[55] Doubling mobile data consumption per 3G connection in Brazil between 2005 and 2010, for example, is estimated to increase the GDP growth rate by about 0.6%. In a group of countries similar to Brazil and for a given level of total mobile penetration, a 10% substitution from 2G to 3G penetration was found to increase GDP per capita growth by 0.15 percentage points.

- Other research suggests that for every new job created in the mobile sector in Brazil, another six are generated in the wider economy.[56]

4. Mobile services support Brazil's development objectives

Through these positive impacts, the mobile industry can support many of the government's objectives:

- The government's G20 **Comprehensive Growth Strategy** of 2014[57] aims to adopt a set of industrial policy measures to boost productivity and economic growth. The objectives target competitiveness, education and skills of Brazilian labour force, and the innovation capacity of national enterprises. These can all be supported through greater digital inclusion.

- The **National Broadband Plan**[58] sets objectives for a reduction in social and economic inequalities across regions and for a promotion of economic growth and digital inclusion. The project aims to provide 35 million homes currently without broadband services with access to a 1 Mbps internet connection for a price of BRL 35 (US$ 10.8) per month, including taxes and is expected to run until the end of 2016. A new programme, Banda Larga para Todos, has been proposed by the Communications ministry but, amid a number of austerity measures in Brazil's 2016 budget, its launch is yet to be announced.[59] Compared to fixed-line connections, mobile provides a relatively cost-effective way of extending connectivity and is therefore key to achieving programmes' targets.

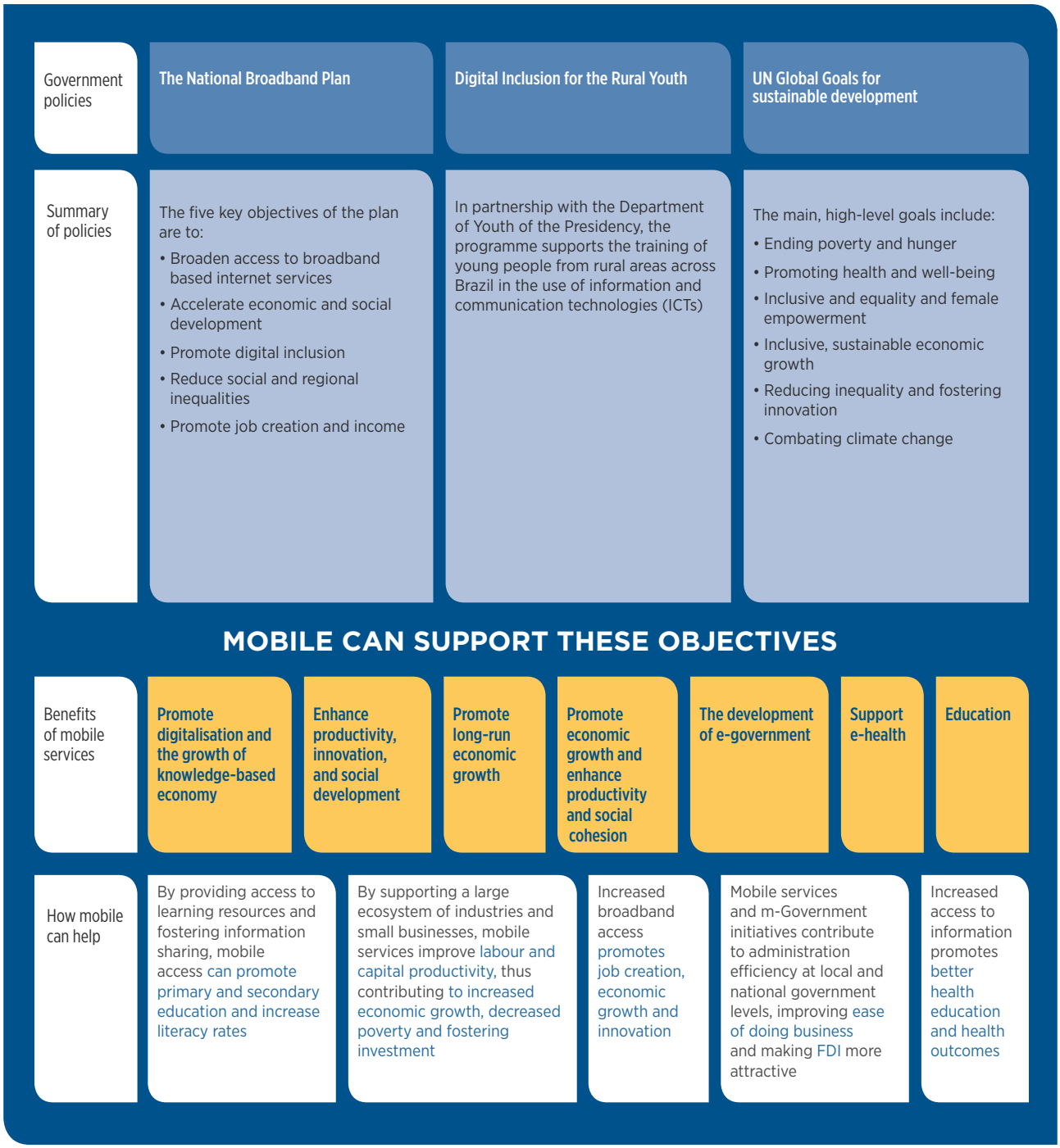
  The Plan aims to reduce the access and affordability barriers for underserved low-income households. It introduced tax cuts and exemptions reducing costs of construction and usage of broadband networks.

- The **Digital Inclusion for Rural Youth**[60] programme promotes training of young people from rural areas across Brazil in the use of ICT. The scheme started in 2011 with a selection of 41 projects from 18 states. By the end of 2013, the programme had trained 6,400 people in sectors such as agriculture and entrepreneurship. Five of its projects were extended until 2015, with a total investment of BRL 3.3 million (US$ 1 million).

- The **UN Global Goals** set out to end poverty and hunger, ensure inclusive and equitable economic growth and quality education, achieve economic and gender equality, improve well-being of people of all ages and promote sustainable development. The Global Goals include 17 goals[61] that were finalised and agreed upon in September 2015. The Global Goals build on the UN Millennium Development Goals (MDGs) that expired at the end of 2015.

51. This is based on a study of 40 economies over the period 1996-2011; for full details of the methodology, see http://www.gsma.com/publicpolicy/wp-content/uploads/2012/11/gsma-deloitte-impact-mobile-telepho-ny-economic-growth.pdf; Qiang, C. Z. W., Rossotto, C.M. (2009): "Economic Impacts of Broadband", in Information and Communications for Development 2009: Extending Reach and Increasing Impact, World Bank, Washington D.C., 35-50.
52. The distinction between users and subscribers of telecommunications services should be noted. Users refer to individuals who do not necessarily own or pay for telecommunications services, but who have access to such services through work, family etc. Subscribers, on the other hand, are individuals who pay for subscriptions to such services, to which a number of individuals may have access. Based on ITU, 2014. Manual for measuring ICT Access and Use by Households and Individuals.
53. Qiang, C. Z. W., Rossotto, C.M. (2009).
54. ITU – Broadband Commission (2016): "Working together to connect the World by 2020".
55. GSMA/Deloitte/Cisco (2012): "What is the impact of mobile telephony on economic growth?".
56. This figure was based on a number of studies conducted in developing and developed countries; see, for example, Moretti (2010); O2 for ONS (2002); Ovum (2010); Zain, Ericsson (2009); and Kaliba et al. (2006).
57. g20.org/wp-content/uploads/2014/12/g20_comprehensive_growth_strategy_brazil.pdf.
58. http://www.mc.gov.br/programa-nacional-de-banda-larga-pnbl
59. http://subscriber.bnamericas.com/Subscriber/news/telecommunications/how-much-of-brazils-2016-budget-for-telecoms-it?idEmail=498171806&lang=en&utm_source=Subscriber&utm_medium=newsletter&utm_cam-paign=telecommunications and http://subscriber.bnamericas.com/Subscriber/en/news/telecommunications/brazil-pay-tv-dth-falls-cable-and-fiber-grow/.
60. http://www.mc.gov.br/inclusao-digital-da-juventude-rural.
61. For the Global Goals, see: https://sustainabledevelopment.un.org/sdgsproposal.

The role of mobile in achieving national and international development objectives



Source: The Brazilian government, the UN and Deloitte.

Figure 4

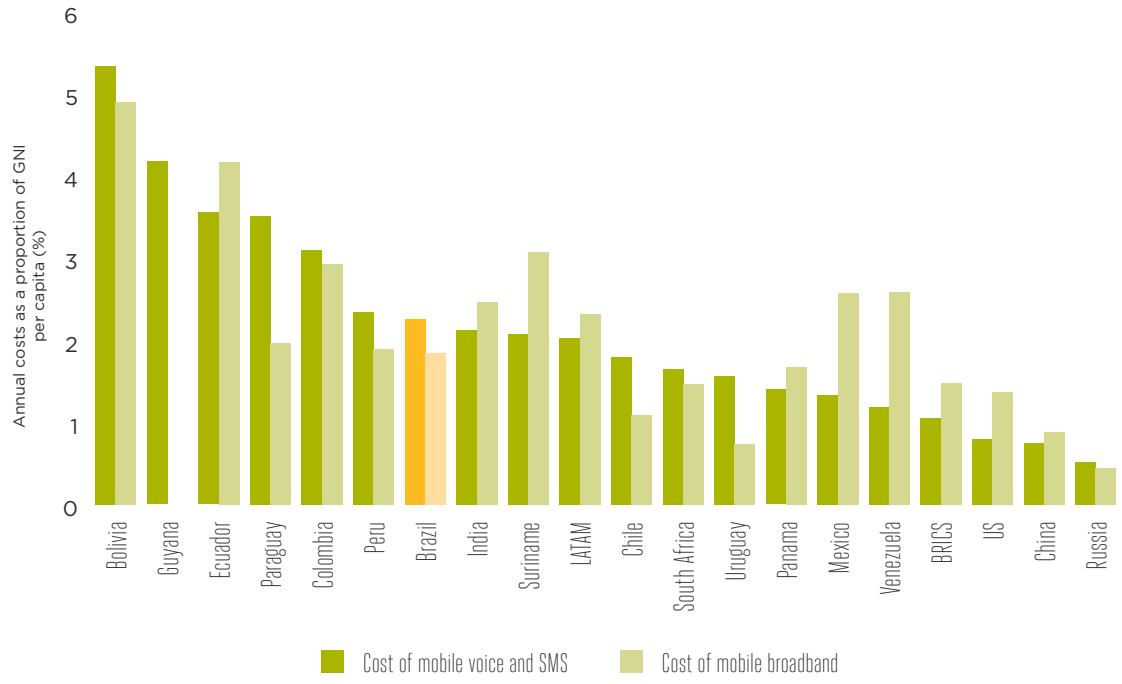
1.3 Current gaps in digital inclusion

Mobile makes an important contribution to the socioeconomic development in Brazil and to the achievement of the government's development programmes. Despite relatively broad uptake of mobile technology, especially for mobile internet, gaps in affordability and usage remain, and regulation of mobile services creates concerns for investment.

The affordability barrier to usage and ownership of mobile telephony is larger in Brazil compared to the Latin America average and the BRICS

Affordability is an important barrier to mobile penetration and usage.[62] Affordability of mobile telephony, which can be measured as the ratio of an annual cost of a bundle of mobile voice and SMS to average national income per capita, is nearly 2.3% in Brazil.[63] This is 9% higher than the Latin American average and more than twice the average of the BRICS countries as shown in Figure 5. The cost of a mobile broadband bundle, however, stands at 1.8% of Gross National Income (GNI) per capita, which is lower than the Latin American average of 2.3%.

Affordability of voice and SMS and mobile broadband,[64] 2014



Source: Deloitte analysis using GSMA Intelligence and International Telecommunication Union, 2015: Measuring the Information Society, 2014 data. Interviews with operators suggest that ITU usage price data for Brazil may now overstate true prices due to pricing policy changes regarding calls to other networks. LATAM average for mobile services excludes Guyana.

Figure 5

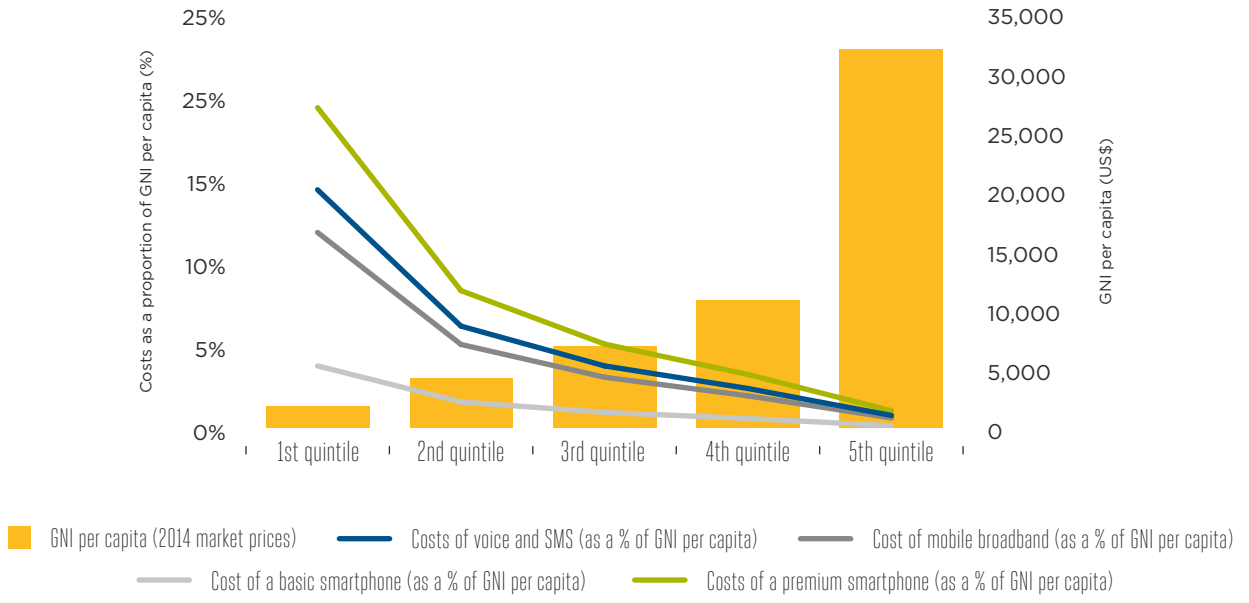
62. Barrantes, R. and Galperin, H. (2008): "Can the poor afford mobile telephony? Evidence from Latin America" in Telecommunications policy, Vol. 32, pp521-530.
63. Both the mobile and voice bundle and the mobile broadband bundle were constructed by ITU for the Measuring Information Society 2015 report.
64. The LATAM average in this Figure does not include Argentina, for both mobile voice and SMS and mobile internet, and Guyana, for mobile internet, due to data unavailability.

Large inequality of income distribution in Brazil means that mobile services are even less affordable for the poorest 20% of the population

The distribution of income in Brazil is one the most unequal in Latin America and the BRICS countries.[65] While an average GNI per capita stood at US$ 11,530 in 2014, the income of the poorest 20% of US$ 1,892 was nearly 84% lower. Assuming a mobile bundle is consumed by all income groups, the poorest fifth of the population pay, on average, more than 14% of their annual income for mobile voice and SMS compared to about 2% for a user with the average income.[66]

The affordability barrier is particularly relevant at the bottom of the income pyramid, i.e. for the income group which "attributes a significant improvement in quality of life to mobile access".[67] In fact, affordability is cited by at least 35% and up to 80% of people as the main barrier to using mobile in developing countries.[68] On an annual basis, the cost of mobile services in Brazil is even higher than the cost of a basic smartphone device,[69] which comprises less than 4% of annual income for the poorest 20% of the population as shown in Figure 6. Mobile broadband represents nearly 12% of annual income of the bottom quintile, more than 6 times the cost for an average income user. Consumers face the sum of these costs in order to acquire and use mobile services.

Affordability of mobile services and income distribution, 2014



Source: Deloitte analysis using industry sources, GSMA Intelligence and ITU (2015): Measuring the Information Society, 2014 data

Figure 6

A number of barriers could contribute to low mobile usage in Brazil. For example, locally relevant content is a key driver of demand for mobile services, especially mobile broadband, and a poor understanding of the available content is often a reason poorer consumers in developing countries do not access mobile services.[70] Linked with this is digital illiteracy, which is a barrier in itself. Across 11 developing countries 37% of the adult population said they required assistance in using mobile.[71]

Section 2 reviews taxes and regulatory fees applicable to the mobile industry and their impact on the sector.

65. This is based on values of the GINI coefficient available in the World Bank Development Indicators Database.
66. Deloitte analysis using industry sources, GSMA Intelligence and ITU (2015): Measuring the Information Society, 2014 data.
67. Galperin, H. and Mariscal, J. (2007): "Poverty and Mobile Telephony in Latin America and the Carribean," Dialogo Regional sobre Sociedad de la Informacion (DIRSI).
68. GSMA (2015): "Connected women 2015 – Bridging the gender gap: Mobile access and usage in low- and middle-income countries"
69. A basic handset is defined as a voice-centric device, having support for data services, such as basic Internet capabilities, although it does not provide a fully integrated experience across the device. It is likely to have basic cellular connections and not have a lot of support for content creation.
A premium device is defined as a device going beyond traditional services such as voice and messaging by integrating data services across the device. It supports rich features to provide high-quality internet access away from the home or office. Wide content creation is not supported; however, consumption will be better than with other phone devices, though still limited. (ITU, 2014: Measuring the Information Society 2014).
70. GSMA (2015): "Connected women 2015 – Bridging the gender gap: Mobile access and usage in low- and middle-income countries"
71. Ibid.

2. Taxes and regulatory fees on the mobile sector in Brazil

The Brazilian mobile sector is subject to a number of taxes and regulatory fees levied both on operators and consumers. The extent to which these charges ultimately fall on operators or consumers depends on the type of tax and market conditions. Some taxes and regulatory fees may be absorbed by operators in the form of lower profits, whilst others may be passed through to consumers through higher prices, or there may be a combination of the two.

This section reviews the taxes applied to mobile consumers and operators in Brazil, focusing on those that are sector-specific, i.e. those which do not apply to other standard goods and services in the economy. It also compares the mobile taxation system to similar countries.

2.1 Taxes on mobile consumers in Brazil

ICMS[72] is a value-added based sales tax, levied on the pre-tax value of mobile traffic, handsets, and SIM cards. It is set at State level and its rates therefore vary across Brazilian states. While most standard goods and services are generally taxed between 7% and 25%, with the national average typically standing at 17%,[73] mobile services are subject to higher rates of up to 35% in some states, as shown in Table 1.

Taxes levied on consumers in Brazil, 2015

Payment base	Type	Tax rate
Calls and SMS	★ ICMS	25% - 35%
Mobile broadband	★ ICMS	25% - 35%, regional exemptions
Handsets and SIM cards	ICMS	17% - 20%

★ Mobile specific

Source: Deloitte analysis using mobile operator data and PwC Taxation Summaries, 2015 data.

Table 1

72. Imposto sobre operações relativas à circulação de mercadorias e serviços de transporte interestadual e intermunicipal e de comunicações.
73. http://thebrazilbusiness.com/article/icms-rates-by-state.

ICMS on mobile usage

Mobile traffic, comprising calls, SMS, and data, is subject to higher sector-specific ICMS rates in 16 out of 27 states. In this group, the State of Rondônia applies the highest rate of 35%.[74] Of the remaining states, mobile traffic is taxed at 25%, i.e. at the highest ICMS rate for standard goods and services, in all eleven regions. Across the Federal market as a whole, ICMS amounts to 65% of all taxes and regulatory fees paid, making it the most important tax on mobile operators in Brazil.[75]

While mobile broadband is treated identically to other mobile services in most Brazilian states, it has been exempted from ICMS in the states of Pará, São Paulo, and the Federal District as a part of the National Broadband Plan[76] for services offered in specific cases. Further ICMS exemptions for mobile broadband have been granted to state, provincial, municipal and Federal public schools.

ICMS on handsets and SIM cards

Based on operator data, handsets and SIM cards are subject to ICMS at rates ranging from 17% to 20%, depending on the state. Although the rate is aligned with the 7% to 25% range applicable to standard goods and services, handsets and SIM cards are typically taxed at the higher end of the range.

Municipalities also levy a service tax, ISS,[77] on the supply of services that are not subject to the ICMS. The tax base of ISS is the price of services rendered and the rate varies between 2% and 5%, depending on a municipality. According to mobile operators, however, the exposure of the sector to ISS is limited because most services provided by the operators are subject to ICMS.

2.2 Taxes and regulatory fees on mobile operators in Brazil

Operators in Brazil are subject to a number of taxes and regulatory fees, which are summarised in Table 2. These include general taxes that apply to all sectors of the Brazilian economy, such as PIS[78] and COFINS,[79] as well as sector-specific regulatory fees, such as FUST[80] and FUNTTEL.[81] Similar to the ICMS, some operator taxes also favour mobile broadband relative to other mobile services, such as FISTEL, discussed further below.

74. http://www.teleco.com.br/tributos.asp.
75. This is calculated as total ICMS tax payments as a proportion of all tax and regulatory fee payments for the mobile industry, based on data reported by the operators.
76. http://www1.fazenda.gov.br/confaz/Confaz/Convenios/icms/2009/cv038_09.htm.
77. Imposto sobre Serviços.
78. Programa de Integração Social.
79. Contribuição Social para o Financiamento da Seguridade Social.
80. Fundo de Universalização de Telecomunicações.
81. Fundo para o Desenvolvimento Tecnológico das Telecomunicações.

Taxes and regulatory fees levied on mobile operators in Brazil, 2015

	Payment base	Type	Tax rate
Taxes	Profit before tax	Corporation tax	34%
	Gross revenue	PIS	0.65% on usage, 1.65% PIS on handsets and SIMs
		COFINS	3.0% on usage, 7.6% on handsets and SIMs
	Value of eligible payments	CIDE	10%
	Value of eligible financial transactions	IOF	0.38%
	Fair market value of the property	IPTU	1.5%, varies by state
	Pre-tax value of imported handsets	Customs duty	20%
Regulatory fees	Gross revenue	☆ FUST	1%
		☆ FUNTTEL	0.5%
	Number of SIM cards or base stations	☆ FISTEL (TFF)	Active SIM: BRL 13.42, active base station: BRL 670.4
		☆ FISTEL (TFI)	New SIM: BRL 26.83, new base station: BRL 1,340.8
	Revenue from eligible activities related to picture and video works	CONDECINE	Active SIM: BRL 4.14 Active base station: BRL 205.57

☆ Telecommunications specific tax

Source: Deloitte analysis based on mobile operator data and PwC Taxation Summaries, 2015 data.

Table 2

Corporation tax and social contributions

Corporation tax in Brazil stands at 34% and is levied on taxable income. It comprises a basic rate of 15%, applicable to taxable income, an additional 10% rate applicable to profits over BRL 240,000 (US$ 73,800),[82] and a 9% social contribution tax.[83]

The PIS[84] is a mandatory Federal contribution to a social integration fund which finances unemployment benefits, child benefits, and allowances for low-paid workers. Levies of 1.65% and 0.65% of gross revenue apply to mobile goods and services, respectively.[85] In 2013, smartphones, tablets, modems and routers were given an exemption from PIS. Despite the initial plan to extend the exemption until the end of 2018, it was eventually suspended in December 2015.[86] As of 1 May 2015, an increased rate of 2.1% applies to imported goods such as handsets or network infrastructure.[87]

Working on a similar principle, COFINS[88] contributions fund the social security system. Rates of 3% and 7.5% are levied on gross revenue and payable on the state level.[89] Similar to PIS, an exemption from COFINS was granted to smartphones and tablets in 2013 and was suspended in December 2015. As of 1 May 2015, an increased rate of 9.65% applies to imported goods.[90]

Customs duty

A customs duty is levied on the pre-tax value of imported goods but not on imported services in Brazil. The duty on electronics generally ranges from 0% to 20%. Imported mobile industry manufactures, such as mobile handsets and mobile broadband hardware, are subject to the top 20% rate. However, based on data provided by mobile operators, the sector only purchased hardware manufactured in Brazil and, as a result, was not required to make customs payments. Brazil has an established handset manufacturing industry and as such there are limited imports of handsets. This is partly a consequence of government policies such as high duties and high transaction costs.

Other general taxes

The CIDE[91], translated as the contribution for intervening in the economic domain, is levied on service payments made to providers domiciled abroad. Eligible transactions involve, among other things, royalties and the supply of specialised technical services. The rate stands at 10% of the gross revenue from the activity and the payment is not creditable by the foreign beneficiary.

The tax on financial operations, IOF,[92] applies to specific financial transactions such as currency exchanges and insurance and security transactions. In the range of up to 6%, based on the data supplied by mobile operators, the mobile industry is exposed to a 0.38% tax on currency exchanges.

Owners of urban property in Brazil are subject to an urban building and land tax, IPTU.[93] The tax, charged by local municipalities, is levied on the construction value of the property and the value of the land it is built on. The rate generally ranges from 0.3% to 1%, with regional exceptions such as a 1.5% rate in São Paulo.

The Contribution to the Development of the National Cinema Industry, CONDECINE, has been charged on commercialisation of audio-visual products since 2011. Apart from mobile operators, it also applies to movie theatres, video sales, radio and television among others. The tax was introduced in response to an emergence of streaming platforms operated by telecommunication companies, including mobile operators. The tax is due annually and is paid to Anatel, the national telecommunications regulator.[94] Anatel collects the payments from mobile operators on an annual basis at the rate of almost 15% of TFI fees, which are described below.[95]

The mobile sector in Brazil is also subject to a number of sector-specific taxes and regulatory fees. Some of these levies are lower for mobile broadband relative to other output of the sector.

82. The basic rate of 15% or 25%, where profits exceed the threshold, is called Imposto de renda sobre pessoa juridical.
83. Contribuição social sobre o lucro liquido.
84. Programa de Integração Social.
85. Which rate applies depends on the type of revenue as well as on a computation method and potential special schemes. Based on the data provided by the mobile operators, mobile traffic, i.e. calls, SMS, and data, are taxed at a different rate than mobile manufactures.
86. Industry sources and http://www.reuters.com/article/brazil-economy-taxbreaks-idUSL2N0QR1LA20140821#wUzbSIfZqadFhXcs.97.
87. Lei nº 13.241/2015
88. Contribuição Social para o Financiamento da Seguridade Social.
89. Industry sources and http://www.reuters.com/article/brazil-economy-taxbreaks-idUSL2N0QR1LA20140821#wUzbSIfZqadFhXcs.97.
90. Lei nº 11.196/2005, art. 28
91. Contribuição e Intervenção no Domínio Econômico.
92. Imposto sobre Operações Financeiras
93. Imposto sobre a propriedade predial e territorial urbana; depending on the rental contract, the payment obligation is often passed on tenants.
94. http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2011/Lei/L12485.htm; Annex I of http://www.planalto.gov.br/ccivil_03/MPV/2228-1.htm#art32.; http://www.noronhaadvogados.com.br/guia/legalguide2011.pdf; http:// www.iipa.com/rbc/2014/2014SPEC301BRAZIL.PDF.
95. http://www.anatel.gov.br/Portal/exibirPortalNivelDois.do?acao=&codItemCanal=1334&codCanal=346.

FUST

FUST[96] payments have been contributing to the Brazilian universal service fund since 2000. The fund is expected to finance the purchase and implementation of telecommunications equipment in isolated underserved regions. However, it is not clear to what extent the proceeds have been invested for this purpose so far. For example, the ITU notes that *"FUST has collected a substantial amount of money but due to conflicting legal interpretations regarding the use of the fund's resources, very limited funds have been disbursed."*[97]

Monthly contributions correspond to 1% of gross revenue from calls, SMS, and data, net of instalments due on the same basis, ICMS, PIS, and COFINS payments.[98]

FUNTTEL

Contributions to the technological and development fund, FUNTTEL,[99] finance research and development projects in the telecommunication industry since 2000. Similar to FUST, FUNTTEL is charged at 0.5% of the gross service revenue and there is limited information available on the utilisation of the money so far.

FISTEL

FISTEL[100] contributions fund telecommunication inspection. All telecommunication companies are obliged to pay FISTEL in two following forms:

- An annual operation fee, TFF,[101] is charged on the number of active mobile connections and base stations. Based on data provided by Brazilian mobile operators, fees of BRL 13.42 (US$ 4.1) and BRL 670.4 (US$ 206.3) apply to mobile connections and base stations, respectively. In May 2014, the FISTEL TFF fee on M2M connections was decreased by 86% to BRL 1.89 (US$ 0.58).[102]
- An Installation fee, TFI,[103] is payable at time of installation of a new connection or a telecommunication station. Fees of BRL 26.83 (US$ 8.3) and BRL 1,340.8 (US$ 412.6) are levied per mobile connection and installed station, respectively. An increase in the Installation fee is planned by the government in 2016.[104] Similarly to the TFF, however, M2M connections are subject to a decreased fee of BRL 5.68 (US$ 1.75) since May 2014, 21% of the original amount.

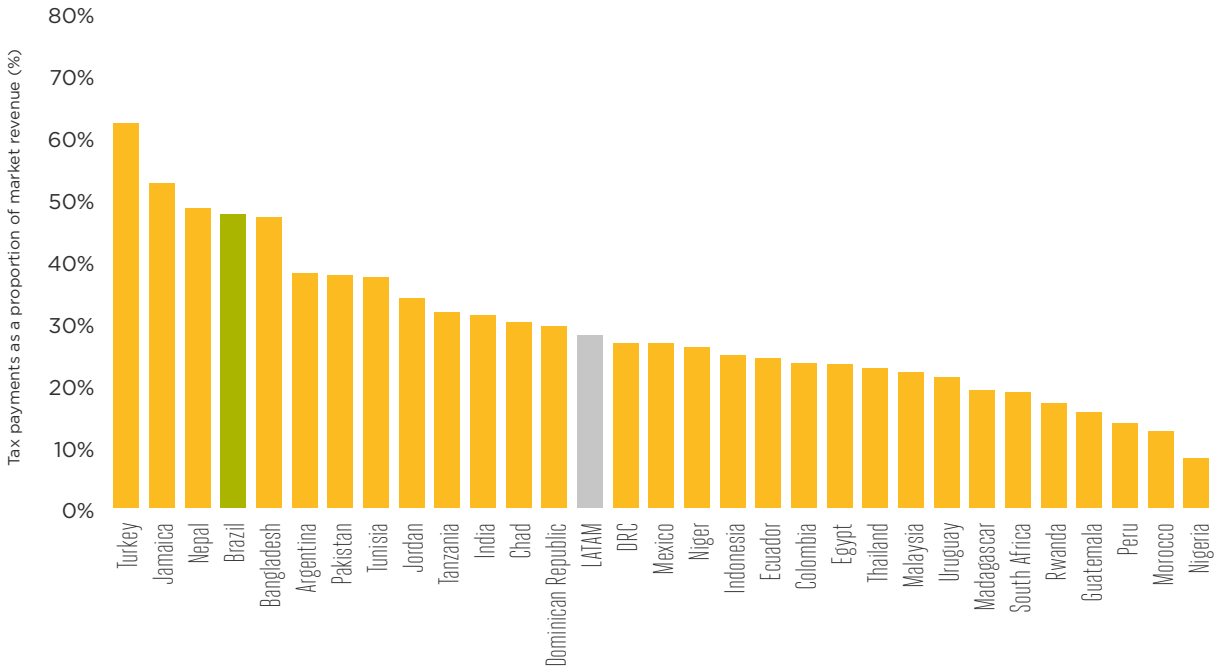
In addition to ICMS exemptions, tax relief was offered to companies under the REPNBL (Regime Especial de Tributação do Programa Nacional de Banda Larga) as part of the National Broadband Plan to support investment in and adoption of telecommunication networks. A company or individual could apply for approval by the Ministry of Communications for tax relief on a specific project relating to the construction of broadband networks. Once approved, all machinery, instruments, new equipment, building material and hiring of manually intensive labour would be exempt from PIS, COFINS, IPI (a tax on the use of industrial products)[105] and PASEP (a social security contribution similar to PIS but for civil servants)[106]. The tax relief programme ended on 30 June 2015.[107]

96. Fundo de Universalização de Telecomunicações.
97. http://www.itu.int/en/ITU-D/Regulatory-Market/Documents/USF_final-en.pdf
98. http://www.anatel.gov.br/setorregulado/index.php?option=com_fsf&view=faq&catid=9&Itemid=131.
99. Fundo para o Desenvolvimento Tecnológico das Telecomunicações.
100. Fundo para Fiscalização de Telecomunicações.
101. Taxa de Fiscalização do Funcionamento.
102. GSMA (2015): "Global cellular market trends and insight – Q3 2015".
103. Taxa de Fiscalização da Instalação.
104. http://www.sinditelebrasil.org.br/sala-de-imprensa/na-midia/3203-novos-impostos-em-telecom-podem-gerar-mais-r-8-bi-aos-governos-em-2016.
105. Imposto Sobre Produtos Industrializados
106. Programa de Formação do Patrimônio do Servidor Público
107. http://www.mc.gov.br/programa-nacional-de-banda-larga-pnbl/regime-especial-de-tributacao-repnbl

2.3 Mobile taxes and regulatory fees can create a barrier to connectivity

Mobile taxation in Brazil is high compared to other Latin America[108] and BRICS countries, as shown below. While then Brazilian Minister of Communications, Paulo Bernardo, described the taxation on the telecommunication industry as "excessive" in 2012,[109] taxes remain the highest in the region.

Tax payments as a proportion of total market revenue, 2014



Source: Deloitte analysis using mobile operator data. The LATAM sample includes Argentina, Brazil, Colombia, Ecuador, Mexico, Peru, and Uruguay

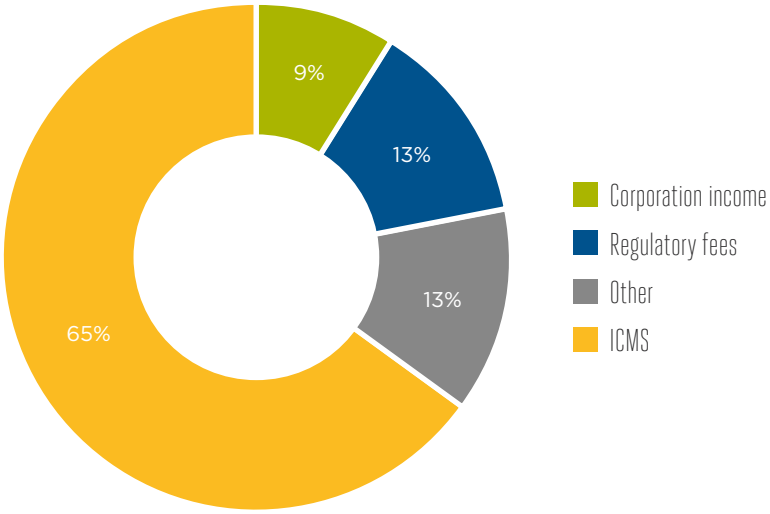
Figure 7

Figure 7 shows tax as a proportion of total market revenue in 2014. Brazil belongs to a group of countries with the highest taxation, with tax and fee payments adding up to 48% of sector revenues. ICMS payments constitute about two thirds of this number, a large proportion of which is attributable to the higher sector-specific ICMS rates. Total sector tax payments translate into 1.9% of government tax revenues, while the sector's contribution to the GDP, measured by market revenues, amounts to only 1.1%.[110] The sector thus contributes to government budget 1.8 times more than is its share in GDP. As a result, mobile taxes and regulatory fees in Brazil are estimated to amount to BRL 240 per subscriber, which represents approximately 5.9% of the annual income of the poorest 20% of the population.[111]

The ICMS payments, including the higher sector-specific rate on mobile services, represent nearly two thirds of mobile operators' total tax payments as shown in Figure 8. Sector-specific recurring regulatory fees, such as the FISTEL fees, amount to 13% of total payments, while the economy-wide corporation income tax constitutes 9% of the total. The Other category comprises taxes and regulatory fees, such as the PIS and COFINS, payments or the property tax, that also apply to other goods and services.

108. The LATAM sample excludes Guyana and Suriname, where data is not available.
109. http://www.marketwatch.com/story/brazilian-official-phone-taxes-are-excessive-2012-08-27.
110. Deloitte analysis based on operator and GSMA Intelligence data.
111. Average income for the bottom quintile (20%) is calculated from the World Bank World Development Indicators data.

Tax type breakdown, 2014

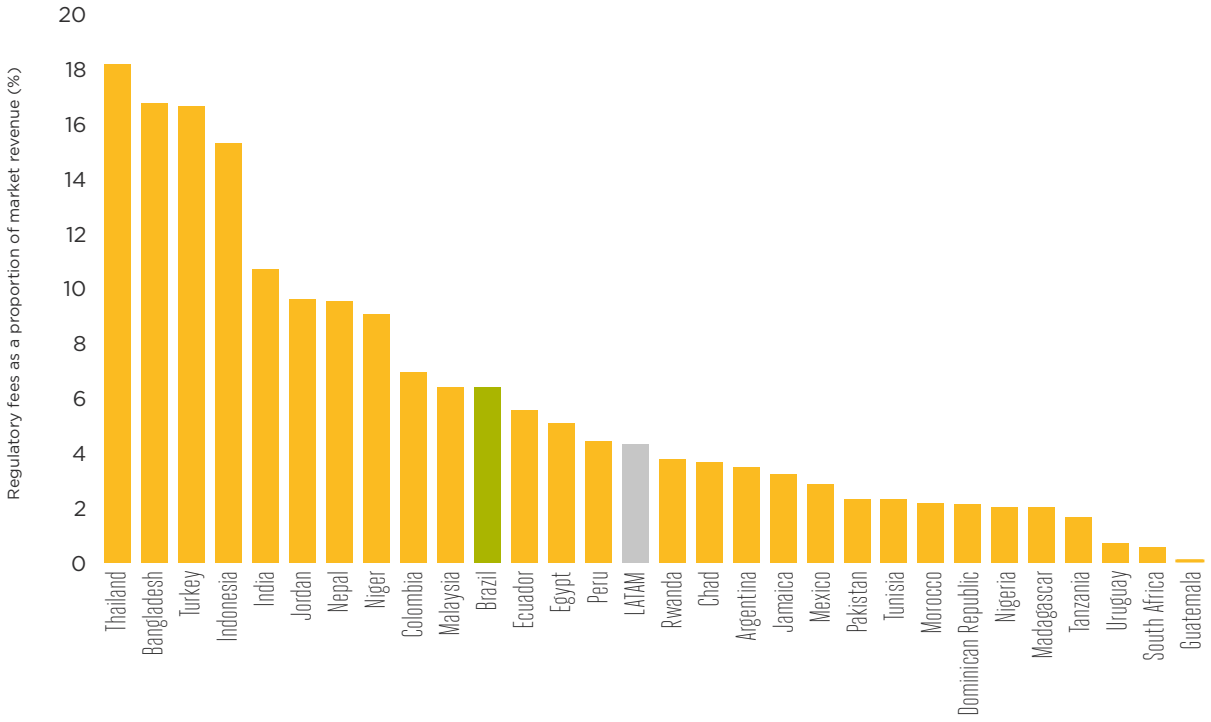


Source: Deloitte analysis using mobile operator data

Figure 8

Recurring regulatory fees[112] alone amount to more than 6% of market revenue in Brazil. Compared to the Latin American average of approximately 4%, the Brazilian figure stands nearly 50% above the regional average.

Regulatory fees as a proportion of market revenue, 2014



Source: Deloitte analysis using mobile operator data

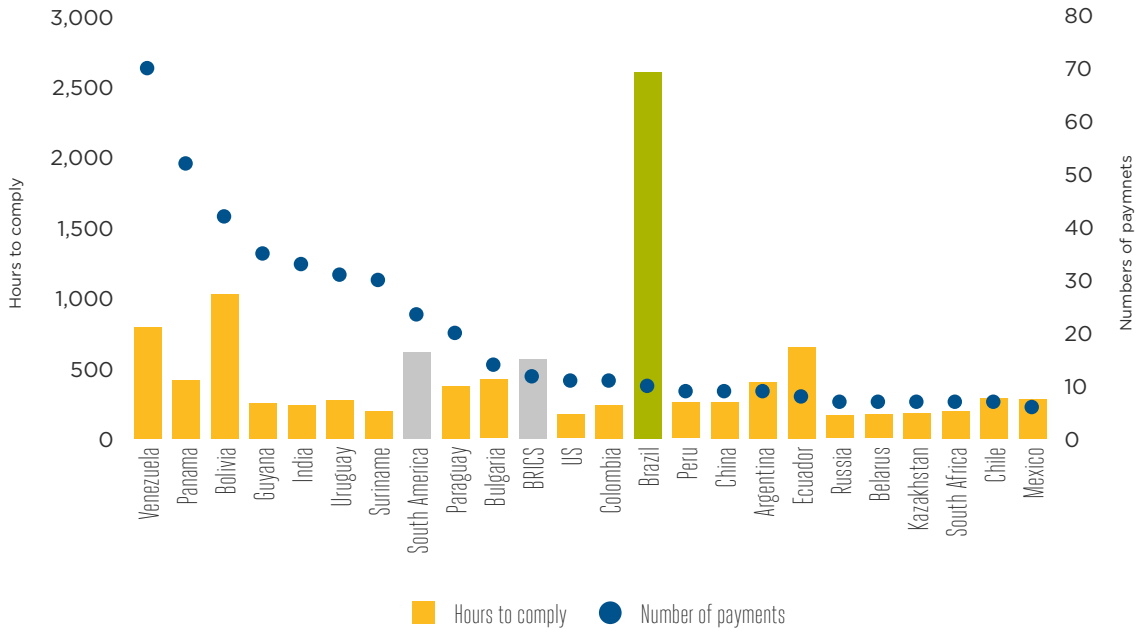
Figure 9

112. Recurring regulatory fees in Brazil include the FUST, FUNNTEL and FISTEL TFF. Excluded from this are non-recurring regulatory fees such as spectrum auction payments.

In addition to the recurring regulatory fees, operators have also paid about BRL 6.6 billion in spectrum auction payments since 2014. At the auction of the Digital Dividend in September 2014 to support provision of 4G services, mobile operators paid a total of BRL 5.8 billion[113] while the smaller auction of municipal blocks of frequency in December 2015 raised a further BRL 762.7 million for the regulator.[114]

The complexity of the Brazilian taxation system adds to the mobile operators' compliance costs, further limiting sector's profitability and efficiency. Although the average number of tax payments[115] is lower in Brazil than, for example, in Bolivia or Colombia, it takes a medium-sized domestic company 2,600 hours to comply[116] with the legislation, as shown in Figure 10. This is the highest number in Latin America and more than four times the South American[117] average of 615 hours. Based on data provided by mobile operators, the number of payments for the mobile sector exceeded country average by 67% in 2014, which indicates that the compliance burden is even larger for mobile operators relative to the medium-size company.

Complexity of the tax system, 2015



Source: Deloitte analysis using World Bank/PWC (2015): "Paying Taxes 2016" data. South America comprises Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, and Venezuela. Rest of the sample follows that of previous sections, including BRICS countries, the US, and economies of similar GDP per capita to Brazil

Figure 10

Further, regulation puts an administrative burden on deployment of mobile network infrastructure. Restrictive regulations on infrastructure deployment can hinder deployment of antennas in Brazil.[118] The law requires operators to obtain approval from municipalities for each tower site, which slows down deployment and replacement of new network infrastructure.[119] A number of regulatory measures have recently been taken to alleviate the administrative burden: the Antenna Law, passed in April 2015 and described in Section 1.1, aims to reduce duplication of the infrastructure and foster investment in expanding next-generation networks. Complemented by the auctions of the Digital Dividend and radio frequency spectrum, new investment opportunities in the sector have been created. However, regulatory changes would need to be first implemented by individual municipalities and no implementation deadlines have been set.

113. Industry sources.
114. http://www.mobileworldlive.com/featured-content/home-banner/brazil-raises-190m-in-spectrum-auction/?utm_campaign=MWL_20151221&utm_medium=email&utm_source=Eloqua.
115. The tax payments sub-indicator reflects the total number of taxes and contributions paid, the method of payment, the frequency of payment, the frequency of filling and the number of agencies involved for this stand-ardised case study company during the second year of operation. World Bank/PWC (2015): "Paying Taxes 2016".
116. The sub-indicator measures the time taken to prepare, file and pay three major types of taxes and contributions: corporate income tax, value added or sales tax, and labour taxes, including payroll taxes and social contri-butions. World Bank/PWC (2015): "Paying Taxes 2016".
117. Compared to Latin America, the South American average does not include Mexico and Panama.
118. GSMA (2015): "Global cellular market trends and insight – Q3 2015", GSMA (2014): "Mobile Economy, Latin America" GSMA (2012): "Brazil Mobile Observatory" and industry sources.
119. GSMA (2015): "Closing the coverage gap, Digital inclusion in Latin America".

Taxation of the mobile sector in Brazil is among the highest globally, with tax and fee payments in 2014 adding up to 48% of sector revenues

2.4 Best practice in taxation policy

An effective tax policy has to balance a number of potentially competing factors. These include the government's revenue needs, supporting key sectors and the practicalities of enforcement and collection, as well as the desire to minimise any detrimental impact on the wider economy. Consequently, tax policy frequently must strike a balance between the theoretically correct response and one that recognises the practicalities of taxation in a market.[120]

The IMF noted that a potential solution to addressing government revenue needs may lie in mobilisation of existing funds.[121] Rather than increasing taxation, distorting markets and worsening perceived inequalities, maximum utilisation of existing funds could aid public finances without further economic distortions. In light of limited utilisation of the FUST and FUNTTEL funds described above, this suggestion seems particularly relevant for Brazil.

There are a number of principles that are generally recognised as contributing to an effective tax system, as outlined by international organisations such as the IMF and International Telecommunication Union (ITU).[122] These principles are intended to minimise the inefficiencies associated with taxation and regulatory fees and the distortive impacts that they may have on the wider economy. If applied in Brazil, these principles have the potential to promote mobile penetration and expand investment in the mobile sector, promoting economic growth and increased tax revenues for the government.

Alignment of taxes and regulatory fees in the mobile sector in Honduras with the principles of taxation

Tax	Broad-based	Accounts for externalities	Simple and enforceable	Incentives for competition and investment	Equitable
Corporation tax	✓	✗	✓	✓	✓
ICMS	✗	✗	✗	✓	✗
ICMS on mobile broadband	✗	✓ (regionally)	✗	✓	✗
PIS/COFINS	✓	✗	✓	✓	✓
CIDE	✓	✗	✓	✗	✓
IOF	✓	✗	✗	✓	✓
IPTU	✓	✗	✓	✗	✓
Customs Duty	✓	✗	✓	✗	✓
FUST	✗	✗	✓	✗	✗
FUNTTEL	✗	✗	✓	✗	✗
FISTEL	✗	✗	✓	✗	✗
CONDECINE	✓	✗	✓	✓	✗

Source: Deloitte analysis.

Table 3

120. IMF (2001): "Tax policy for developing countries".
121. https://www.imf.org/external/np/pp/eng/2011/030811.pdf.
122. See IMF (2001): "Tax policy for developing countries"; IMF (2011): "Revenue Mobilization in Developing Countries"; and ITU (2015): "ICT regulation toolkit", http://www.ictregulationtoolkit.org/5.5.

As shown in Table 3, many of the taxes levied on the mobile sector in Brazil do not appear to fully align with the key principles of efficient taxation, which has ramifications for the development of the sector and the wider economy.

Ensuring a broad base to any tax or fee is important for minimising distortions to economic activity. Although most of the standard taxes have a broad base, the sector-specific taxes and regulatory fees such as FUST and FUNTTEL, by their nature, do not.

Only the limited ICMS reduction for mobile broadband can be characterised as accounting for externalities, that is to say, spillovers to third parties who are neither direct consumers nor producers of mobile services. Sector-specific taxes, however, discourage consumption of mobile services, which have been shown to produce positive externalities. In economic theory, positive externality goods and services should be complemented with tax and regulatory policy that encourage consumption so as to realise the full potential social benefits.

It is important that taxes and regulatory fees are simple and enforceable. This minimises the cost of compliance and administration costs for companies and it also reduces the cost of enforcing and collecting the tax or fee for the government. Taxes and regulatory fees that are not uniform across product group or industries such as ICMS, or those that are deemed complex such as the IOF, violate this principle of best practice.

Further, tax policy should aim to encourage competition and investment, or at a minimum not discourage it. Standard corporation tax is a good example of a tax that accomplishes this. It taxes profits and thereby provides incentive to invest any surplus funds before they are counted as profit. In contrast, taxes and regulatory fees on revenues discourage competition and investment as they reduce companies' ability to invest and finance themselves. In Brazil, these taxes and regulatory fees include FUST, FUNTTEL and FISTEL and the impact of their abolition on macroeconomic and sector variables, including investment, is modelled in the section 3.

In addition, taxes that are not equitable to consumers at the lower end of the income distribution impose a social cost as they can prevent poorer consumers from having access to otherwise ubiquitous goods and services. Ad valorem sales taxes such as the ICMS fall into this category. This is because for a given amount of good or service, poorer consumers must pay a higher proportion of their income in tax.

In particular, those taxes and regulatory fees that are sector-specific have the highest negative impact and lack of alignment with the established principles of taxation:

- **Sector-specific taxes such as regional ICMS surcharges increase the affordability barrier to access and hit the poorest consumers hardest:** Brazilian mobile consumers in many states are subject to sector-specific taxes, in the form of increased ICMS rates. These taxes and regulatory fees are not broad-based as it is specific to the consumption of mobile services and sales, which may distort consumers' purchasing decisions. By potentially increasing the final price of mobile services, it creates a barrier to affordability and to mobile access. This barrier is greater for low income consumers and therefore risks excluding them from the benefits of mobile and the internet.

- **Sector-specific taxes and regulatory fees fail to account for positive externalities and discourage consumption:** In addition to the ICMS, mobile is subject to a number of sector-specific regulatory fees such as the FUNTTEL or FISTEL. Mobile may have positive impacts on the wider economy through positive spillover effects and facilitation of innovation and productivity in other sectors such as agriculture, healthcare and education. Furthermore, higher taxation on goods and services is typically applied by governments on goods such as alcohol and tobacco, which are recognised to provide certain negative externalities on societies, and of which governments seek to discourage consumption. Taxing mobile in a disproportionate manner could be taken as a signal that the government wishes to discourage rather than encourage consumption.

- **Revenue taxes such as the FUST and FUNTTEL contributions are non-transparent and discourage investment:** these levies are non-itemisable and mobile operators must therefore either suffer a consistent reduction in their profitability or pass these taxes and regulatory fees through to consumers in a non-transparent way. Further, taxes

applied on gross revenues directly reduce the profitability of all operators, independently of their level of investment, and may thus distort investment decisions. In a given year, these taxes have the same effect on operators with positive profits and operators with no profits due to recent network investment.

- **Regulatory fees could distort operators' investment decisions:** FISTEL payments represent 14% of operators' revenues and are one of the key determinants of investment in the sector. Regulatory fees could negatively affect the roll-out of network infrastructure,[123] through reduced incentives to invest due to lower returns on the capital employed. Other investment impacts of the fees include increased uncertainty on future tax liability, which is likely to impact investment decisions, and distortions across industries and within ICT sector due to higher costs for mobile operators, further driving (local and foreign) investment away from mobile.

- **The complexity of the Brazilian taxation code may reduce mobile operators' investment resources:** the complexity of the code, which translates into high compliance hours, forces mobile operators to allocate resources to tax compliance rather than investment. This further distorts investment decisions and reinforces the adverse impact of regulatory fees.

The potential inefficiencies created by these various mobile taxation issues may not only limit the development of the mobile sector, but also hinder economic growth and the realisation of the positive externalities created by mobile services.

123. Gorecki, Hennessy, Lyons (2011): "How impact fees and local planning regulation can influence deployment of telecoms infrastructure".

3. Economic impacts of reforming mobile taxation in Brazil

This section discusses the impacts of reforming taxation through three tax policy changes, using a combination of qualitative evidence and a quantitative model of the mobile sector and its impact on the wider economy in Brazil.[124]

3.1 How mobile taxation in Brazil impacts the economy

By reforming mobile taxation and transitioning to a more balanced taxation structure where mobile is taxed similarly to other standard goods and services, the government of Brazil can promote the agenda of the National Broadband Plan and the Comprehensive Growth Strategy and move towards an inclusive, knowledge-based competitive economy, while potentially benefitting from increased tax revenues in the short-term as a result of the additional GDP growth.

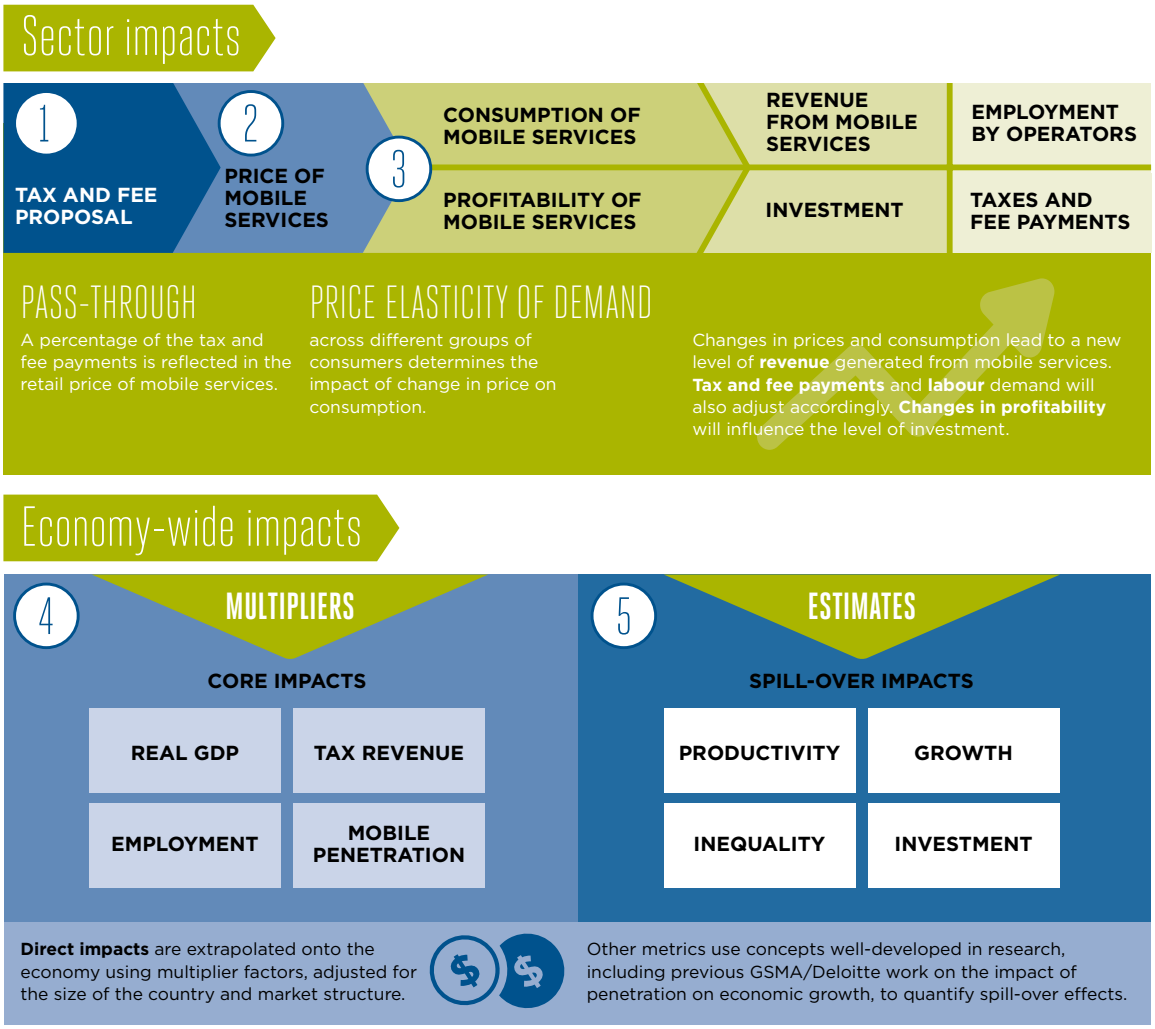
The government recognised the principle of tax reduction on mobile in 2014, when the two FISTEL fees on M2M connections were reduced by 86% and 79% (effective as of May 2015). Between the second quarters of 2014 and 2015, the number of M2M SIM cards grew by 1.5 million connections, an increase of 17%.[125] Brazil is currently the fourth largest M2M market worldwide and further tax reductions could support the sector's contribution to economic and social growth.

To estimate the quantitative impacts of tax reform, an economic model of the Brazilian economy and mobile sector was constructed, using sector-specific data from the GSMA and mobile operators in Brazil, together with macroeconomic data from the IMF and the World Bank. This allows the model to represent both the mobile sector and its impacts on the economy as a whole. This approach also enables comparison between a base case that uses current projections for the sector and several tax reduction scenarios; other potential impacts on the sector that may arise from the government's current reform programme are not explicitly modelled but may have been considered in projections by the GSMA or third party sources and would therefore be taken into account in the base case. The policy reform scenarios were estimated separately and their interactions are not considered.

Figure 11 illustrates the impacts of tax reform on key economic and sector variables.

124. As a result of data constraints and a high volatility of forecasted nominal USD:BRL exchange rate, monetary variables are estimated in local currency at 2014 prices.
125. GSMA/Deloitte (2014): "Taxation on IoT services".

Schematics for modelling the economic impacts of mobile taxation changes



Source: Deloitte analysis

Figure 11

The modelling involves several steps which encompass the impacts outlined in figure 12:

1. The level of taxation and regulatory fees applied to the mobile sector are reflected in the retail prices operators charge for using their services. Therefore, a change in taxation or regulatory fees will lead to a change in the retail price of mobile services. A pass-through rate represents the percentage of the tax and fee payments which is reflected in the retail price of mobile services.

2. The price of mobile services determines the demand and therefore the aggregate consumption of mobile services. The price elasticity of demand describes the responsiveness of demand to a change in the price, and is defined as the percentage change in demand resulting from a given percentage change in price.

3. Changes in the level of consumption of mobile services lead to a new level of revenue generated by operators, which changes the level of taxes and fee payments and labour demand accordingly.

4. These changes to the mobile sector lead to direct impacts on value-add and employment and, through spillover effects, on the wider economy, in particular on real GDP, tax revenues, employment and investment.

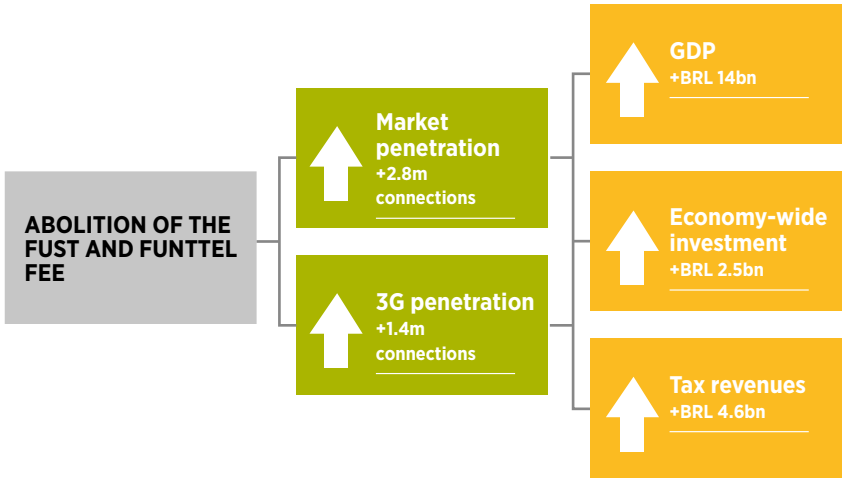
5. An elasticity determines the impact of a change in mobile penetration on GDP growth. Multipliers are assumed which allow changes in mobile sector employment to affect the wider Brazilian labour force. Productivity is calculated using the total factor productivity impact, described in the appendix.

The tax payments data provided by the operators refer to 2014. The modelled impacts therefore do not account for taxation changes that came into effect in 2015. These include an increase in PIS and COFINS rates on imports, effective as of 1 May 2015. Instead, the base case scenario assumes that PIS and COFINS rates on imports stand at 1.65% and 7.60%, respectively. These two payments combined amounted to 3% of total tax payments in 2014 and their limited increase is therefore unlikely to make a significant difference to the estimates presented in this study.

3.2 Abolition of sector-specific FUST and FUNTTEL fees

FUST and FUNTTEL are levied on gross usage revenue from mobile services at 1% and 0.5%, respectively. Combined, they represent a relatively low proportion of 2.8% of total tax payments. However, the Brazilian mobile market is competitive and the price sensitivity of the demand for mobile services is relatively high in Brazil, compared to other developing countries,[126] which means that consumers are expected to change their consumption levels in response to even relatively small changes in prices. As such, even a small reduction in the tax burden could, if passed on to prices, potentially yield economic benefits through greater usage. The tax reform could have the following impacts:

Potential economic impact in 2020 of an abolition of the FUST and FUNTTEL fees, relative to the base case scenario



Source: Deloitte analysis based on operator, GSMA Intelligence, IMF and World Bank data. Values are in 2014 prices.

Figure 12

- In 2020, additional demand for mobile services, brought about by the tax reform, could potentially increase total connections by up to 2.8 million, constituting a 0.8% increase in penetration. Of these, about half is estimated to be 2G connections while the remaining 1.4 million would be 3G connections.
- The total impact of the increase in mobile ownership and usage may potentially increase economic growth: GDP growth in 2020 could rise from 2.40% to 2.46%, a 2.6% increase.[127] This means an extra BRL 14 billion of GDP and BRL 2.5 billion of economy-wide investment.
- Despite the initial tax reduction of BRL 770 million, increased economic growth could potentially support government tax neutrality within a limited period[128] and bring an extra BRL 4.6 billion into the government budget in 2020 if the reform is introduced in 2016.

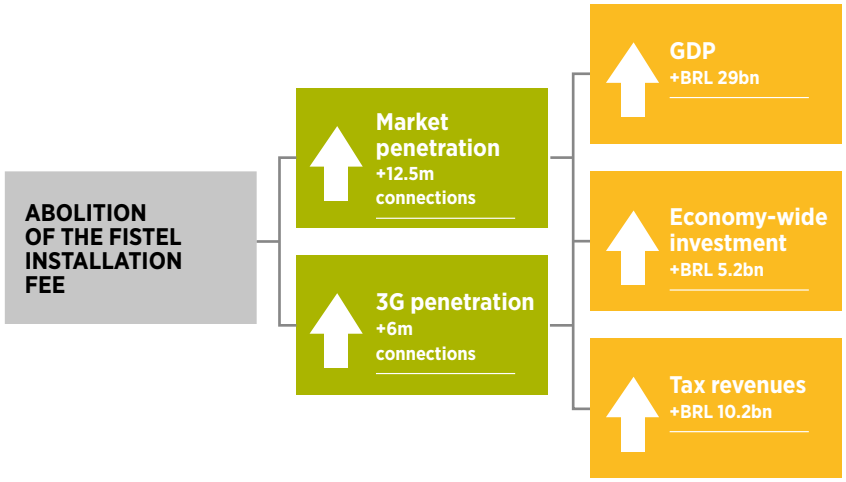
The abolition of the FUST and FUNTTEL fees has the potential to encourage consumption and increase access to mobile services. The resulting promotion of mobile penetration could potentially also foster economic growth.

126. Baigorri and Maldonado (2010); UK Competition Commission (2003); Gruber and Kontroupis (2010): "Mobile telecommunications and the impact on economic development"; Wheatley, J. J. (1998): "Price elasticities for telecommunication services with reference to developing countries"; GSMA (2005): "Tax and the digital divide: How new approaches to mobile taxation can connect the unconnected." London: GSMA.
127. This is a compound annual growth rate over the estimation period, i.e. 2016 to 2020, based on an IMF forecast.
128. The scenario analysis suggests tax neutrality could be achieved from the second year the change is implemented, and this assumes an immediate change in price and consumer behaviour. In practice, there are reasons to caution that this may take longer as consumers adjust their behaviours.

3.3 Abolition of sector-specific FISTEL Installation fee

Operators are required to pay FISTEL Installation fee on new connections and base stations. The fees are set as a fixed nominal amount of BRL 26.83 (US$ 8.3) per a new SIM card and BRL 1,340.8 (US$ 412.6) per a new mobile station. A reduced rate of BRL 5.68 (US$ 1.75) applies to M2M connections since May 2014. The Installation payments totalled 1% of overall tax payments of the mobile sector in 2014. However, since the Installation fee is exclusively levied on new connections, the impact of its abolition is assumed to concentrate on ownership of mobile services as opposed to being distributed among ownership and usage as was the case under scenario 1. As a result, the connection impact of scenario 2 is larger than that of scenario 1. The abolition of the Installation fee is estimated to have the following impact:

Potential economic impact in 2020 of an abolition of the FISTEL Installation fee, relative to the base case scenario



Source: Deloitte analysis based on operator, GSMA Intelligence, IMF and World Bank data. Values are in 2014 prices.

Figure 13

- In 2020, the tax reform could potentially add up to 12.5 million connections, representing a 3.6% increase in mobile penetration. About 6 million of these could be in 3G connections, while the remaining 6.5 million would be for 2G connections.
- Increased demand for mobile goods and services may potentially add an extra BRL 29 billion to the GDP in 2020, with GDP growth rising from 2.40% to 2.53%, a 5.3% increase.[129] In the wider Brazilian economy, the lower taxation could also incentivise investment of up to BRL 5.2 million.
- Mobile revenues net of taxes and regulatory fees could potentially increase by up to BRL 249 million in 2020 while the government tax revenues may potentially grow by BRL 10.2 billion. The initial tax reduction of BRL 199 million could thus be eliminated within a limited period of time[130] and followed by a revenue surplus relative to the base case scenario of no taxation reform.

The abolition of the FISTEL Installation fee could promote digital inclusion and ownership of mobile devices. The positive externalities associated with mobile connectivity may then, in the short- to medium-term, potentially stimulate economic growth and raise government revenue above the levels of the base case scenario.

129. This is a compound annual growth rate over the estimation period, i.e. 2016 to 2020, based on an IMF forecast.
130. The scenario analysis suggests tax neutrality could be achieved from the second year the change is implemented, and this assumes an immediate change in price and consumer behaviour. In practice, there are reasons to caution that this may take longer as consumers adjust their behaviours.

3.4 Aligning the ICMS on mobile service with that on other standard goods and services

The average sector-specific rate of the ICMS of 27% is 50% higher than the average rate of 18% applicable to other standard goods and services. States Pará, São Paulo, and the Federal District, however, apply limited regional exemptions to reduce the average rate for mobile broadband.

In the Latin American region, a sector-specific VAT rate applies in Argentina where mobile is subject to 27% VAT tax while other standard goods and services are taxed at 21%. Three countries in the region also levy a luxury excise tax on mobile voice and SMS. These include a 4.2% tax in Argentina, 4% excise in Colombia and 3.0% levy in Mexico. However, other countries in the region, such as Chile and Uruguay, subject mobile to neither excise taxes nor a sector-specific VAT. As a result, mobile operators in Brazil pay 31% of sector revenues in consumer taxes, which is the highest proportion in Latin America.[131]

Aligning the sector-specific value-added sales tax with the best practice taxation principles across all mobile services and across all states would rectify any potential distortions in consumers' and producers' incentives. Once introduced, the tax reform could potentially increase revenues not only for the mobile sector but also for the government through higher productivity and stronger economic growth.

131. Deloitte analysis based on operator data.

4. Mobile taxation in Brazil: potential for reform

The Brazilian economy has been in an economic recession as of Q1 2015[132] and GDP is forecasted to contract by a further one percent in 2016.[133] Despite the negative outlook and uncertainty about solutions to economic challenges, the telecommunications industry remains attractive to investors[134] and can continue to contribute to the Brazilian economy and society.

However, the mobile industry in Brazil is subject to a relatively high level of taxation with 48% of market revenues being paid in taxes and regulatory fees. In particular, sector-specific taxes, called "excessive" by a former Brazilian Minister of Communications, Paulo Bernardo,[135] may reduce investment opportunities in the sector and, as such, may prevent the positive spillover effects of digital inclusion from materialising. Some countries raised sector-specific taxes in response to the fiscal pressures brought about by the economic crisis. Apart from limiting the benefits of mobile consumption, these increases expose government to further risks. For example, in Hungary a proposed introduction of an internet tax was met with social unrest.[136]

A reform of mobile taxation, however, has the potential to stimulate demand for mobile services, thereby enhancing investment and employment opportunities in the sector as well as in the wider economy.

4.1 Contribution to fiscal stability

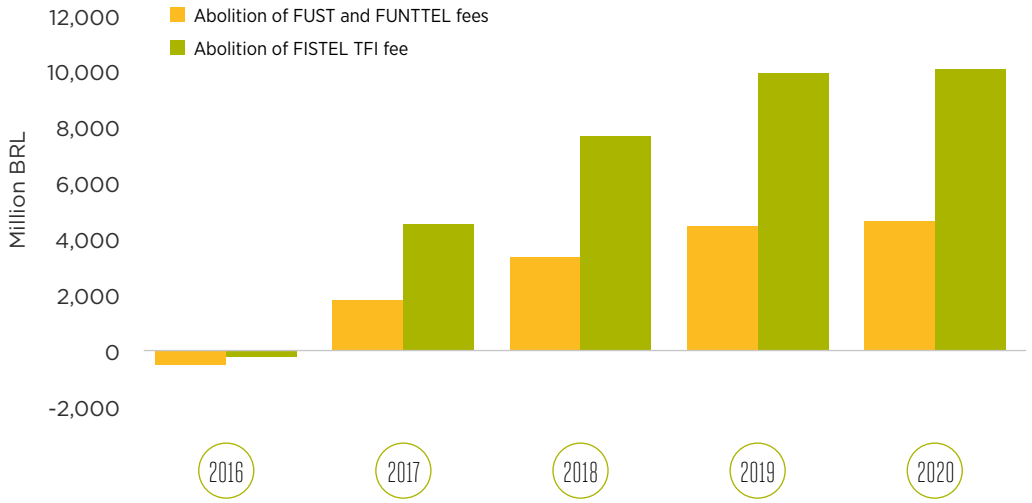
Total taxes and regulatory fees on mobile consumers and operators in Brazil add to the cost of owning and using a phone and investing in mobile networks. Reducing the level of taxation on the mobile sector may negatively impact government revenues initially. However, by increasing mobile penetration and promoting economic growth, reducing the taxation on mobile could also increase the tax base, and generate additional economic growth, presenting the potential for the government to recover these revenues, potentially in a limited period of time, subject to the time taken for changes in consumer behaviour.

The additional economic growth arising from the abolition of sector-specific FUST and FUNTTEL fees could create additional tax revenue for the government in the short term. Tax neutrality under this scenario could potentially be achieved in a limited period if the reform is implemented in 2016.[137]

The impact on government revenues of the tax policy alternatives analysed in this report are illustrated in Figure 14. The impacts of each policy are estimated independently and their interaction is not considered.

132. http://www.wsj.com/articles/brazil-gdp-slips-for-third-consecutive-quarter-1448970368.
133. IMF (November 2015): "World Economic Outlook: Adjusting to Lower Commodity Prices".
134. http://www.ft.com/cms/s/0/247bf6fe-d3e2-11e4-99bd-00144feab7de.html#axzz3xaTffz20.
135. http://www.marketwatch.com/story/brazilian-official-phone-taxes-are-excessive-2012-08-27.
136. http://www.bbc.co.uk/news/world-europe-29783253
137. The scenario analysis suggests that under both tax changes tax neutrality could be achieved from the second year the change is implemented, and this assumes an immediate change in price and consumer behaviour. In practice, there are reasons to caution that this may take longer as consumers adjust their behaviours.

Potential additional tax revenues compared to the base case under tax policy alternatives (BRL millions, year on year differences)



Source: Deloitte analysis based on operator, GSMA Intelligence, IMF and World Bank data. Values are in 2014 prices

Figure 14

4.2 Options to align mobile taxation to standard goods taxation

By transitioning to a taxation structure where mobile is taxed similarly to other goods and sectors, the government of Brazil can promote digital inclusion, increase productivity and generate economic growth, whilst also benefitting from increased tax revenues. This could produce positive spillovers throughout the Brazilian economy and society: the government, mobile operators, consumers and the economy as a whole. Moreover, the subsequent spread of mobile services could contribute to the economic and social objectives of Brazil, improving access to life-enhancing services such as education and health applications and facilitating the country's transition to a knowledge-based economy.

In interviews with mobile operators, they recognised the sector's role in supporting Brazilian government revenues and in contributing to public services. However, while higher than standard taxation on the mobile sector can potentially deliver short-term benefits to the government, it would need to be balanced with the impacts on the cost of long-run socioeconomic development. Evidence from other developing countries shows that different interventions on the taxation regime could have the effect of enhancing the consumption of mobile services:

- The elimination of an airtime tax by the Uruguayan government in 2007 has been followed by a fall in price by over two thirds in the following year. In parallel, connections penetrations more than doubled from 65% in 2006 to 140% in 2011. Alongside increased penetration, mobile usage rose from just under 400 minutes per subscriber per year in 2006 to 1,600 in 2011;[138]

- In 2008, the Ecuadorian government has abolished a telecommunications excise tax that applied on mobile usage and subscriptions. The elimination of this sector-specific tax has been accompanied by an increase of mobile penetration from 70% in 2007 to over 110% in 2012. Moreover, the cost per minute of calls has fallen by 63%, while there has been a 133% increase in minutes of usage per user per month;[139]

138. GSMA and Deloitte (2012): "Mobile telephony and taxation in Latin America".
139. GSMA and Deloitte, ibid.

- A recent report by Deloitte and the GSMA on mobile sector taxation in Mexico has estimated that a reduction of the Impuesto Especial sobre Produccion y Servicios (IEPS), a tax on mobile airtime, from 3% to 1.5% could potentially lead to an increase in 1.1 million connections, US$ 2,227 million in GDP and 15,000 jobs by 2020. The government has recognised these impacts and has announced that a reduction in IEPS will be brought to the parliamentary agenda in 2016.[140]

By working in partnership with the mobile operators to minimise the distortions and inefficiencies created by sector-specific taxation, the Brazilian government has the opportunity to make progress on its key ICT and development ambitions:

Support in the transition towards a knowledge-based economy: By reducing sector-specific taxation, such as the Installation fee on new connections, the government could increase the number of mobile connections, promoting digital inclusion. This has the potential to enable the widespread use of information and communication technologies across areas such as agriculture, healthcare, and education. This has in turn the potential to create new opportunities for innovation and the development of new applications and content, promoting higher-skilled employment and the transition to a knowledge-based economy.

Increased economic development: Based on the modelling described above, the tax reform alternativesexamined have the potential to increase the usage of mobile services and uptake of mobile broadband. The improvement in digital inclusion may potentially generate BRL 29 billion of additional GDP and BRL 5.2 billion of additional economy-wide investment in 2020 if the sector-specific FISTEL Installation fee were abolished.

Improved network infrastructure: Ensuring an equitable structure of regulatory fees has the potential to increase the investment required to further improve mobile broadband network infrastructure. Further international investment could facilitate the spread of mobile broadband and its positive spillover effects.

Sustainable government revenues: Achieving the government's ICT objectives could potentially be achieved without a reduction in government revenues in the medium to long term. By increasing productivity and economic growth, tax neutrality could be achieved within a limited period of time after the sector-specific FUST and FUNTTEL fees are eliminated through the expansion of the tax base. The additional economic growth arising from the abolition of sector-specific FUST and FUNTTEL fees could create additional tax revenue for the government in the medium term. Tax neutrality under this scenario could potentially be achieved in a limited period following the introduction of the tax reform.

Based on evidence from a series of studies[141] and the best practice principles outlined in Table 3,[142] as well as on consultation with the GSMA and mobile operators, a number of areas for tax reform have been identified which could support the mobile sector to further contribute to economic growth and government revenues over and above its current impact:

Reduce specific taxation of the mobile sector: Those taxes and regulatory fees that are charged exclusively to the sector over and above general taxation may create economic distortions, potentially affecting service prices and investment levels. Reducing these sector-specific taxes has the potential to lead to increases in penetration and usage. By extending the user and tax base, reductions in taxation could have a neutral or positive impact on government revenues in the medium to long term. Phased reductions of sector-specific taxes and regulatory fees can represent an effective way for governments to signal their support to the connectivity agenda, to benefit from economic growth resulting from the reductions, and to limit short-term fiscal costs.

140. GSMA and Deloitte (2015): "Digital inclusion and mobile sector taxation in Mexico". And, Convergencia Latina, 2015. IEPS reductions, brought to the parliamentary agenda 2016 [Online]. Available from: http://www. convergencialatina.com/News-Detail/175137-6-20-IEPS_reductions_brought_to_the_parliamentary_agenda_2016?Lang=EN&SMMK=3590.649%E2%80%A6.
141. GSMA/Deloitte, studies on digital inclusion and mobile taxation in Ghana, Tanzania, Pakistan; GSMA/Deloitte (2014): "Mobile taxes and Fees - A Toolkit of Principles and Evidence".
142. IMF (2001): "Tax policy for developing countries".

Facilitate the development of emerging services through supportive taxation: The growth of mobile data and other innovative applications opens up the possibility for the sector to increase its economic value through a whole new generation of products and services ranging from health care services to education and finance. While this has already been recognised in regional exemptions of specific mobile broadband services from ICMS and in the Federal reduction in the FISTEL fees for M2M SIM cards, more could be done on the Federal level.

Streamline tax regulations, reduce complexity and reduce uncertainty over tax implementation: The Brazilian taxation system is complex, relative to other systems in Latin America and in the BRICS group. The complexity translates into 2,600 hours required by a medium-size Brazilian company to comply with the tax legislation.[143] The administrative burden diverts financial and human resources from investment to compliance, thereby potentially distorting companies' investment decisions. Inefficient tax practices raise compliance costs for businesses and forces them to divert scarce resources from more productive uses towards tax administration issues. This may constrain innovation and competition, limiting the performance of the economy.

143. World Bank/PWC (2015): "Paying Taxes 2016".

Methodology

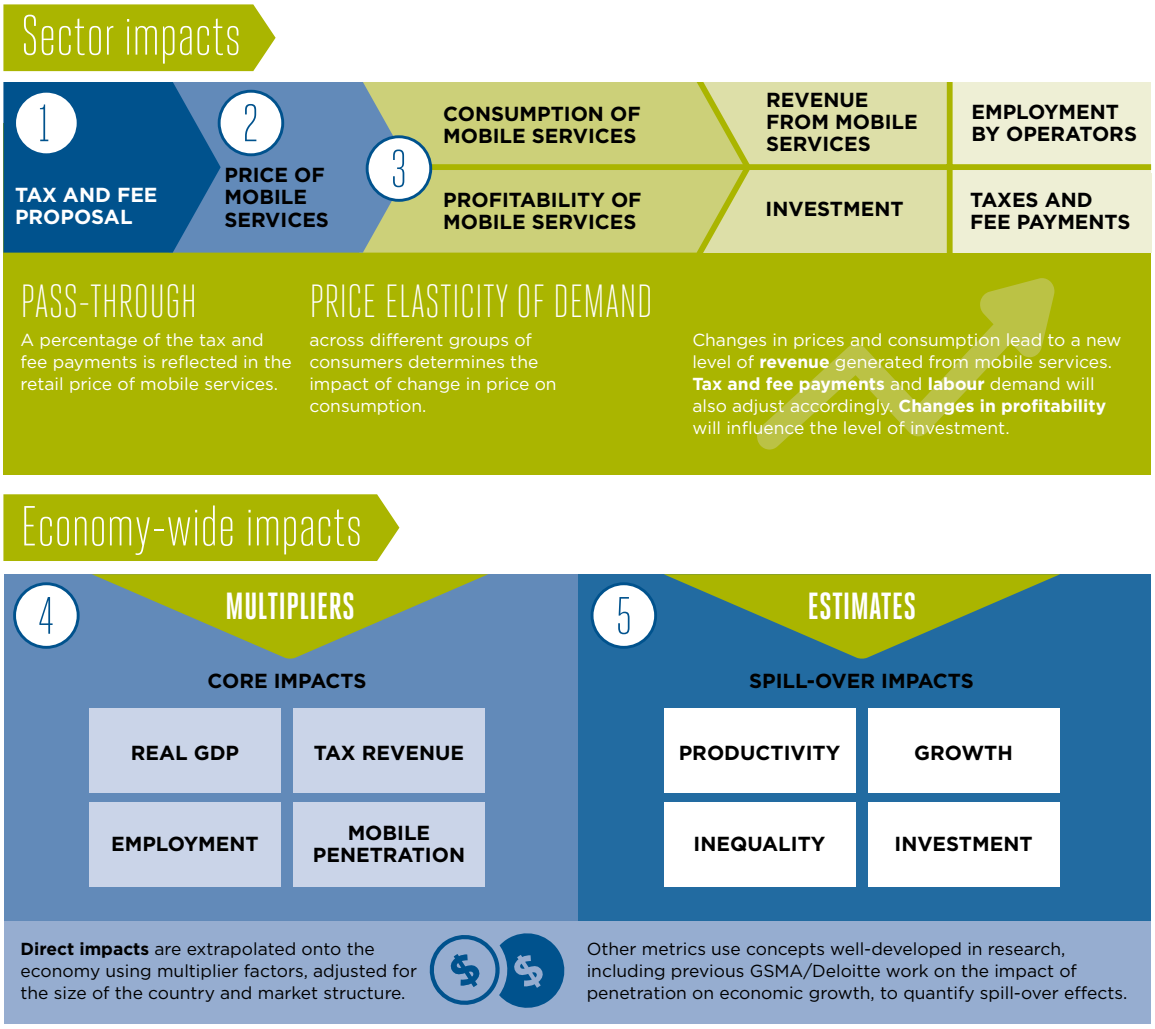
A.1 Estimation of the economic impact of a tax change

In order to conduct the tax scenario analysis, an economic model was created to describe the mobile sector and the macro-economy of Brazil. This model estimates the impacts of more than 25 sector-specific and macroeconomic variables up to 2020, which can be driven either by removing or changing current taxes and regulatory fees or by the introduction of a new tax or fee.

Firstly, a base case scenario is developed for the mobile sector and economy, where taxes and regulatory fees remain at their current level throughout the period 2016-2020. Then, a simulation of alternative policy scenarios quantifies the economic impact of reformed mobile sector taxation. It is assumed that the tax policy is implemented in 2016 and the model estimates the effects up to 2020. The impacts of each policy are estimated independently and their interaction is not considered.

Modelling the macroeconomic impact of changes to mobile taxation in Brazil
As illustrated in Figure 15, the following steps are involved in the modelling process:

Schematics for modelling the economic impacts of mobile taxation changes



Source: Deloitte analysis

Figure 15

- The tax or fee change affects the price of mobile services. This depends on the extent to which the tax reduction is passed on to consumers, modelled by a pass-through rate which determines the percentage of the tax and fee payments that is reflected in the retail price of mobile services. All assumptions in the model are described in more detail in the section below.
- Changes to the price of mobile services affect their consumption. In order to estimate this, assumptions are made on the price elasticity of demand[144], which measures how much demand for mobile services will change in response to a price change.
- Changes in prices and consumption alter the amount of revenue generated from mobile services. Increased demand generates additional employment opportunities in the sector, while increased operator revenues enable additional capital expenditure on the development of network infrastructure.
- These sector impacts lead to economy-wide impacts, which are estimated through assumptions that describe the impact of the mobile sector on the wider Brazilian economy. These effects include the impact on GDP, calculated through a multiplier that links mobile and 3G penetration rates to economic growth, and the effect on employment, calculated

144. An elasticity describes the quantitative impact of a variable on another variable; the usual notation is that a 1% increase in a variable will lead to an x% change in another variable.

through a multiplier, which estimates the number of jobs created across the economy for every job created within the telecom sector. The proliferation of mobile services is captured by an increase in productivity, quantified through the change in Total Factor Productivity (TFP).

- Thanks to additional GDP growth from reformed taxation on mobile, the potential short-term loss of tax revenues from the mobile industry can be offset by tax revenues from more broad-based consumer and operator taxes.

The inputs for the model are provided by operators in Brazil, the GSMA[145] and publicly available statistics from the World Bank and the IMF and include forecasts for 2015 and subsequent years. The outputs are derived based on estimates of the elasticity of demand for mobile services from a number of developing markets, while the impacts of mobile and internet penetration on GDP have been derived from econometric studies of similar developing markets. In order to avoid confounding various sources of nominal variations, the Brazilian country study estimates monetary variables in local currency 2014 values.

A.2 Key assumptions behind the model

The assumptions underlying the model have been researched from a review of academic literature and previous studies in this area. These are discussed in more detail below.

Pass-through rates

Taxes and regulatory fees paid by mobile operators and consumers may be completely or partly passed-through to the end-consumer prices. The level of pass-through of taxes and regulatory fees to final prices will depend on market power and the price elasticity of demand, among other factors. For this analysis, an average pass-through rate of 75% has been assumed for all taxes. These assumptions were based on market characteristics and Deloitte analysis of telecoms markets worldwide.

Price elasticity of demand

A change in the price of mobile services leads to a change in the consumption of these services, both in terms of ownership and usage. Consumption changes depend on the price elasticity of demand, that is, the responsiveness of consumers to price changes. The assumptions regarding elasticity of demand are based on a review of studies conducted in a number of developing markets on the elasticity rates observed. Given the level of market penetration and historical price developments in Brazil the elasticity of demand for mobile subscriptions is assumed to be -1.03.[146] For those that own mobile devices, demand for mobile services is more elastic: the elasticity of demand for mobile services is assumed to be -1.19, based on a number of studies within the field.[147]

145. Data from the GSMA Intelligence used in the text was downloaded on 7th March 2015 while data used for the modelling was downloaded on 9th November 2015.
146. Baigorri and Maldonado (2010); UK Competition Commission, 2003.
147. See, for example: Gruber and Kontroupis, 2010, Mobile telecommunications and the impact on economic development; Wheatley, J. J., 1998, Price elasticities for telecommunication services with reference to developing countries; GSMA, 2005, Tax and the digital divide: How new approaches to mobile taxation can connect the unconnected. London: GSMA.

Employment multiplier

The employment multiplier is used to estimate the impact of a change in employment in the sector on total employment in the economy. The magnitude depends on the economic features of the sector, such as the degree of interconnection across the supply chain and the openness of the economy. Based on the characteristics of the Brazilian mobile sector and the general economy the employment multiplier is assumed to be 6.21.[148] That is, for every additional job created within the mobile sector, an additional 6.21 jobs are generated in the wider Brazilian economy.

Market penetration Impact

There is substantial evidence in the literature on the impact of mobile penetration on GDP growth. Analysis conducted by the GSMA on the impact of mobile and 3G penetration on GDP growth estimated that a 1% increase in market penetration leads to an increase in GDP growth of 0.14 percentage points.[149] A similar impact was found by a World Bank study which estimated that a 1% increase in mobile penetration increases the GDP growth rate in developing countries by 0.112% percent.[150] This model does not consider switching between 2G and 3G services and so these impacts are treated separately.[151]

Total Factor Productivity Impact

The impact on TFP is calculated based on the change in GDP, employment and investment. TFP is a measure of economic productivity that accounts for changes in output over and above those expected as a result of increased employment and investment. It is defined as follows:

$$TFP = \frac{GDP}{Capital^{a} Labour^{\beta}}$$

where it is assumed that $a = 0.3$ and $\beta = 0.7$[152].

148. This figure was based on a number of studies conducted in developing and developed countries; see, for example, Moretti, 2010; O2 for ONS, 2002; Ovum, 2010; Zain, Ericsson, 2009; Kaliba et al, 2006.
149. This is based on a study of 40 economies over the period 1996-2011; for full details of the methodology, see http://www.gsma.com/publicpolicy/wp-content/uploads/2012/11/gsma-deloitte-impact-mobile-telephony-eco-nomic-growth.pdf.
150. Qiang, C. Z. W., Rossotto, C.M., 2009, Economic Impacts of Broadband, in Information and Communications for Development 2009: Extending Reach and Increasing Impact, World Bank, Washington D.C., 35-50.
151. That is, given that it is not known whether a new 3G subscriber may previously have been a mobile user, this is treated as an increase in internet penetration only, not as an increase in mobile and internet penetration.
152. Bassanini A and Scarpetta S, 2001, "The Driving Forces of Economic Growth: Panel Data Evidence for the OECD countries".

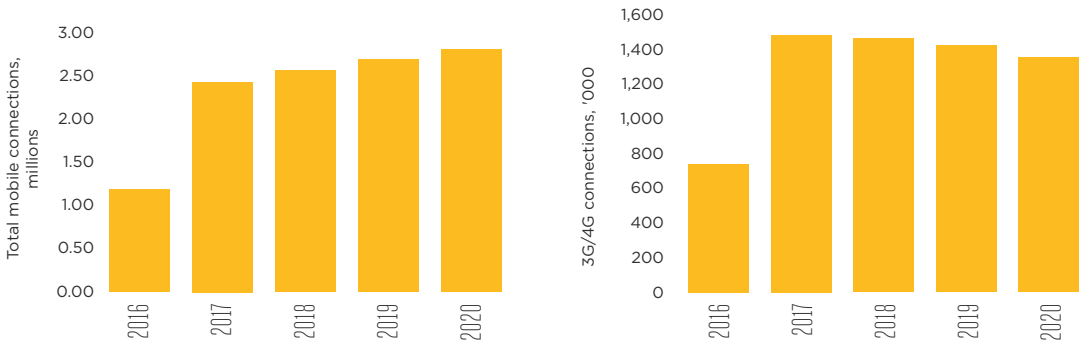
A.3 Scenario simulation results

This report uses a macroeconomic model in order to assess the impacts of a change in taxation policy on the mobile sector and the wider economy. Three scenarios were addressed and each compared against the base case scenario, where there is no change in tax policy. The overall findings of each scenario are described in more detail in the sections below, on the assumption that the change in tax policy is implemented in 2016.

Scenario 1

Scenario 1 estimates the impact of an abolition of the FUST and FUNTTEL fees, levied on gross revenue from mobile traffic. The potential change in mobile and 3G connections are shown in Figure 16.

Potential impact of total mobile penetration (left) and mobile broadband penetration (right) in Scenario 1 relative to the base case



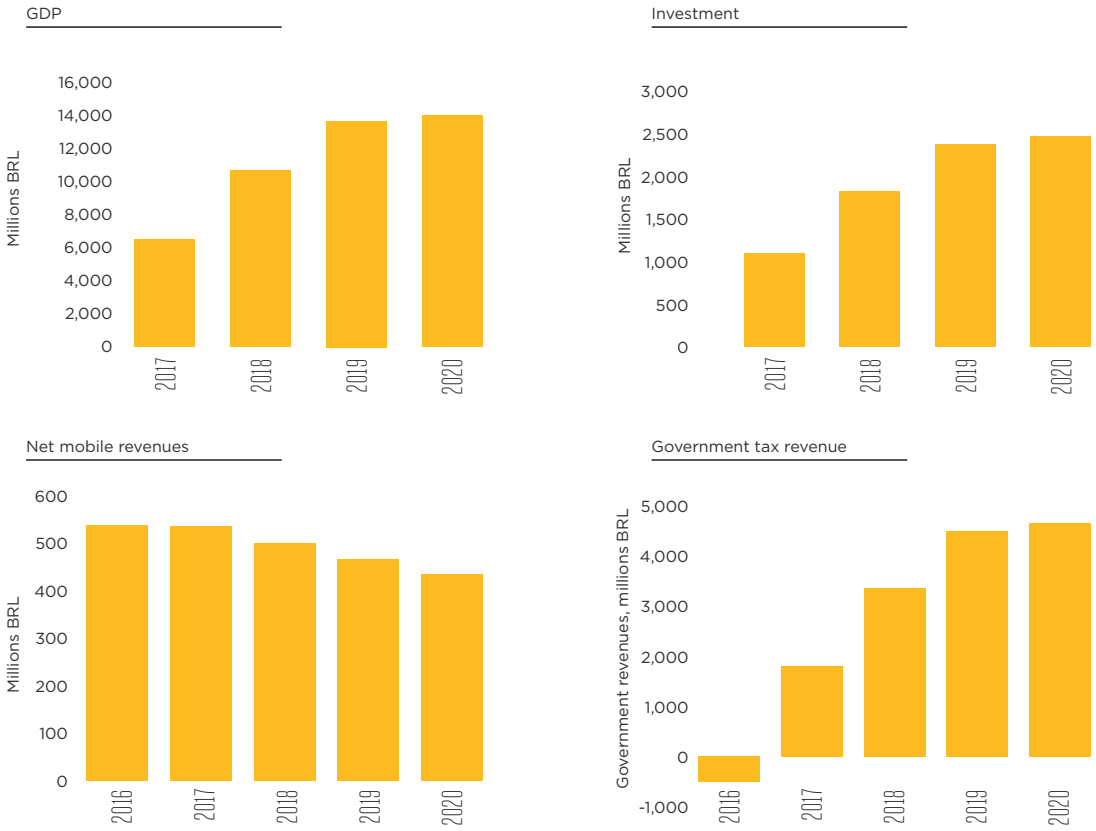
Source: Deloitte analysis based on operator, GSMA, IMF, and World Bank data, 2014 data. Values are in 2014 prices.

Figure 16

Mobile connections could increase by up to 2.8 million in 2020, constituting 0.8% increase in total market penetration relative to the base case scenario. The impact on mobile broadband connections could potentially reach up to 1.4 million 3G and 4G connections, which translates to about 0.8% increase in penetration.

Figure 17 presents the impacts of Scenario 1 on GDP, economy-wide investments, mobile sector revenues net of taxes, and government tax revenue. An employment impact was not estimated due to insufficient data.

Potential impact on macroeconomic indicators and government tax revenue in Scenario 1 relative to the base case



Source: Deloitte analysis based on operator, GSMA, IMF, and World Bank data, 2014 data. Values are in 2014 prices.

Figure 17

As a result of the tax cut, net sector revenue could increase by about BRL 432 million in 2020 relative to a no-tax reform base case. The positive externality of higher connectivity could benefit GDP by additional BRL 14bn in 2020, representing about 0.2% of the forecasted size of Brazilian economy. Economy-wide investment may potentially grow by up to BRL 2.5 billion as a result of the tax reform and, based on the modelled expansion of the economy, government tax revenue could increase by up to BRL 4.6 billion in 2020.

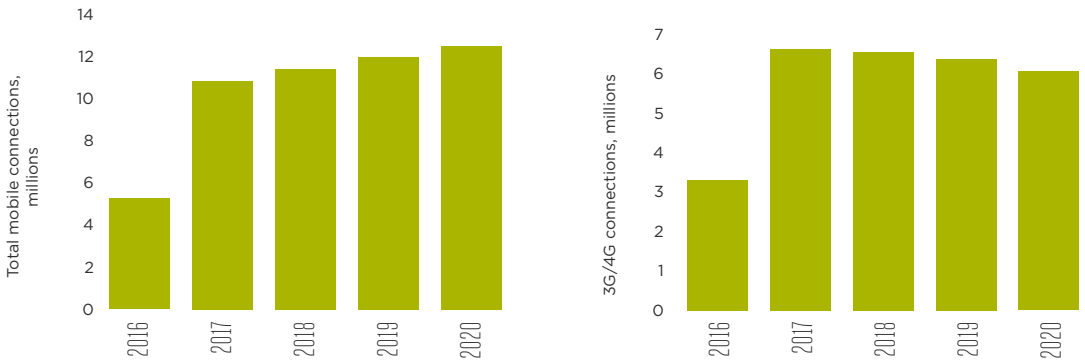
Tax neutrality is estimated to be achieved within a limited period of time[153] after the introduction of the tax reform, with the initial shortfall of BRL 504 million being compensated in the second year from the implementation.

153. The scenario analysis suggests tax neutrality could be achieved from the second year the change is implemented, and this assumes an immediate change in price and consumer behaviour. In practice, there are reasons to caution that this may take longer as consumers adjust their behaviours.

Scenario 2

Scenario 2 models an abolition of sector-specific FISTEL Installation fee on new connections and base stations. The impact on mobile and 3G/4G connections is presented in Figure 18.

Potential impact of total mobile penetration (left) and mobile broadband penetration (right) in Scenario 2 relative to the base case



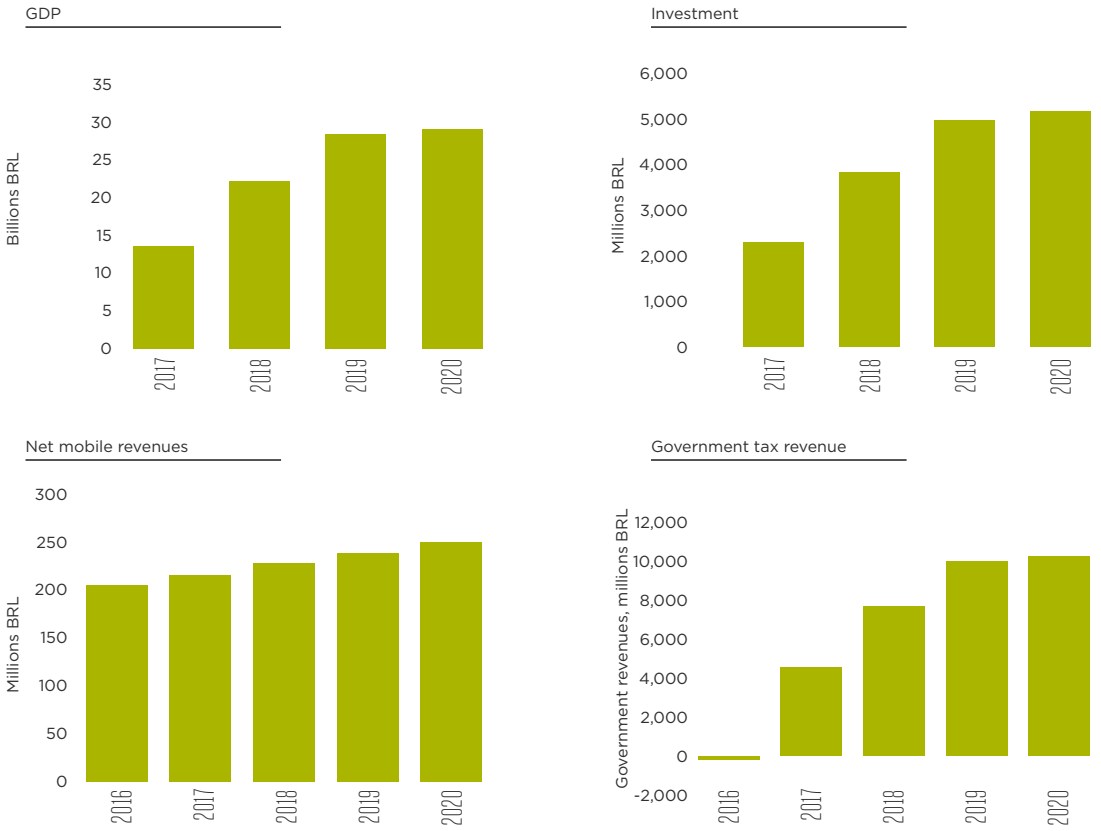
Source: Deloitte analysis based on operator, GSMA, IMF, and World Bank data, 2014 data. Values are in 2014 prices.

Figure 18

Total mobile connections could benefit from the tax cut by up to 12.5 million relative to the base case scenario, which translates into a 3.6% increase in market penetration. 3G and 4G connections could potentially grow by up to 6 million, representing a 3.7% growth compared to the base case.

Figure 17 shows the impacts of Scenario 2 on GDP, economy-wide investments, mobile sector revenues net of taxes, and government tax revenue. As in Scenario 1, the employment impact could not be modelled due to insufficient data.

Potential impact on macroeconomic indicators and government tax revenue in Scenario 2 relative to the base case



Source: Deloitte analysis based on operator, GSMA, IMF, and World Bank data, 2014 data. Values are in 2014 prices.

Figure 19

The positive spillover effects of the expansion in connectivity, potentially brought about by the abolition of the FISTEL fee on new connections, could bring up to 29.1 billion, or 0.5%, to GDP in 2020. The growth impact could stimulate additional economy-wide investment of BRL 5.1 billion in the same year relative to the base case scenario. Net sector revenue may potentially grow by almost BRL 250 million in 2020 with government collecting up to BRL 10.2 billion more in taxes compared to the base case of no tax cuts.

Similar to Scenario 1, tax neutrality could potentially be achieved within the second year from the implementation of the reform,[154] when tax receipts could exceed the base case by more than BRL 4.5 billion.

154. The scenario analysis suggests tax neutrality could be achieved from the second year the change is implemented, and this assumes an immediate change in price and consumer behaviour. In practice, there are reasons to caution that this may take longer as consumers adjust their behaviours.

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GSMA HEAD OFFICE
Floor 2
The Walbrook Building
25 Walbrook
London
EC4N 8AF
United Kingdom
Tel: +44 (0)207 356 0600
Fax: +44 (0)20 7356 0601