



OXFORD
ECONOMICS



ONE MILLION OPPORTUNITIES:

THE IMPACT OF MOBILE INTERNET ON THE ECONOMY OF SOUTHEAST ASIA

JUNE 2016



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EXECUTIVE SUMMARY

 **\$58.1 bn**
Boost to GDP in 2020.

Each percentage point increase in the penetration rate is forecast to add an extra US \$1.5 billion to Southeast Asian regional GDP by 2020.

 **1 m jobs**
Created by 2020.

Each percentage point increase in the penetration rate is forecast to add an extra 26,200 jobs in the formal sector by 2020.

 **1.3 m**
Primary school places potentially funded in 2020.

Economic activity would support sufficient government revenue to finance the primary school education of 1.3 million children across the region.

Mobile internet is transforming opportunities for people all over the world. This can be measured, not just in terms of increased consumer choice and convenience, but by a robust assessment of the economic value that the technology brings to economies—boosting GDP, creating jobs and driving social investment.

Asia is a global leader in mobile, with five out of the global top 10 markets in terms of smartphone penetration.¹ In Southeast Asia, mobile internet penetration has more than trebled since 2010. It reached 38 percent in 2014, in line with the global average despite lower incomes in many countries. In many Southeast Asian nations, mobile represents the sole means of connecting to the internet for the majority of the population.

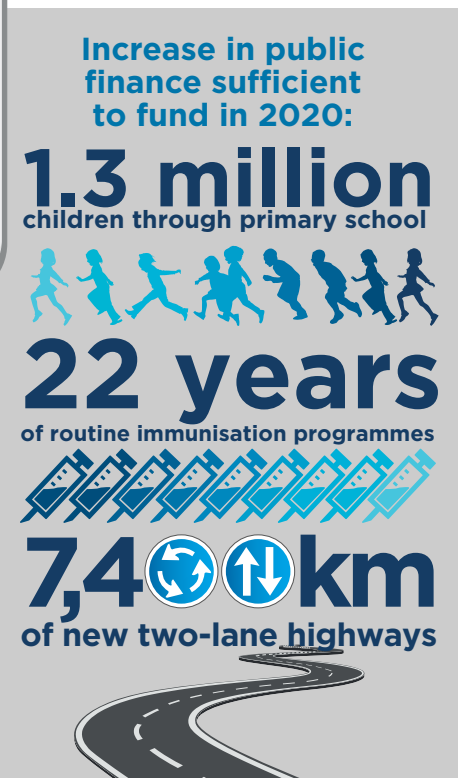
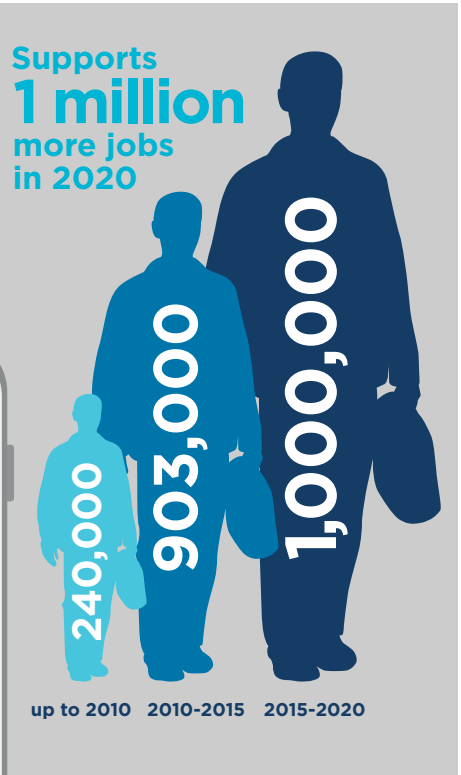
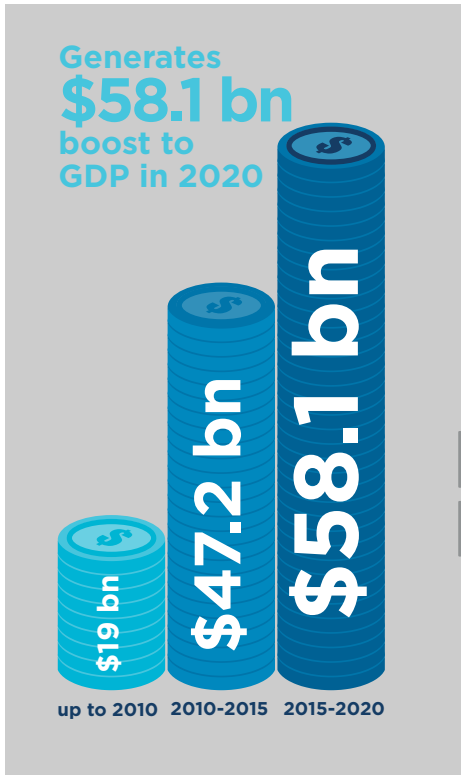
Going forward, the economic opportunity to be gained by embracing mobile internet is considerable. Already, since 2010 growth in the market has added US \$47.2 billion to regional GDP. In 2020, our forecasts suggest that GDP will be boosted by an additional US \$58.1 billion. And the potential impact is even greater: if countries in the region each improved their penetration rates by a further 10 percentage points—harnessing the potential through favourable investment and regulatory policies—the total economic prize would rise to US \$73.4 billion in GDP in 2020.

By increasing productivity and encouraging more people into the formal labour market, the region stands to gain one million extra jobs by 2020. This is on top of the similar number of jobs that have already been created by mobile to date.

Higher wages and profits as a result of the boost in GDP will be a boon to governments across the region. The increased incomes generated by higher mobile internet penetration will boost government revenues across Southeast Asia. How this extra money would be used is unknown, but in aggregate it would be sufficient to finance 1.3 million children through primary education, to fund the construction of 7,400 km of new two-lane highways or to support the cost of routine immunisation programmes across the region for 22 years.

Of course, disparities within the region are substantial, reflecting both underlying socioeconomic conditions and varying levels of investment to date. Over the next half-decade, growth in mobile internet penetration and the associated economic impact, will likely be led by those countries which have relatively underdeveloped but sizeable consumer markets—for example, Indonesia and the Philippines. The extent to which governments across the region seek to foster this economic opportunity will also play a decisive role.

IMPACT OF MOBILE INTERNET GROWTH IN SOUTHEAST ASIA



1. INTRODUCTION

Recent years have seen startling growth in the reach of mobile technology. Such growth has been truly ‘global’ with vast investment in mobile infrastructure, supporting increased network coverage across emerging markets in all six continents.² As a result of this growth, mobile internet has emerged as a revolutionary social phenomenon. Geographically, Asia has been an industry leader with the continent providing five of the top 10 global markets for smartphone penetration. As smartphones become ever more accessible, helped by the emergence of lower-cost models, consumers of all income levels are able to access the internet on mobile devices, increasingly from wherever they are in the world.³

Exemplifying this trend, global mobile broadband penetration—active mobile-broadband subscriptions per 100 inhabitants—has trebled since 2010, reaching just over 38 percent in 2014, the latest year for which data are available.⁴

These changes in the way that people access the internet are having an impact that extends far beyond matters of just convenience and consumer choice. Increasing mobile internet penetration rates are also driving economic growth and creating new jobs, the world over. In light of such striking growth, this paper is timely in attempting to systematically assess these wider economic and social implications.

Leveraging mobile internet technologies allows businesses to significantly increase their speed of communication and the sharing of ideas, especially in regions where traditional fixed internet connections are limited. Mobile internet also enables businesses to enjoy lower access costs to communications and information, allowing them to focus greater resources on other productive uses.⁵ Together these factors increase the speed and proficiency with which employees can complete tasks, resulting in a boost to overall labour productivity and hence the economy’s capacity to produce goods and services.

Online marketing also gives businesses instant national, regional and even global reach, helping them to identify new customers and grow their sales. This is especially helpful for small businesses whose customer base, otherwise, would be likely limited to the local area. Increasingly, people are looking for goods and services on the move and mobile technology helps connect them to businesses. In addition, online maps help people use their mobile to locate businesses near them, even when they are unfamiliar with the area, a trend that has particular relevance for the tourism sector.

The proliferation of mobile internet also has the effect of connecting more people with formal employment

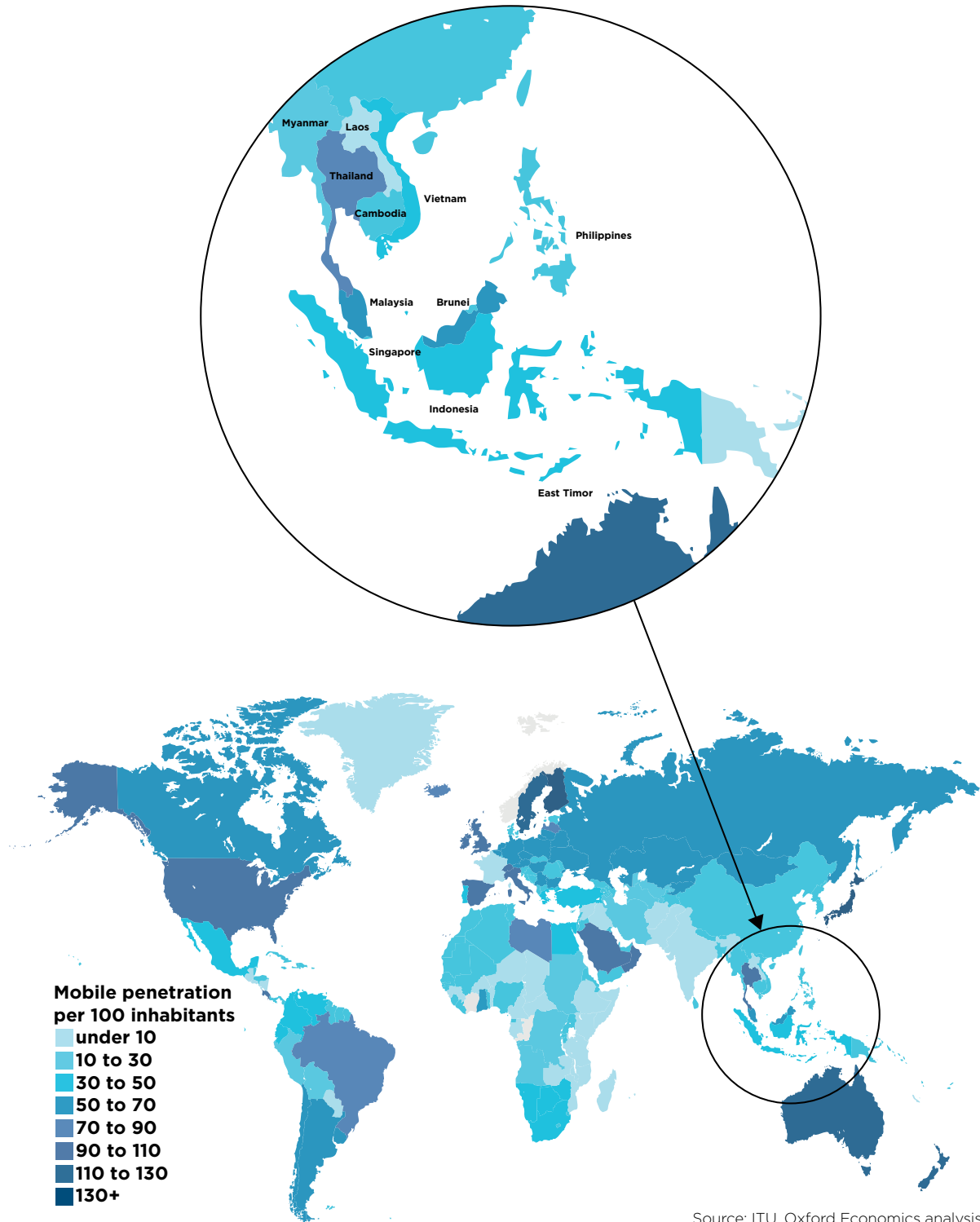
opportunities. This is especially the case in regions where traditional internet connections are limited, with mobile broadband connecting whole communities to the labour market.⁶

² For example, Grupe Special Mobile Association (GSMA) Intelligence estimate that the proportion of the global population covered by a 3G network rose from 43 percent in 2010 to 78 percent in 2015. GSMA Intelligence, “The Mobile Economy” (2015).

³ For example, the Android One smartphone has been progressively launched across a select group of emerging markets over the past two years. The device, typically priced at less than US \$100, has been designed to be affordable for the mass market in these countries.

⁴ Throughout this paper mobile internet penetration is defined as active mobile broadband subscriptions per 100 inhabitants. This is a count of the number of active subscriptions on mobile devices with access to data communications at broadband downstream speeds (256 kbits/second or higher). This global figure was calculated as a population-weighted average of countries for where data was available.

Fig. 1. Mobile broadband penetration in 2014



⁵ Survey evidence from Australia estimated a time saving of 2.3 percent and a cost saving of 1.4 percent from the adoption of mobile broadband technologies. Australian Communications and Media Authority, "The economic impacts of mobile broadband on the Australian economy, from 2006 to 2013" (2014). Academic evidence has identified that communication technologies reduce the cost of transmitting information in developing countries. A Bedi, "The Role of Information and Communication Technologies in Economic Development", ZEF Discussion Papers on Development Policy, 1999.
⁶ Evidence from South Africa identified very significant increases in employment due to the spread of information and communication technologies as they country developed. S Klonner and P Nolen, "Does ICT benefit the poor? Evidence from South Africa", World Bank, (2008).

The advent of mobile devices has transformed the way in which consumers and businesses operate, and as such, it has increased economic growth through productivity gains. Whilst the direct impact of mobile technology on economic growth has received wide interest, few econometric studies have tried to measure the effect of mobile phones on productivity. Our study seeks to ascertain the direct impact of mobile phone technology on productivity and labour participation.

We focus on the ability of mobile internet technology to enhance the economy's supply-side capacity and therefore harness faster long-term economic growth. Our research illustrates that mobile internet does so through two separate and important channels:

1. By increasing labour productivity, so that workers are able to produce more goods and services; and
2. By increasing the labour force participation rate, so that more people take jobs in the formal labour market, resulting in higher employment and output.

Having established these relationships we are able to apply them in order to quantify the economic impact of mobile internet technology both now and in the future. This impact is measured in terms of two main metrics:

1. The change in economic output as measured by Gross Domestic Product (GDP) expressed in US \$ at today's (2015) exchange rates and prices; and
2. The change in employment as measured by headcount jobs.

In addition, we are able to derive broad estimates of the additional public finances that would be associated with that extra activity, and set out how this might be used in terms of a range of social investments such as: the number of students that could be funded through primary school; the number of kilometres (km) of new two-lane highways that could be financed; or the number of years for which the cost of routine immunisation programmes could be supported.

The geographic focus of our research is on the Southeast Asia region. This is taken to be the 10 member nations of the Association of Southeast Asian Nations (ASEAN): Brunei; Cambodia; Indonesia; Laos; Malaysia; Myanmar; the Philippines; Singapore; Thailand; and Vietnam. Together they represent a diverse group with noticeable variation in terms of income level, size, culture, political stability and many other factors beyond—and all of which play a role in determining the level and nature of mobile internet use within a given territory.

This report seeks to document how some of these differences have contributed to variations in the past and how they are set to contribute to the future development of the mobile internet market and its social and economic implications in countries across the region.

Fig. 2. Overview of Southeast Asian country characteristics

Country	GDP per capita (US \$, PPP exchange rate)	Population ('000s)	Urban density	Mobile cellular subscriptions (per 100 inhabitants)
Brunei	57,770	423	76%	110
Cambodia	3,446	15,578	22%	155
Indonesia	11,019	257,940	55%	126
Laos	5,423	6,802	39%	68
Malaysia	26,812	30,384	76%	149
Myanmar	4,917	53,897	34%	48
Philippines	7,334	100,892	45%	112
Singapore	84,548	5,546	100%	157
Thailand	16,337	67,981	48%	143
Vietnam	5,830	93,448	33%	146

Source: Oxford Economics, CIA

METHODOLOGICAL APPROACH

This study's findings are the product of a multi-stage research approach, summarised here. Further detail regarding the econometric research behind this analysis is contained in the appendix.

Step 1: Econometric research

Our analysis is underpinned by two panel data regressions which statistically identify the relationship between the level of mobile internet penetration and both labour productivity and the labour force participation rate.⁷ Panel data analysis involves examining change through two dimensions—through time and across countries. Through this exercise, we quantified the extent to which observed differences in the growth rate of mobile internet penetration were associated with differences in the observed growth of labour productivity/the participation rate, after controlling for other factors that may have affected the path of the latter two 'dependent' variables.

Step 2: Forecasting mobile internet penetration

The second stage of our research involved developing a forecast of mobile internet penetration over the next five years in the 10 countries of focus. The forecast was developed using an equation where penetration was predicted as a function of the economy's level of GDP per capita, a trend factor (to account for the tendency for penetration to rise over time across all countries) and the past penetration rate (reflecting the fact that penetration displays a high degree of 'persistence').

Step 3: Applying the results at a country level

Finally, the headline results were calculated by applying the statistical relationships estimated in step 1 to the observed and forecast level of future change in mobile internet penetration in the 10 Southeast Asian economies. In particular, two sets of economic effects were calculated for each country:

1. The estimated economic impact of the observed change in mobile internet penetration since 2010; and
2. The forecast future impact of the expected change in mobile internet penetration over the five years from 2015 to 2020.

The impact was quantified in terms of both GDP and employment.⁸ An associated increase in public finances was also calculated by applying the forecast ratio of public finances to GDP to the estimated change in GDP. Such tax figures are not related to the contribution of mobile internet companies. Instead, they reflect additional public finances that are forecast to be collected owing to the higher level of wages and profits resulting from a higher level of GDP. We do not set out these public finances amounts as such, but do indicate how they could be used in terms of, for example, the number of students that could be funded through primary school.

2. THE IMPACT OF MOBILE INTERNET IN SOUTHEAST ASIA

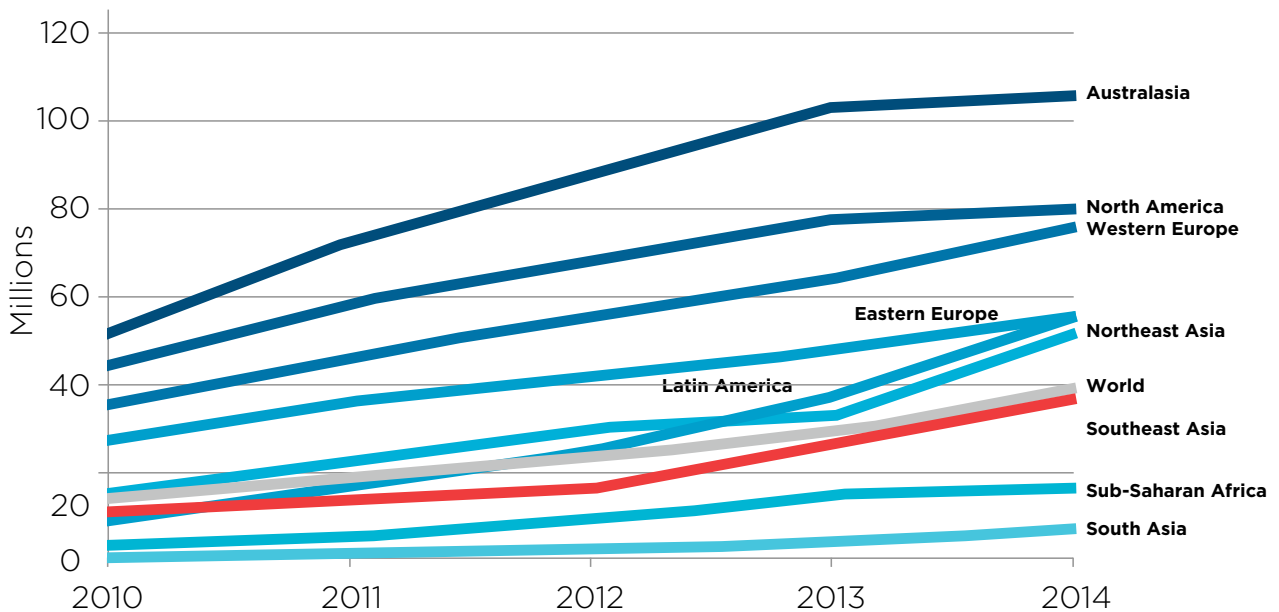
In line with the global trend, mobile internet penetration in Southeast Asia has boomed in recent years, more than trebling since 2010.

From 2010 to 2014, average penetration across the region grew almost perfectly in line with the global average, reaching 38 percent in 2014, a figure that is also broadly in line with the global average despite income per capita in the region being on average significantly lower than the rest of the world.⁹

Such growth has been facilitated by several enabling factors, including a significant investment in network coverage and the increasing availability of more affordable smartphones.

By way of indication, the Groupe Special Mobile Association (GSMA) has estimated that smartphone adoption (as a share of all connections) in Asia Pacific rose from six percent in 2010 to over 40 percent in 2015.¹⁰

Fig. 3. Mobile internet penetration around the world, 2010-2014



Source: ITU, Oxford Economics

⁹ Based on estimates from the Oxford Economics Global Economic Model. GDP per capita (measured at constant 2010 prices and Purchasing Power Parity exchange rates) in 2015 in Southeast Asia was around 30 percent lower than the global average.
¹⁰ GSMA Intelligence, The mobile economy: Asia Pacific 2015 (London: GSM Association, 2015).

Over the next half-decade, we expect this rapid growth to continue, taking regional penetration from an estimated 47 percent in 2015 to 86 percent by 2020.

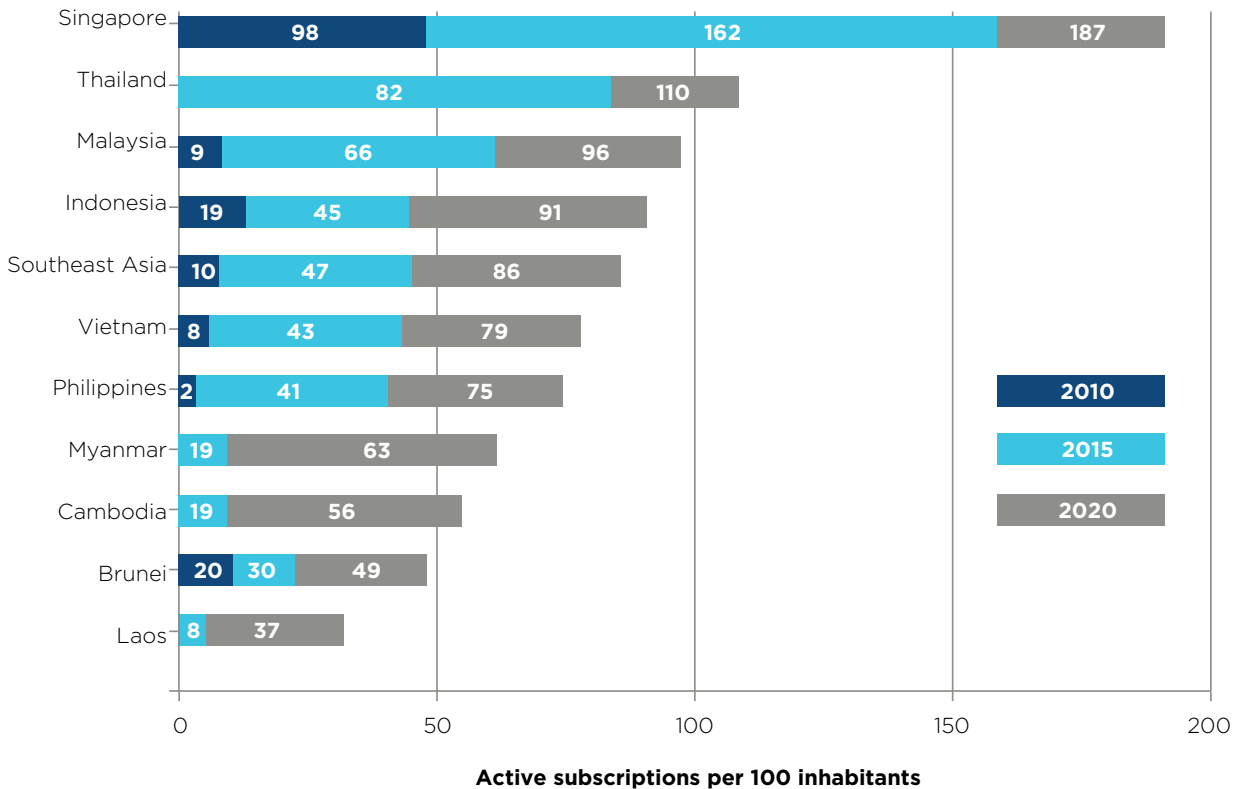
Growth will be led by countries where the market is currently relatively underdeveloped such as Indonesia, Vietnam and Cambodia. However, we expect a fairly strong expansion across all markets given generally sound economic growth prospects.

The region is characterised by a wide disparity in terms of market maturity that is likely to persist in the medium term.

As illustrated in Fig. 4, penetration in Singapore is currently almost twice as high as anywhere else in the region. In contrast, despite some recent progress, penetration in the poorer countries in the region such as Laos, Cambodia and Myanmar remains well behind the curve. In general, we expect this relative picture

to be maintained over the next five years, with the ‘ranking’ of countries within the region predicted to be broadly unchanged in 2020 compared to 2015.

Fig. 4. Forecast growth in mobile penetration by country in Southeast Asia, 2010-2020



Source: ITU, Oxford Economics

THE ROLE OF REGULATION

This report demonstrates the tremendous potential that mobile internet technology possesses to drive socioeconomic development across the Southeast Asian region. Although it is widely recognised that mobile internet has been a transformative social phenomenon, it has also had an appreciable effect on the commercial landscape, helping businesses to provide consumers with more choice and lower prices. The mobile economy is fast-moving, competitive and vibrant—characteristics symbolised by the new wave of app entrepreneurs.

However, alongside these benefits come new challenges for policymakers. As governments respond to the changing economic landscape, they need to consider carefully the impact of new regulation on investment and on the potential growth of the mobile economy. The fact that the market environment is so dynamic raises the risk of governments acting in haste and making policy errors, potentially stymying the growth potential of the mobile industry. For example, research suggests that almost two-thirds of investors are uncomfortable investing in internet/mobile businesses where regulators are applying traditional telecom regulations to new mobile and ‘over the top’ (i.e. content and app) services.”

Countries need to consider carefully how they can set regulations in such a way that they allow for data-driven innovation and encourage cross-border data flows. With the right balance between regulation and innovation, countries in the Southeast Asia region are in a strong position to help their ‘mobile-first’ populations reap the benefits of the mobile economy.

2.1 IMPACT ON GDP

Our analysis indicates that the economic benefits of embracing mobile internet going forward will be considerable. Each one percentage point increase in the penetration rate is forecast to add an extra US \$1.5 billion to regional GDP in 2020. Around three-quarters of this impact can be attributed to higher labour productivity with the remainder related to more workers being encouraged into the formal labour force. As such, it is clear that harnessing the potential of mobile internet through fostering a favourable investment and regulatory climate can act as a major spur to growth and poverty alleviation.

For example, we expect increased usage to create an

additional US \$58.1 billion (1.9 percent) in GDP in 2020.

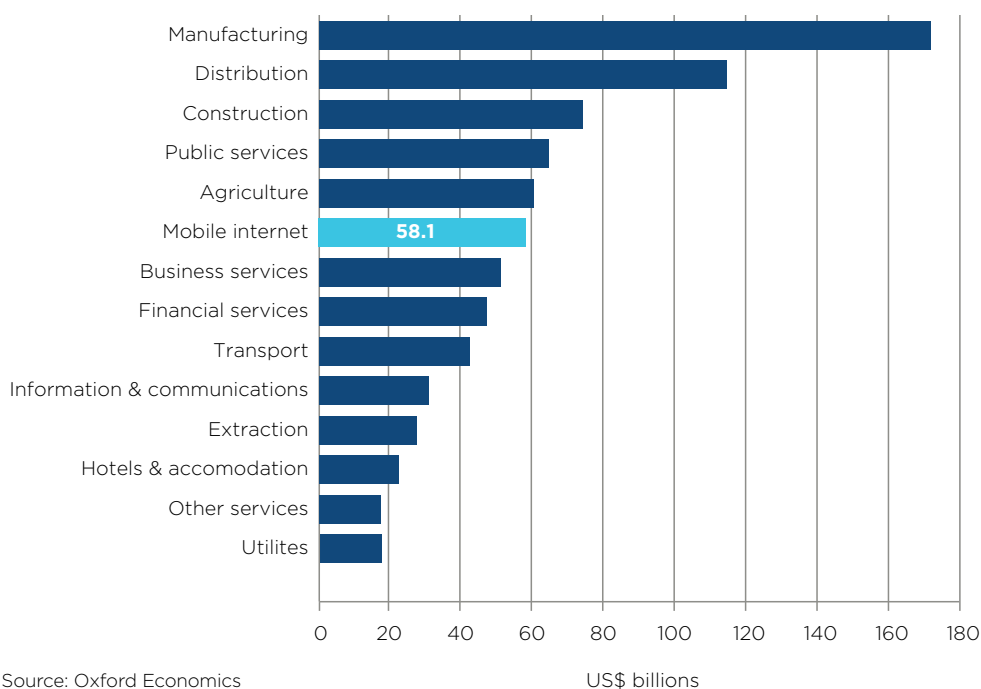
Moreover, if each country in the region was able to increase its penetration rate by a further 10 percentage points (on top of our baseline forecast growth) the economic prize would reach US \$73.4 billion (2.4 percent) in extra GDP by 2020.

The potential gains unleashed by mobile internet compare favourably to the forecast contributions of more established industries. For example, we expect the impact of mobile internet on the economic capacity of the region to exceed the additional contribution of sectors such as business services or transport over the next five years. Overall,

in our baseline forecast, the increase in mobile internet penetration is projected to account for around 9.7 percent of aggregate forecast GDP growth during the half-decade from 2015.¹²

Moreover, such benefits come on top of the considerable gains already realised by higher mobile penetration. We estimate that advancements in mobile technology since 2010 led to regional GDP being US \$47.2 billion (1.9 percent) higher than it would otherwise have been by 2015. By way of context, this is equivalent to the increase in GDP of the entire financial services industry during this period.

Fig. 5. Forecast contribution to GDP growth in Southeast Asia 2015-2020¹³



Source: Oxford Economics

US\$ billions

¹² It is important to note that the figures presented in this chart are not strictly comparable. For mobile internet, our figure refers to an impact on the region's supply-side capacity whereas the sector values presented refer to forecast demand-side contributions due to the projected expansion of output of the relevant industry.

¹³ The industry forecasts in this chart are based on projections for Singapore, Thailand, Indonesia, the Philippines, Malaysia and Vietnam. Together they accounted for 95 percent of Southeast Asian GDP in 2015.

2.2 IMPACT ON EMPLOYMENT

By encouraging greater participation, increased usage of mobile internet can also deliver a big boost to the regional labour market.

Our modelling indicates that each unit increase in the penetration rate will help to support an extra 26,200 jobs in the formal sector. Creating formal employment opportunities remains vital for a region where labour markets will continue to be dominated by a high incidence of informality and reliance on subsistence agriculture.¹⁴

As such, the spread of mobile internet is expected to support an extra one million jobs across the region by 2020.

Moreover, if each country in the region was able to increase its penetration rate by a further 10 percentage points (on top of our baseline forecast growth) this boost would reach 1.25 million jobs by 2020.

¹⁴ Here the population of working age is defined as those aged between 16 and 64.

2.3 POTENTIAL SOCIAL BENEFITS

Higher wages and profits as a result of the boost in GDP will be a boon to governments across the region.

Overall, we estimate that each unit increase in the penetration rate will enable governments to collect additional public finances sufficient to put more than 34,900 children through primary education.¹⁵ Taking into account the significant increase in penetration expected between now and 2020, this would enable an additional 1.3 million students to be put through primary education across the region.

An alternative use of the additional receipts would be to finance an upgrade of the region's road infrastructure.

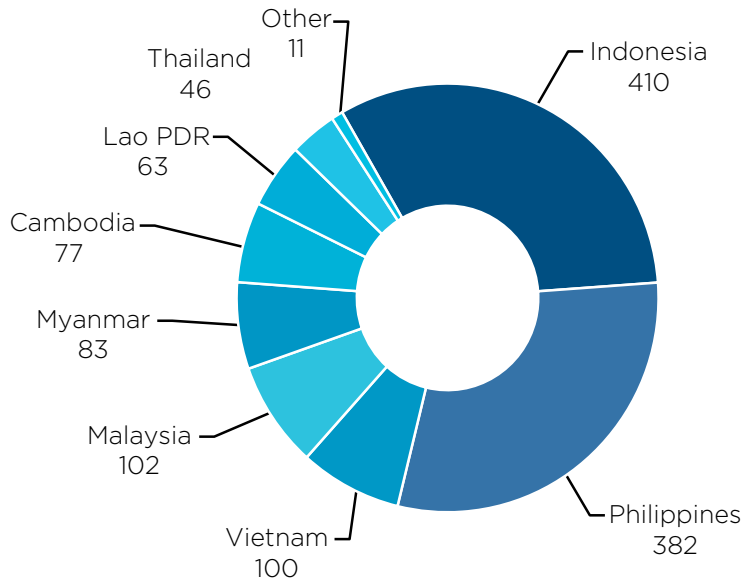
We estimate that the economic activity supported by increased mobile penetration over the five years to 2020 could support the construction almost 7,400 km of new two-lane highways across the region, as broken down in Fig. 7.¹⁶

Alternatively, the revenues could be used to support health-related services such as immunisation programmes.

In total, we estimate that the receipts would be sufficient to fund the cost of implementing routine immunisation programmes for 22 years.¹⁷

Fig. 6. Primary education funded in 2020

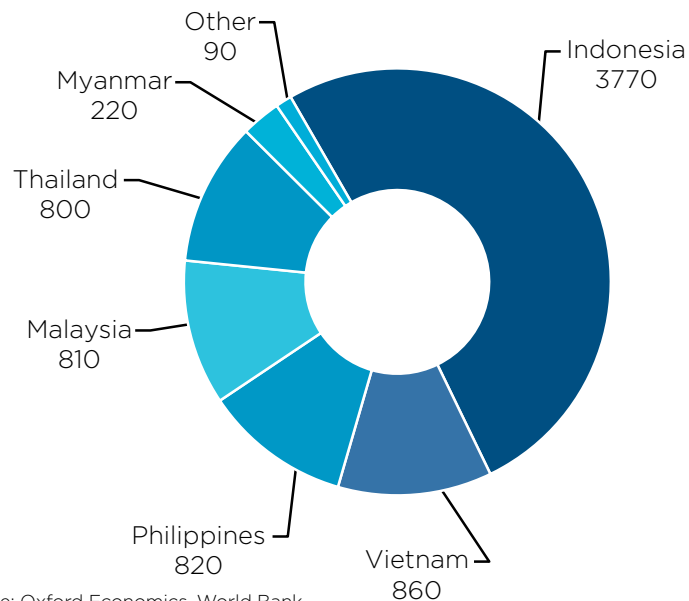
Thousands of students



Source: Oxford Economics

Fig. 7. Kilometres of new two-lane highways financed in 2020

Km of new two-lane highways



Source: Oxford Economics, World Bank

¹⁵ This estimate is derived via a bottom-up calculation. The cost of primary education was estimated based on available data from UNESCO. These figures were projected forward based on the change in the education deflator (where available) or the GDP deflator (otherwise). Since the original primary school figures collected were on an annual basis the final estimate was scaled down based on the average number of years of primary school education in each respective country with data sourced from the World Bank.



¹⁶ The cost of building a km of new two-lane highway was estimated based on the World Bank's Road Cost Knowledge System (ROCKS) database. Average values for Asia were projected forward based on inflation and exchange rate movements and then individual estimates for each Southeast Asia country were produced based on Purchasing Power Parity (PPP) exchange rates. A separate methodology was used for Singapore to account for the fact that costs of road construction are much higher. Here the average cost was estimated based on the projected cost of the forthcoming North-South Expressway.

¹⁷ This figure is the average figure across the 10 country member states weighted by population. Estimates of the cost of implementing routine immunisation were based on original data from the World Health Organisation (WHO) on total expenditure on routine immunisation from all sources in US \$. For each country this was projected forward based on forecast population growth and inflation.

3. THE IMPACT OF MOBILE INTERNET IN BRUNEI

Brunei’s economy is marked by a number of idiosyncratic features compared to the rest of the region.

The economy is hugely dependent on oil which accounts for over half of GDP and over 90 percent of exports. The recent collapse in oil prices has hit activity hard with the economy projected to have slipped into recession during 2015. On the other hand, such vast oil wealth has helped Brunei to become one of the richest countries in the world as measured by GDP per capita.¹⁸

Brunei’s mobile internet penetration has expanded in recent years, but it remains low by regional standards despite the country’s comparatively high average income.

In 2015, Brunei’s mobile internet penetration was around 30 percent, up from 20 percent in 2010.¹⁹ But this is only the seventh highest usage rate

out of the 10 countries in this study, despite Brunei having the second highest per capita income in Southeast Asia.

In this context, substantial interventions to lower costs and speed up the integration of mobile internet technology are likely to be required to prevent Brunei slipping still further down the regional ‘rankings’.

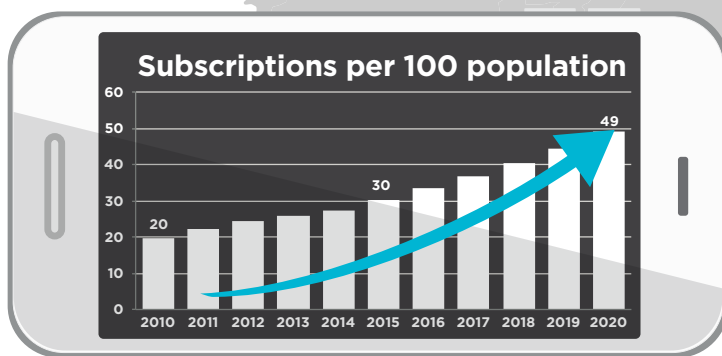
On current trends, mobile internet penetration is forecast to rise to only 49 percent by 2020, with this usage rate being overtaken by those of Myanmar and Cambodia. As a relatively underdeveloped market, there is a huge potential for growth in Brunei’s mobile internet capabilities, but increased competition in its telecoms market, along with further investment in infrastructure, will both be needed to bring down costs and improve accessibility.

The economic contribution of mobile internet to GDP in Brunei has, nonetheless, already been significant.

Mobile internet penetration has added US \$76.5 million to GDP since 2010 (0.7 percent of GDP). This figure is expected to rise to US \$163.1 million by 2020 (0.9 percent of GDP). These benefits come alongside additional formal employment opportunities expected to be created by mobile technology—around 400 new jobs by 2020.

And such activity has the potential to finance additional social investment.

For example, we estimate that the extra receipts would be sufficient to finance half the total cost of implementing routine immunisation programmes for a year.



In 2020 Brunei* stands to gain an additional
\$163 m in GDP
400 jobs
 due to mobile internet growth
*signifies that GDP impact is measured in US\$ millions not US\$ billions

Increase in public finance sufficient to fund in 2020:

300
 children through primary school



6 months
 of routine immunisation programmes



¹⁸ For example, in 2015 we estimate that Brunei had the fifth highest GDP per capita in the world by PPP exchange rates, behind Qatar, Luxembourg, Bermuda and Singapore.

¹⁹ Figures for mobile internet penetration in Brunei were sourced from the GSMA Intelligence database.

4. THE IMPACT OF MOBILE INTERNET IN CAMBODIA

Cambodia is a low income economy with a relatively high potential growth rate. At just under US \$3,500, Cambodia's GDP per head is the lowest in Southeast Asia and just a third of the regional average.

This is despite an impressive recent growth performance, absent a fairly stagnant 2009 as the economy was hit by the global recession. The economy's industrial structure is fairly balanced with agriculture accounting for around a quarter of GDP and the fast-growing services sector now representing over 40 percent of output.

Cambodia enjoys a high level of mobile internet penetration relative to its income. Despite having the lowest level of per capita income in the region, Cambodia has experienced steady growth in mobile internet in recent years. Such growth has

been driven by youth take-up, with Cambodia's penetration rate increasing from just one percent in 2010 to almost 20 percent in 2015.

This growth in mobile internet is expected to accelerate as coverage extends beyond urban areas. We expect it to grow to 56 percent by 2020.

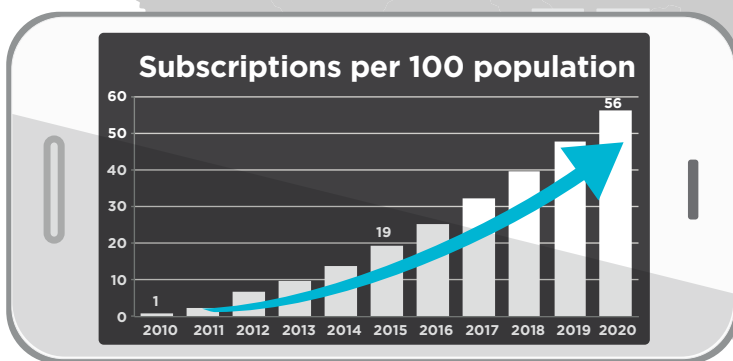
This can be expected to increase further still if planned investment in Cambodia's 4G network is supported. The productivity growth that has resulted from this change has contributed millions to GDP. Since 2010 increased mobile penetration in Cambodia has already added over US \$135 million to GDP and we expect it to generate an extra US \$362 million (1.4 percent) by 2020.

The anticipated rapid growth in the penetration rate will generate thousands of

new job opportunities. We expect higher productivity and increased labour force participation to support an extra 23,600 jobs by 2020, on top of the 10,800 already added since 2010.

The potential to enhance the country's social infrastructure through increased public finances is significant.

The extra public finances that are expected to be generated through mobile internet growth through to 2020 would be enough to put 78,000 students through primary education, to finance the construction of 50 km of new two-lane highway or to cover the cost of routine immunisation for two years.



In 2020 Cambodia* stands to gain an additional

- \$362 m in GDP**
- 23,600 jobs**

due to mobile internet growth

*signifies that GDP impact is measured in US\$ millions not US\$ billions

Increase in public finance sufficient to fund in 2020:

- 78,000** children through primary school
- 2 years** of routine immunisation programmes
- 5 km** of new two-lane highways

5. THE IMPACT OF MOBILE INTERNET IN INDONESIA

As the largest economy in Southeast Asia in terms of GDP and population, Indonesia—the only regional member of the G-20—represents one of the world’s foremost emerging market economies. Aided by a large consumer base and political stability, the country has made great strides in economic and social development in recent years, sustaining a solid economic growth rate of over five percent per annum since 2000, with the economy continuing to expand through the 2008-2009 global recession. As a result, poverty has halved since the beginning of the century.²⁰ Growth has generally been investment-led with the government playing a prominent role in terms of financing large infrastructure projects.

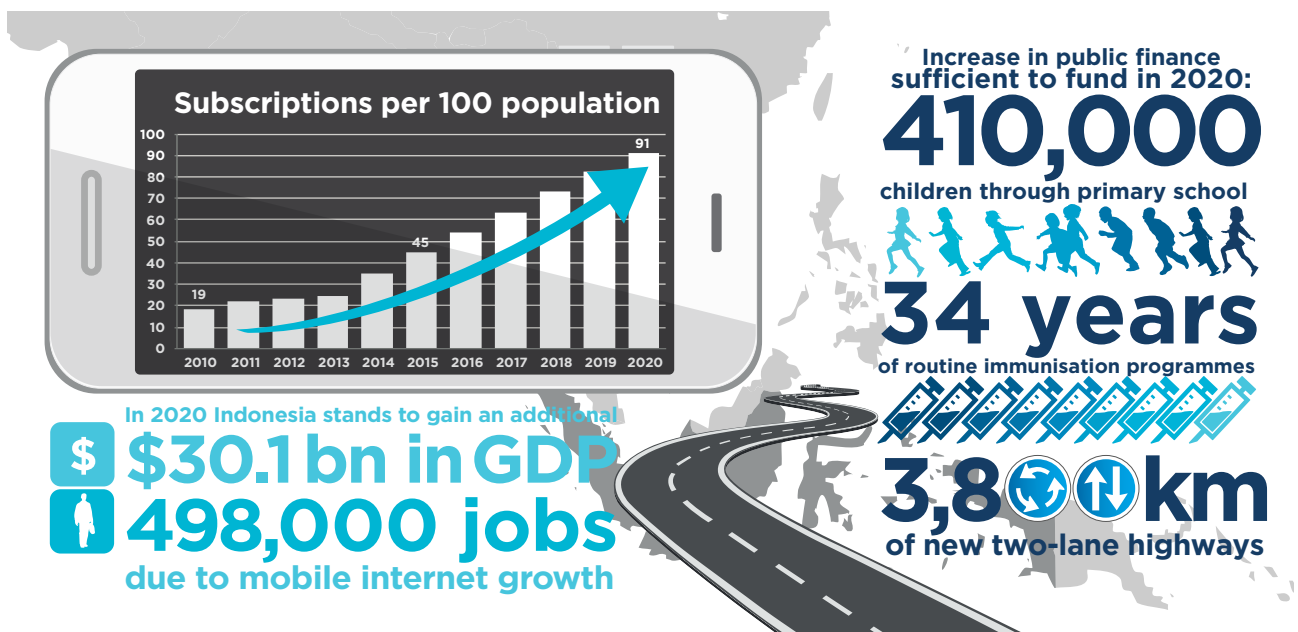
Dependency on oil and agriculture has eased as the

service sector has become more important. In recent years, the economy has modernised and diversified with activity now less concentrated in agriculture and mining, and industries such as financial services and telecommunications now accounting for a higher share of GDP. Reflecting its very large internal market, exports account for a relatively low share of GDP—20 percent compared to the regional average of almost 50 percent. At around US \$10,200 in 2015, the country’s GDP per head is close to the regional average.²¹

Despite this economic success story, mobile internet penetration growth over the past five years has been relatively muted. Penetration in 2010 was reasonably high by regional standards at 19

percent, but progress since has been more restrained with an estimated subscription rate of 45 percent in 2015 being below the regional average.

The country has tremendous potential for growth in this market. We expect Indonesia to make impressive headway in the next half-decade, with rapid growth taking its mobile internet penetration rate to over 90 percent by 2020. As the economy develops further, internet coverage will extend beyond the main cities with mobile internet usage continuing to be the dominant medium of web access. Moreover, recent developments in the smartphone market should assist the proliferation of lower-cost handsets, vital for encouraging mass consumption in a country where average disposable income remains relatively low.



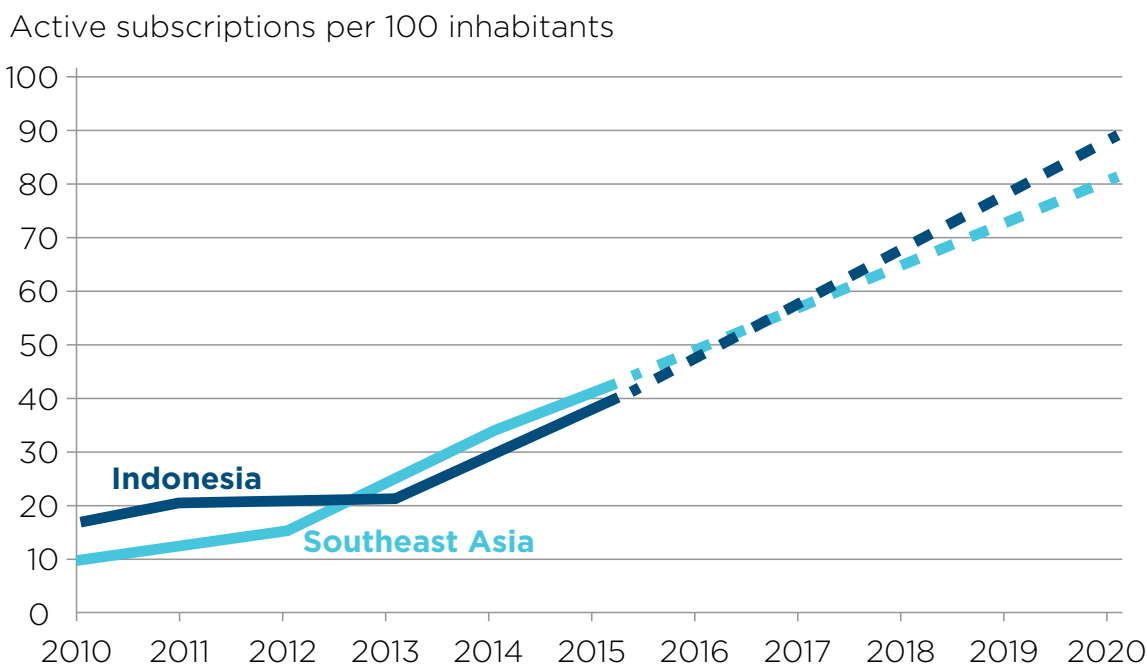
The impact of this change in mobile access will be felt throughout the country in terms of higher economic output.

Our analysis indicates that each percentage point increase in mobile penetration over the next five years will add US \$640 million to GDP in 2020. Given our forecast for healthy penetration growth, this means that we expect the diffusion of mobile technology to create an additional US \$30.1 billion (2.4 percent) of GDP in 2020.

Mobile internet's potential to generate growth compares favourably to more established sectors.

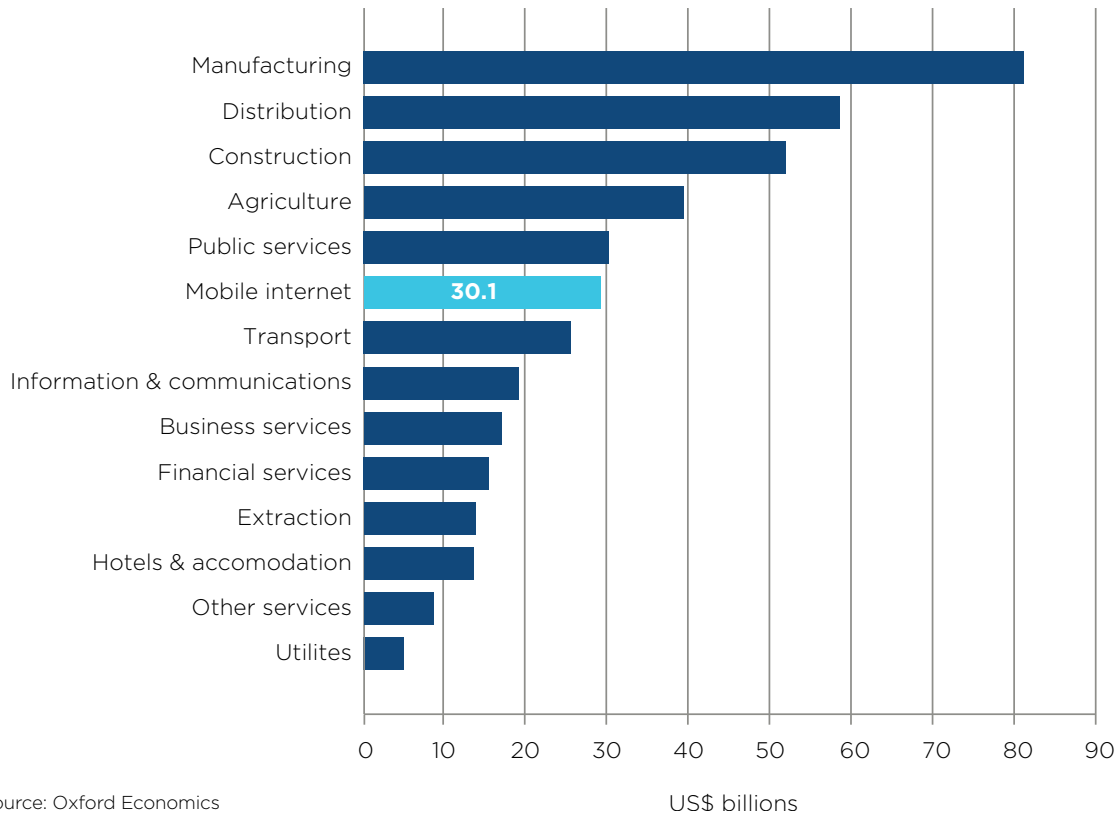
For instance, our forecast contribution of mobile internet to Indonesia's supply-side capacity by 2020 is around 25 percent greater than the expected contribution of the transport services to GDP during this period. In aggregate, we expect mobile internet to sustain around eight percent of total forecast GDP growth in the period to 2020.

Fig. 8. Mobile internet penetration in Indonesia, 2010-2020



Source: ITU, Oxford Economics

Fig. 9. Sectoral contribution to GDP growth 2015-2020²²



Source: Oxford Economics

Moreover, all this will come on top of the sizeable benefits that have already been supported by mobile internet. Our modelling indicates that the development of the market over the past half-decade has resulted in a US \$10.9 billion (1.3 percent) gain in GDP in 2015, equivalent to the contribution of the hotels and restaurant sector to growth during this period.

Beyond boosting productivity, mobile internet can also help to develop the spread of formal opportunities in the labour market. Indeed, we estimate

that through to 2020 each one percentage point increase in mobile internet penetration will support an extra 10,700 formal jobs in Indonesia. Such advances are particularly pertinent to Indonesia where, in 2014, more than 50 percent of those employed were working in the informal sector, often in subsistence farming or petty services.²³

Given Indonesia's clear potential for strong growth in mobile internet take-up, job creation impacts could be considerable. For example, according to our baseline projections the growth of

mobile internet over the next half-decade will generate close to an extra 500,000 formal jobs by 2020 by encouraging higher participation in the labour market. By way of comparison, this is similar to the expected job creation potential of the entire financial and business services industry during the same period.²⁴

²² It is important to note that the figures presented in this chart are not strictly comparable. For mobile internet, our figure refers to an impact on Indonesia's supply-side capacity whereas the sector values presented refer to forecast demand-side contributions due to the projected expansion of output of the relevant industry.

²³ International Labour Organization, Indonesia: Labour and social trends update - August (Jakarta: ILO, 2014).

²⁴ It should be noted that the two forecasts are not strictly comparable since the additional jobs attributed to mobile internet reflect the impact of a supply-side effect on the labour market. By contrast, the increase in jobs in the financial services industry reflects higher demand for labour from this sector as a result of its increased output.

By helping to stimulate GDP and employment growth, mobile internet technology can provide a substantial boost to public finances.

For example, we estimate that the forecast increase in the mobile penetration rate over the next five years will generate a significant fiscal windfall, sufficient to finance the primary education of over 410,000 children, to fund the cost of building almost 3,800 km of new two-lane highway or to cover the expense of implementing routine immunisation programmes for 34 years.²⁵ With 65 million Indonesians still living below the poverty line, these public finances could prove crucial in enabling the provision of social assistance to Indonesia's poorest.²⁶

²⁵ This calculation was based on an in-house forecast for government revenue in Indonesia.

²⁶ World Bank, "Indonesia 2014 Development Policy Review", in <http://www.worldbank.org/en/news/feature/2014/06/23/indonesia-2014-development-policy-review> [accessed 15 January 2016]

REAL WORLD EXAMPLE: SALE STOCK, INDONESIA SMARTPHONES OPEN UP NEW MARKETS

Sale Stock is an Indonesian online fashion goods retailer. It was launched in September 2014 and has since expanded rapidly. It now employs more than 500 people in six offices and has plans to double its workforce in the near future. It owes its existence to the rise of mobile technology.

Sale Stock is almost entirely geared to the use of mobile internet with some 90 percent of visitors coming through this source. By making use of mobile as direct route to customers it is able to offer affordable fashion at lower prices and to a much larger customer base than its bricks-and-mortar competitors. Our interviews with Sale Stock executives suggested that they seek to operate on 'customer-friendly low margins', meaning they can market garments at between a quarter and half of the price of competitors. Its offer depends on making effective use of mobile technologies and on offering free shipping across Indonesia's vast archipelago of over 17,000 islands. The company primarily targets young women aged 18-35 in Indonesia's emergent middle class.

The availability of cheap smartphones has been vital to its fast growth. Without them, it would not have been able to reach its customers at the price point at which it operates. Our interviewee suggested that many of Sale Stock's customers were

"straight to mobile" consumers who would never have had access to the internet prior to the development of affordable smartphones.

Sale Stock makes wide use of mobile internet opportunities in its business, especially in marketing its products. It was an early adopter of Facebook and quickly sought to maximise the platform's potential. More recently, Sale Stock has keenly tapped into the opportunities provided by Google Apps, and is seeking to use Android to drive future market growth. For example, it uses Google's AdMob network of websites and apps, and has experimented with TrueView's 'pay per view' video advertising technology as a way to drive product awareness.

Before the Internet, capacity to sell consumer goods to consumers was constrained by the practicalities of geographic reach. Without such boundaries, Sale Stock estimates that it has reached only half a percent of its target market of perhaps 50-70 million across Southeast Asia, giving it huge potential for future growth. The primary constraint on the company's growth is not in the size of the customer base per se, but instead in the fact that many customers still use 2G or GPRS, which comes with size, storage, and connection issues. Over time, as mobile internet infrastructure advances and

more and more consumers move to smartphone technologies, it expects to continue its upward trajectory. For consumers this means access to more and different products at lower cost than would have been the case previously.

For a company such as Sale Stock this means increased revenues, enabling it to employ more staff to meet the new demand. The supply chain and wage spending of these additional staff helps to drive further spending in the domestic economy. In so doing, it demonstrates how mobile internet is driving growth and providing new jobs and export opportunities in Indonesia.



6. THE IMPACT OF MOBILE INTERNET IN LAOS

Despite recent rapid growth, Laos' agriculture-dependent economy remains undeveloped by regional standards. Recent performance has been robust with the economy sustaining strong growth even during the financial crisis of 2008-2009. However, this has come from a low base with GDP per head—at US \$5,000—only half the regional average. Despite falling back markedly over the past 15 years, agriculture still accounts for around a quarter of economic activity.

Laos' growth in mobile internet penetration has been slow in comparison to its peers. Its mobile internet market has been characterised by limited competition and relatively high prices, and growth has been further held back by insufficient infrastructure investment and a lack of market regulation. As a result, growth in mobile internet

penetration has been slower than in Southeast Asian countries with comparable per capita incomes, from virtually zero in 2010 to eight percent in 2015.

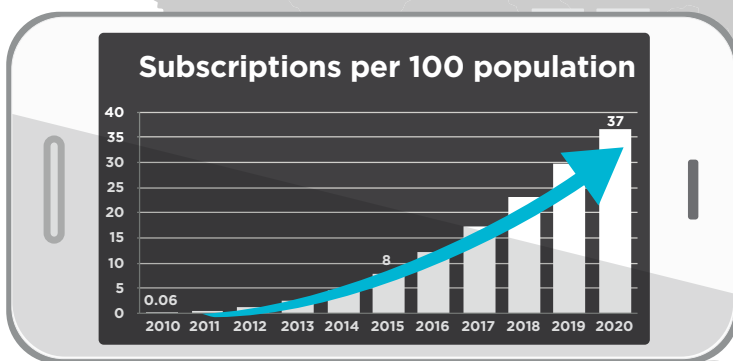
As in other smaller and lower income Southeast Asian markets, increasing the availability of affordable handsets and expanding network coverage will be crucial to future development. Network maintenance and upgrades should help to bring consumer prices down, leading to an increase in the penetration rate to 37 percent by 2020.

Despite the relative immaturity of its market, growth in mobile internet is expected to contribute an extra US \$224 million to GDP by 2020. This is around 1.2 percent of Laos' GDP, compared to the regional average of 1.9 percent. This is additional to the US \$45 million

in GDP already generated by the rise in penetration between 2010 and 2015.

This economic impact will create new jobs throughout the country. By 2020, we anticipate that growth in mobile internet use will support 7,900 new jobs, a significant increase from the contribution of 1,900 new opportunities between 2010 and 2015.

The potential benefit of this economic impact for the country's social infrastructure is considerable. Overall, the total expected tax gain up to 2020 would be sufficient to finance 63,000 children through primary school, to fund the construction of 40 km of new two-lane highway or to cover the cost of routine immunisation programmes for two years.



In 2020 Laos* stands to gain an additional
\$224m in GDP
7,900 jobs
 due to mobile internet growth

*signifies that GDP impact is measured in US\$ millions not US\$ billions

Increase in public finance sufficient to fund in 2020:
63,000
 children through primary school
2 years
 of routine immunisation programmes
4 km
 of new two-lane highways

7. THE IMPACT OF MOBILE INTERNET IN MALAYSIA

The Malaysian economy has grown at a solid pace recently, keeping income levels well above the regional norm.

Malaysia is reasonably wealthy by Southeast Asian standards with a GDP per head of US \$27,000 almost two-and-a-half times the regional average. The economy has rebounded strongly since a recession in 2009 but we expect it to enter a slower growth phase to 2020 given a weaker performance in key trading partners and worsening demographics.

Malaysia has experienced rapid growth in mobile internet in recent years.

With one of the highest penetration rates in Southeast Asia, Malaysia enjoys a mobile broadband market that is highly competitive, with low prices and wide coverage. The rate of penetration has increased more than five-fold since 2010 to over 73 percent in 2015 placing Malaysia firmly in third place in the regional 'ranking'.

We expect penetration to continue the positive growth trajectory, with rates increasing to reach close to one subscription per inhabitant by 2020.

Within this, the continuing support of the Malaysian government, through its 'Digital Malaysia Initiative', is expected to play a prominent enabling role.

Already mobile internet growth has added billions to Malaysian GDP.

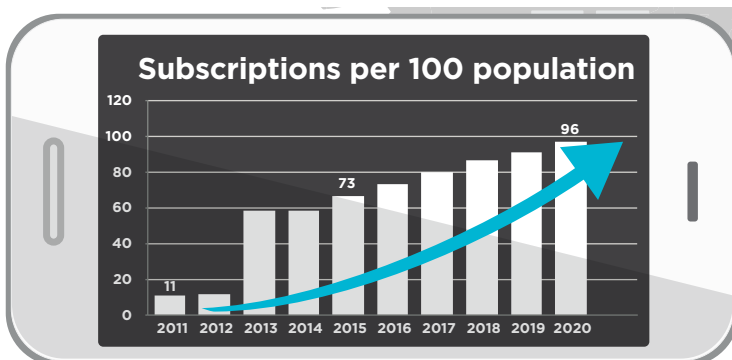
The increase in mobile internet penetration between 2010-2015 is already estimated to have raised the long-term level of GDP by US \$7.1 billion (2.4 percent). Moreover, over the next five years, we estimate that each additional percentage point rise in penetration will support an extra US \$183 million in GDP in 2020. Applying this finding to our forecast for penetration indicates an expected future gain of US \$5.5 billion over the next five years (1.2 percent of GDP).

By boosting labour productivity and creating new opportunities in the formal labour market, mobile internet technology will create thousands of new jobs in Malaysia.

By 2020 we anticipate that a further 41,000 jobs will be supported by mobile, on top of the 71,200 already added since 2010.

Associated higher levels of public finance could also support social infrastructure development.

By way of context, the additional tax contributions generated by expected mobile internet growth through to 2020 would be enough to support 102,000 students through primary school, to finance the construction of 810 km of new two-lane highway or to cover the cost of routine immunisation programmes for over six years.



In 2020 Malaysia stands to gain an additional
\$5.5 bn in GDP
41,000 jobs
 due to mobile internet growth



REAL WORLD EXAMPLE: THE BATTERY SHOP, MALAYSIA A 'DIGITAL-FIRST' APPROACH

The Battery Shop was launched in November 2014 by Eugene Tan who spotted a gap in the market while working in his uncle's traditional automotive shop. It sells car batteries and offers an installation service to stranded drivers who can find his breakdown service online and have a replacement battery delivered to them, complete with jump start cables, to get them back on the road within an hour. In this way, the company meets an established service need but takes a 'digital-first' strategy to finding its customers.

From the start, Eugene made the most of online advertising opportunities to enable his customers to find him. He started advertising online in both English and the local dialect, and on only a small budget. He attributes more than 60 percent of the traffic to his site to Google AdWords. He runs daily campaigns across both desktop and mobile.

Mobile internet is vital for the Battery Shop in connecting it to customers at their time of need. Broken down drivers naturally tend to reach for their mobile phone and use it to search online for 'car battery' as a way to find a rescue service. Consequently, more than half of the Battery Shop's customers access the site directly from mobile devices. The company has particularly found that the 'click to call' function, whereby customers can easily find a number online and



call directly without additional navigation, is very effective in converting customers—three of every five calls it receives are via this function on mobile devices. The company is growing rapidly, and expects to expand its services beyond the immediate area in coming years. Its success is illustrative of the channels through which mobile internet is driving growth and creating employment in Malaysia.

8. THE IMPACT OF MOBILE INTERNET IN MYANMAR

Political reform has opened up the economy and should ensure continued rapid growth going forward. At just under US \$5,000 per capita at purchasing power parity, Myanmar's GDP per head is the second lowest in the region and around 45 percent of the Southeast Asia average. Despite falling somewhat over the last decade, agriculture still accounts for around a third of GDP. The importance of international trade is set to expand rapidly reflecting the country's transition towards democracy.

Mobile internet is playing an increasingly important role in Myanmar. Coupled with falling prices, the country's transition from military to democratic rule in 2011 has helped to improve consumer internet access, leading to fast growth in mobile internet penetration. Between 2010 and 2015, the penetration

rate has grown from zero to almost 20 percent.

The country has considerable potential for growth in mobile internet. Currently, coverage and usage are largely limited to the main cities, and as this pattern shifts, growth is likely to pick up in the coming years. We forecast that the penetration rate will be over 60 percent by 2020. Achieving this will require significant improvements to existing infrastructure, which should be aided by the recent privatisation of the telecoms industry.

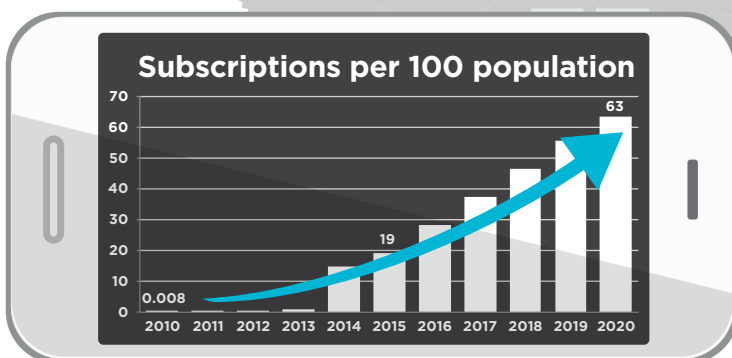
This increase in mobile internet penetration will add billions to GDP. We estimate that growth over the past five years has already supported an extra US \$600 million in GDP to 2015. This figure is expected to triple by 2020—adding US \$1.9 billion (1.9 percent of GDP).

The economic benefits are being felt in terms of employment as well as output.

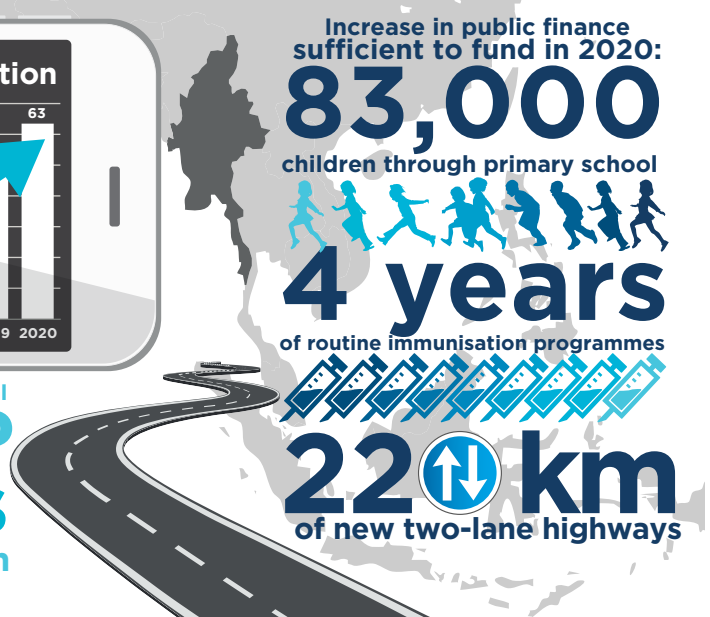
Increasing mobile internet penetration has resulted in the creation of over 37,000 jobs as of 2015, and a further 92,000 jobs are expected by 2020, providing much-needed formal employment opportunities for a population in which informal employment, for example, in subsistence farming, is the norm for many.

Higher growth and employment could support wider social benefits through associated increased public finances.

We estimate that in 2020, the additional receipts will be sufficient to finance the primary school education of 83,000 children, to fund the construction of 220 km of new two-lane highway or to cover the cost of routine immunisation for over four years.



In 2020 Myanmar stands to gain an additional
\$1.9 bn in GDP
92,000 jobs
 due to mobile internet growth



9. THE IMPACT OF MOBILE INTERNET IN THE PHILIPPINES

The Philippines has the core characteristics of a market which should attract strong levels of investment in mobile telephony. It has a population of over 100 million and consistently strong GDP growth, helped recently by supportive government policies including infrastructure expansion.²⁷ At just under US \$7,000, GDP per head is around a third lower than the regional average. Medium-term growth prospects appear very solid given the economy's favourable demographic profile and scope for strong productivity growth due to the application of more advanced technologies and more efficient business models.

The spread of network coverage may have been held back by the rural nature of the country, but the economy

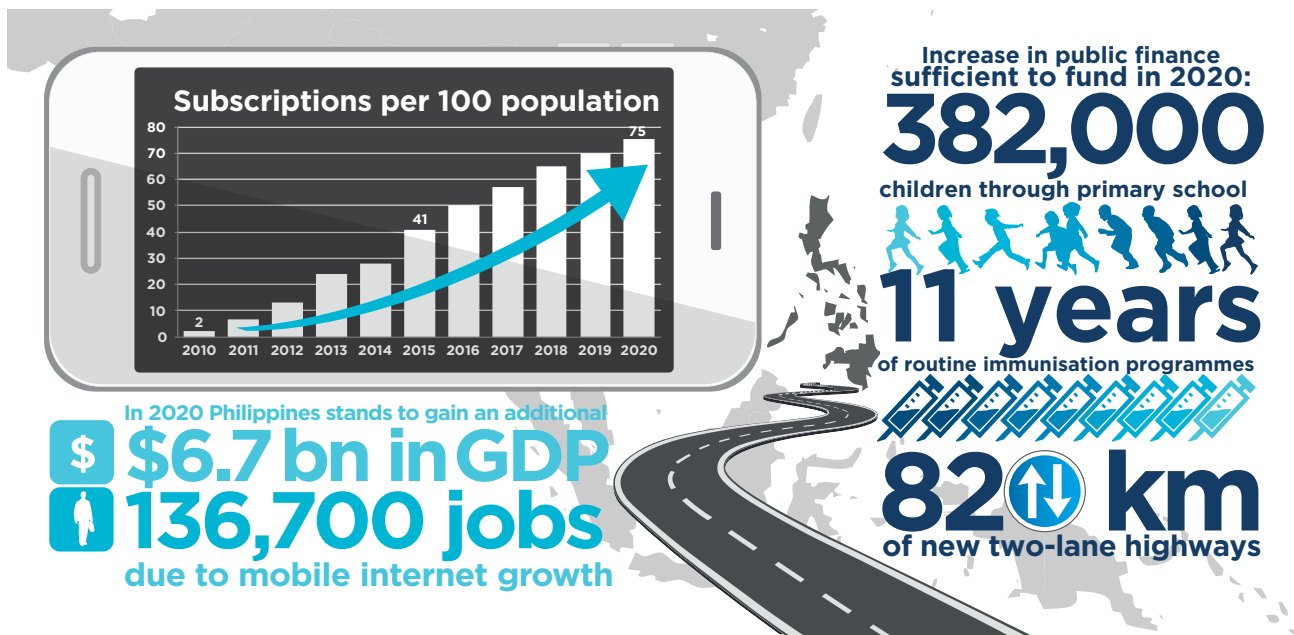
is shifting away from its dependency on agriculture.

The share of agriculture in GDP has almost halved over the past 15 years, with a broadly commensurate rise in the importance of the services sector. Investment growth has been very strong over the past four years despite regional headwinds created by fears over a slowdown in China. Meanwhile, the country's large consumer base provides a solid foundation for growth with consumption accounting for an unusually high share of GDP by regional standards. Exports account for just under a third of GDP, below the regional average of close to 50 percent.

The mobile internet market in the Philippines has remained relatively immature by regional standards. Penetration in 2010 was just

over two percent, well below the regional average. Despite strong economic growth this gap persisted up to 2014, by which time penetration had risen to around 28 percent.

We believe that the market has considerable capacity to develop over the next five years. Our baseline forecast is for penetration to nearly treble in the next half-decade to over 75 percent by 2020, although we expect this would still be relatively low by regional standards. As in other lower middle-income economies in the region, the wider availability of sub-smartphone models (priced within the US \$50-US \$100 range) will be vital to stimulating mass adoption.



²⁷ Data from the National Statistics Co-ordination Board shows that real GDP growth has averaged 5.4 percent per year over the past decade while political development can be gauged by the World Bank's government effectiveness index which has displayed a steady improvement since the turn of the century.

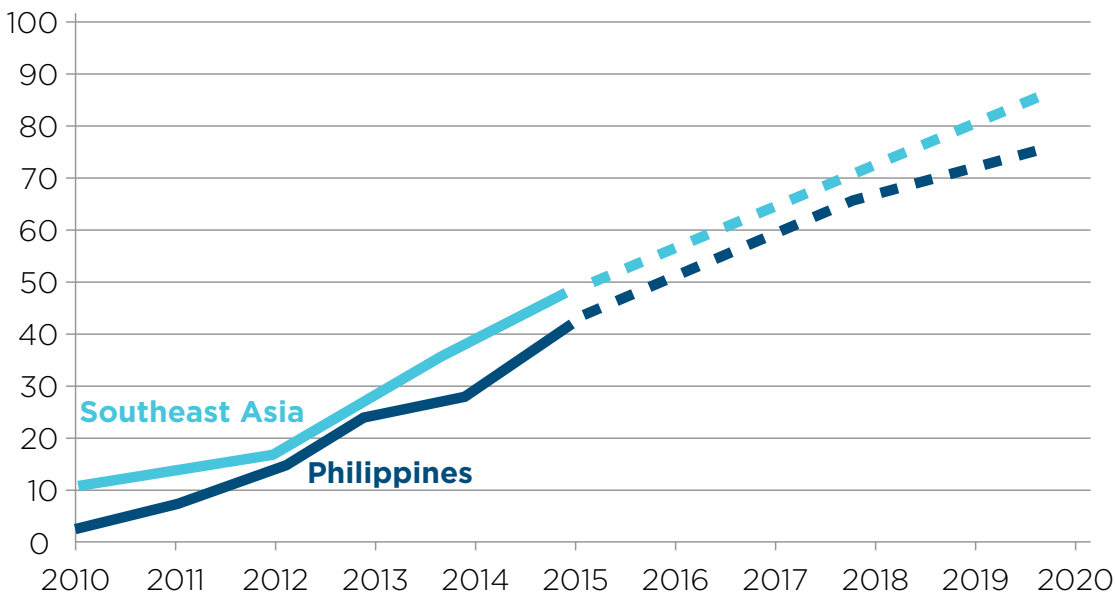
Our analysis highlights the potential of mobile internet to drive economic growth in the medium term. It shows that each unit increase in mobile penetration over the next five years will add US \$200 million to GDP in 2020. Applied to our forecast for penetration growth, we expect the expansion of mobile technology to create an additional US \$6.7 billion (1.4 percent) of GDP in 2020.

expected increase in GDP of the construction sector and almost twice the size of projected contribution of the transport sector during this period.²⁸

We expect mobile internet's contribution to growth to outstrip some of the economy's core sectors over the next half-decade. For instance, our forecast that the growth of mobile internet usage can help to expand the capacity of the Philippines' economy by US \$6.7 billion is broadly equivalent to the

Fig. 10. Mobile internet penetration in the Philippines, 2010-2020

Active subscriptions per 100 inhabitants



Source: ITU, Oxford Economics

²⁸ It is important to note that the figures presented in this chart are not strictly comparable. For mobile internet, our figure refers to an impact on the Filipino economy's supply-side capacity whereas the sector values presented refer to forecast demand-side contributions due to the projected expansion of output of the relevant industry.

Moreover, it should be noted that any such future contribution will come on top of the notable economic gains realised by the development of mobile internet technology up to this point. Our modelling indicates that the development of the market over the past half-decade resulted in a US \$5.1 billion (1.7 percent) gain in GDP in 2015, equivalent to the contribution of the public services sector (health, education and government) during this period.

Beyond the benefits delivered via higher productivity, mobile internet can also help to develop the spread of formal opportunities in the

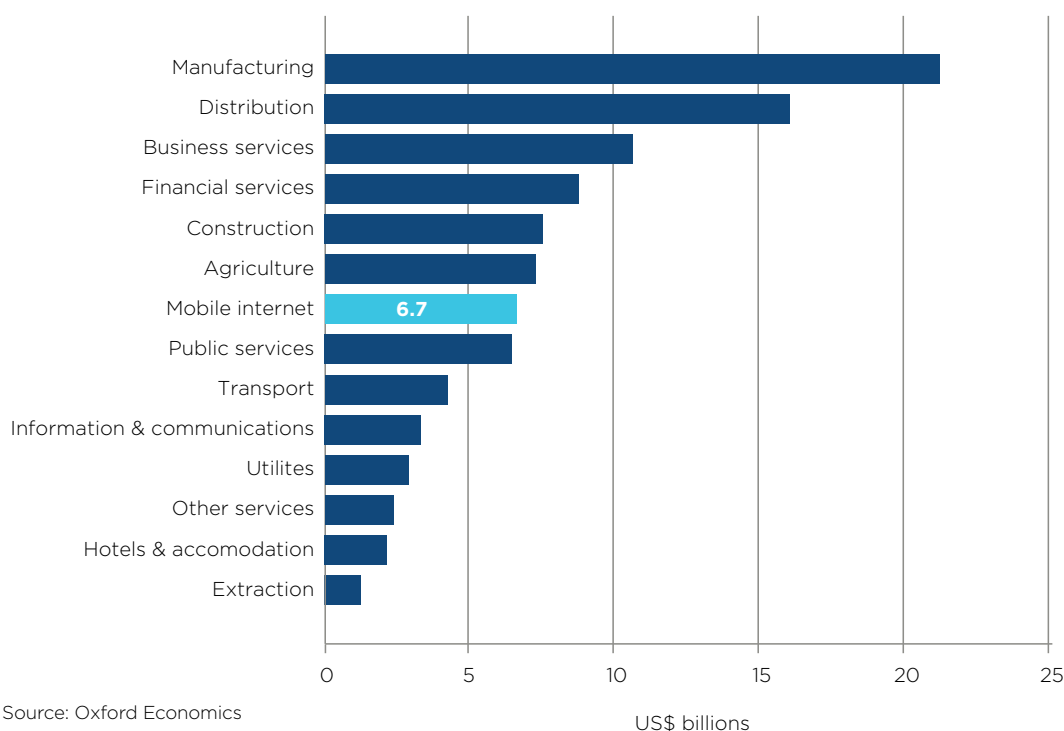
labour market. Indeed, we estimate that going forward each unit increase in mobile internet penetration will support an extra 4,000 formal jobs in 2020.

Given the strength of anticipated growth in mobile internet penetration, employment impacts are forecast to be considerable.

For example, according to our baseline projections the growth of mobile internet over the next five years will generate an extra 136,700 formal jobs by 2020. To put this in context, this is more than twice the expected level of employment creation in the financial services industry during this period.²⁹

Such economic impacts will create a significant boost for public finances, to underpin investment in social infrastructure. The extra public finances generated in 2020, as a result of the additional economic activity associated with increased mobile internet penetration, would be sufficient to finance the primary education of over 382,000 children, to fund the construction of over 820 km of new two-lane highway or to cover the cost of implementing routine immunisation programmes for over 11 years. Such examples illustrate the role that mobile internet technology could play in enhancing socioeconomic outcomes in the Philippines.³⁰

Fig. 11. Sectoral contribution to GDP growth 2015-2020



Source: Oxford Economics

US\$ billions

²⁹ It should be noted that the two forecasts are not strictly comparable since the additional jobs attributed to mobile internet reflect the impact of a supply-side effect on the labour market. By contrast, the increase in jobs in the financial services industry reflects higher demand for labour from this sector as a result of its increased output.

³⁰ According to the World Bank's poverty and equity database, the proportion of the population in the Philippines living on less than US \$3.10 per day in 2012 (the latest available data) was almost 12 percent.

REAL WORLD EXAMPLE: MOBKARD, THE PHILIPPINES MOBILE INTERNET ENABLES CONSUMERS TO CONNECT IN NEW WAYS

MobKard is a small start-up, founded in September 2013. In combination with Google Maps, its mobile app allows smartphone users to find retailers near to them that are offering discounts, promotions, sales or other special offers to users of the app. Information on over 500 retailers is currently available to MobKard customers.

For customers, as our MobKard interviewee explained, the app enables users to buy goods and services at a lower price or as part of a better overall package than would otherwise be the case. It also saves them time. Meanwhile, retailers get new customers and can try out different marketing strategies via the app to test what appeals to consumers. The result, says MobKard, is a win-win situation: customers are better off while retailers enjoy increased revenues and again a better understanding of their growing mobile-savvy customer base.

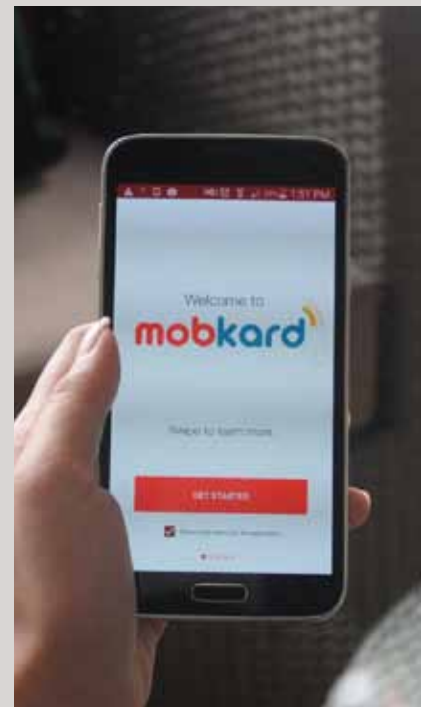
MobKard is still consolidating its business in the Philippines but hopes to develop in the future by expanding to other Southeast Asian countries, such as Indonesia and Malaysia. As is common in emerging markets, MobKard

cites the major barriers to growth as being poor internet connectivity and limited speeds. Smartphones have become affordable to the mass market in the Philippines and mobile internet penetration in the Philippines is now around 40 percent. However, many customers still only have 2G technology, access to Wi-Fi is limited and speeds are often slow, especially outside Manila.

To try to overcome these constraints, MobKard has invested in making the app itself more efficient. It also works to raise the familiarity of its potential customer base with smartphone apps in general in an effort to converting users away from SMS, which remains a popular messaging form in the Philippines. As infrastructure improves throughout the country, and affluence increases, MobKard expects that these challenges will be overcome, driving its future growth.

Apps like MobKard show how mobile internet can enhance market efficiency by bringing consumers and producers together through targeted product information, in this case related to both proximity and convenience. The benefits to consumers are self-evident

in the form of greater choice and lower prices. MobKard also demonstrates how the mobile internet is driving growth and providing new jobs and export opportunities in the Philippines.



10. THE IMPACT OF MOBILE INTERNET IN SINGAPORE

Singapore’s highly developed city-state economy is unique to the region. At just under US \$85,000, GDP per head in Singapore is almost eight times the regional average.

The city’s industrial structure is also very different to that of its neighbours, with agriculture and mining virtually non-existent and services accounting for almost three-quarters of GDP.

In terms of mobile internet penetration, Singapore leads the pack in Southeast Asia, by some distance.

Singapore has long been at the forefront in the innovation and integration of digital technology and dedicated investment in infrastructure has led to the provision of top-speed mobile internet. At 162 percent in 2015, Singapore has the world’s second-highest mobile penetration rate, only behind Macao.

Ongoing investment in mobile internet technology will enable Singapore to continue pushing the boundaries of its digital economy.

But in the next half-decade, we expect mobile internet penetration to grow at a slower pace, reflecting its existing maturity. Nonetheless, Singapore is expected to remain a global leader in mobile internet technology—we forecast a penetration rate of 187 percent by 2020.

The economic impact of its market-leading position is reflected in the economic benefits that Singapore has achieved. Since 2010, higher mobile penetration has helped to increase the capacity of Singapore’s economy by adding US \$6.8 billion to GDP.

In addition, over the next five years we expect a further US \$3.3 billion (0.9 percent) GDP

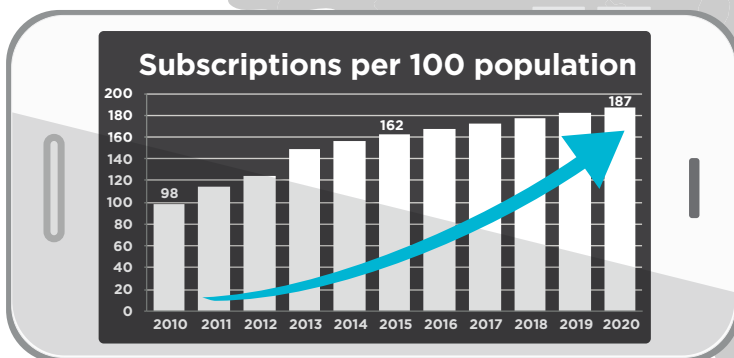
contribution from increased mobile internet.

The impressive employment growth that it has achieved already owing to mobile internet will slow as the market reaches maturity.

The high penetration rate has, however, already supported the creation of more than 15,400 jobs since 2010 and is expected to add a further 6,100 jobs by 2020.

This economic activity will help to generate additional tax receipts that could be used to finance beneficial socioeconomic investments.

For example, in 2020 we estimate that these receipts could be used to fund the primary school education of almost 11,000 children or to cover the cost of routine immunisation for six years.



In 2020 Singapore stands to gain an additional

\$3.3 bn in GDP

6,100 jobs

due to mobile internet growth

Increase in public finance sufficient to fund in 2020:

11,000

children through primary school

6 years

of routine immunisation programmes

11. THE IMPACT OF MOBILE INTERNET IN THAILAND

The newly industrialised Thai economy is the second largest in the Southeast Asia region after Indonesia. The economy was hit comparatively hard by the 2008-2009 global recession and has since suffered from inconsistent and often sluggish growth. At just over US \$16,000, GDP per head remains 50 percent above the regional average, albeit that this gap has narrowed significantly since 2008.

Despite this modest economic performance, Thailand has seen extraordinary growth in mobile internet in recent years. Helped by the wide availability of lower-cost smartphones and the rapid development of available 3G networks, mobile internet penetration rocketed from virtually zero in 2010 to 82 percent in 2015. As a result, in 2015 Thailand benefited from the second highest penetration rate in the Southeast Asia region, considerably higher

than in wealthier countries such as Malaysia.

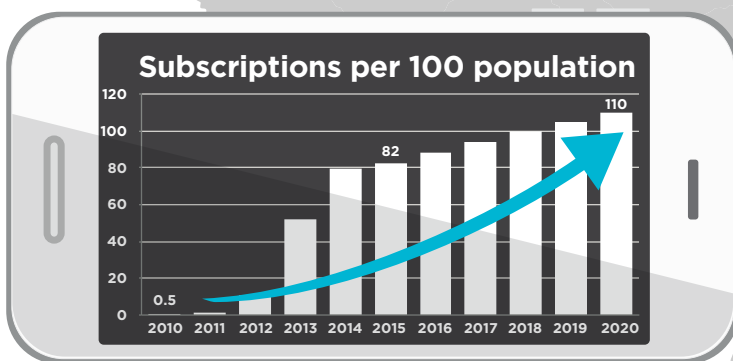
Expanded network coverage in rural areas will be critical if Thailand wants to continue its rapid development. The high level of penetration already achieved, however, will likely limit the pace of growth, especially by comparison to more immature markets in the region. However, we still expect penetration to remain well above the regional average in the medium term, exceeding one subscription per person by 2020.

Going forward there is still scope for mobile internet to create considerable economic value. Since 2010 increased mobile penetration in Thailand has already added US \$12.9 billion to GDP and we expect it to generate a further US \$4.6 billion (1.0 percent) by 2020. This is more than 50 percent larger than the forecast contribution of the hotels and

catering industry to GDP growth during this period.

And thousands of new opportunities will be created in the labour market. Associated higher labour force participation will support an extra 80,600 jobs by 2020, on top of the 241,000 already added since 2010. This is equivalent to 15 percent of the total expected (net) job creation in the decade from 2010.

The associated boost in public finances will be large enough to fund substantial investment in social infrastructure. For example, by 2020, we estimate it would be sufficient to put more than 46,000 children through primary school, to fund the construction of over 850 km of new two-lane highway or to pay for the implementation of routine immunisation programmes for over 22 years.



In 2020 Thailand stands to gain an additional
\$4.6 bn in GDP
80,600 jobs
 due to mobile internet growth

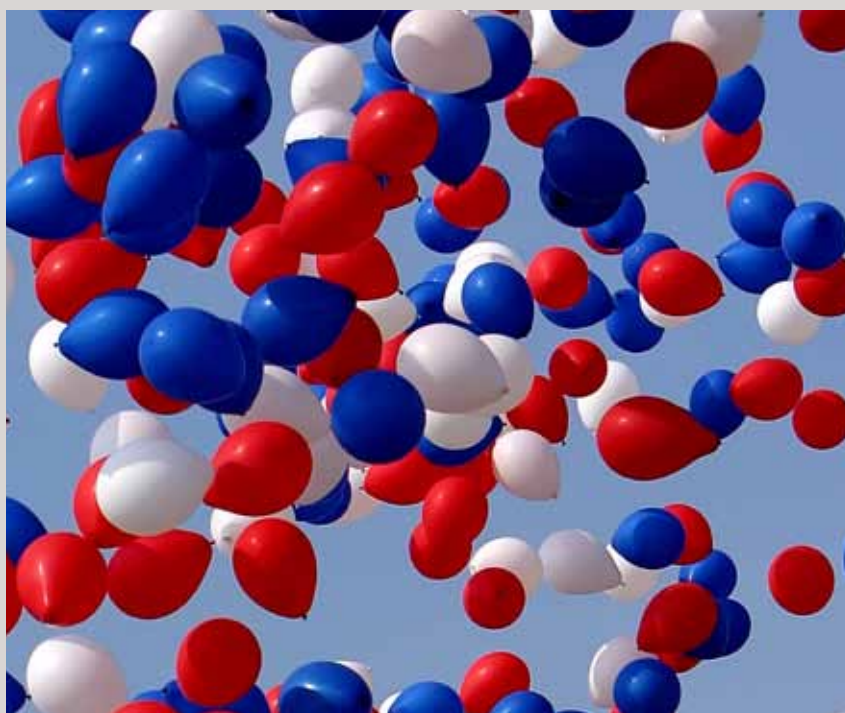
Increase in public finance sufficient to fund in 2020:
46,000
 children through primary school
22 years
 of routine immunisation programmes
85 km
 of new two-lane highways

REAL WORLD EXAMPLE: BALLOON ART 2 GO, THAILAND GROWTH PROSPECTS TRANSFORMED BY MOBILE INTERNET

Balloon Art 2 Go was started in 1992 by Poomjai Lohaprom following an inspiring trip to Japan. It delivers balloons and balloon decorations to customers all around Bangkok. In the first few years the company grew steadily, relying on print, broadcast and radio advertising to get the word out and eventually opening a physical store in 1997. The business really took off, however, when increasingly widespread internet access in Thailand enabled Poomjai to reach a much wider pool of customers in a cost-effective way than had been the case with print media advertising.

Mobile internet infrastructure in Thailand has developed quickly in the past half-decade with 3G networks spreading rapidly. The company has undoubtedly benefited from this, giving it ready access to a population where mobile internet penetration exceeds 80 percent. Targeted advertising using online search has enabled it to make the most of this opportunity with revenues doubling in a short space of time when the company adopted a digital strategy.

By 2015, on the back of this growth, the company had opened 10 more stores around Bangkok, and employed more than 70 staff to fulfil its orders. Poomjai



plans to open stores nationwide in the coming years but over time these plans will likely rely on the expansion of reliable mobile network coverage outside of the main urban centres. Balloon Art 2 Go demonstrates how mobile internet is driving growth and providing new jobs in Thailand.

12. THE IMPACT OF MOBILE INTERNET IN VIETNAM

Vietnam represents a strong growth opportunity for mobile internet technology. The country has a youthful population of over 90 million allied to a strong recent track record in terms of its macroeconomic performance.

Vietnam has been one of the strongest growing economies in the Asia Pacific region since the turn of the century with real annual GDP growth averaging over 6.5 percent since 2000.³¹ This follows a set of reforms beginning in the mid-1980s which promoted market forces and increasingly opened the economy up to foreign investors.

In the medium term, growth looks set to remain buoyant.

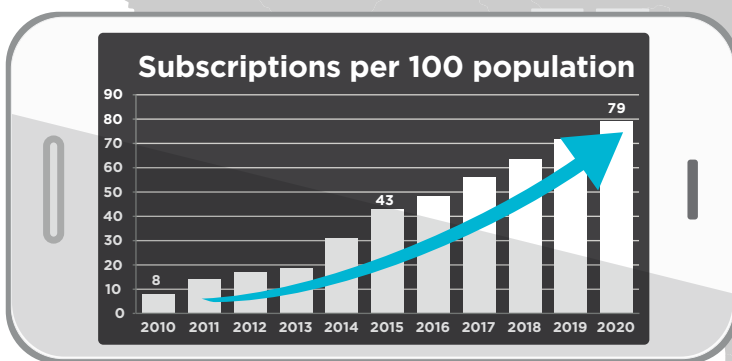
Medium-term economic prospects appear strong given a favourable demographic profile with less than seven percent of the country's

population aged over 65 as of 2014.³² At just below US \$6,000, GDP per head is just over half of the regional average, indicating that the economy has relatively strong scope for 'catch-up' growth.³³ Such potential should ensure that Vietnam remains a viable location for foreign investment.

A continued structural economic transformation has helped to reduce the economy's dependence on agriculture. In common with most other emerging markets in the region, the economy has been undergoing some structural transformation with the importance of the services sector rising at the expense of more traditional primary sector industries. For example, agriculture's share of GDP has fallen from over a quarter in 2000 to less than one-sixth last year. In its place, the

services sector has generally thrived, in particular finance, insurance and retail.

Mobile internet penetration remains below the regional average but has picked up noticeably over the past two years. Progress up to 2013 was fairly staid with penetration increasingly lagging behind the regional average. However, 2014 saw a take-off with penetration nearly doubling to 31 percent, helped by a near-60 percent increase in the purchase of smartphones.³⁴ Such growth has been supported by a dynamic industry environment with multiple players competing for market share helping to push down prices for consumers. Such a market structure bodes well for future prospects, particularly given our forecast for continued strong growth in households' disposable income.



In 2020 Vietnam stands to gain an additional
\$5.1 bn in GDP
145,600 jobs
 due to mobile internet growth

Increase in public finance sufficient to fund in 2020:

100,000

children through primary school



20 years

of routine immunisation programmes



86 km

of new two-lane highways

³¹ Based on data published by the General Statistical Office of Vietnam.

³² Based on data published by the United Nations.

³³ These forecasts are based on in-house projections from the Global Economic Model.

³⁴ This figure is an estimate provided by IDC based on analysis of shipping data. IDC, "Vietnam Smartphones Increase by 57% in 2014, Heats Up by Budget Models, Says IDC", in <http://www.idc.com/getdoc.jsp?containerId=prVN25480615> [accessed 14 January 2016].

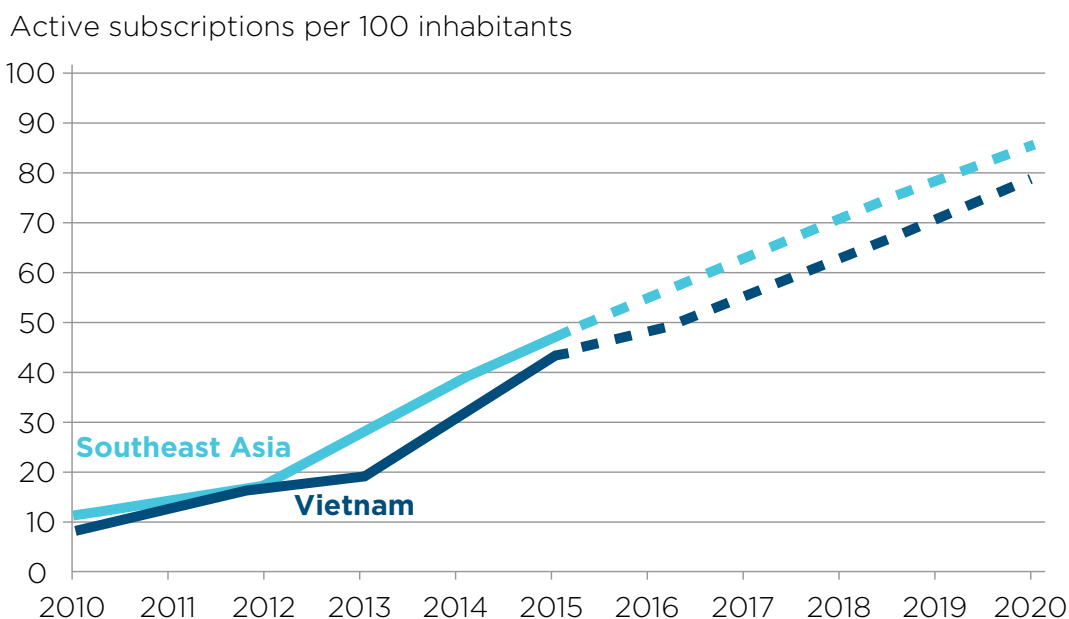
In the next half-decade the proliferation of lower-cost hardware should encourage the continuation of this healthy pick-up in penetration. Our forecast is that mobile internet penetration will almost double over the next five years, climbing to just under 80 percent by 2020.

The economic opportunity afforded by mobile internet is considerable. We estimate that each percentage point increase in mobile penetration over the next five years will add US \$143 million to GDP in 2020. Moreover, given our forecast for healthy penetration growth, we

expect the diffusion of mobile technology to create an additional US \$5.1 billion (1.8 percent) of GDP in 2020.

Mobile internet’s contribution to GDP growth is expected to exceed that of some of Vietnam’s more established industries. For instance, the US \$5.1 billion increase in the capacity of the Vietnamese economy due to mobile internet growth in 2020 is around 20 percent higher than our forecast of the increase in the GDP of the financial services sector during this period and almost 50 percent higher than the expected increase in GDP of the construction sector.

Fig. 12. Mobile internet penetration in Vietnam , 2010-2020



Source: ITU, Oxford Economics

All this will come on top of the sizeable benefits that have already been supported by mobile internet.

Indeed, we estimate that the growth of the market between 2010 and 2015 resulted in a US \$3.7 billion (1.9 percent) gain in GDP in 2015, 30 percent greater than the contribution of the business services sector during this period.

Mobile internet can also deliver a separate stream of economic benefits by helping to generate formal opportunities in the labour market.

Indeed, we estimate that each percentage point increase in mobile internet penetration between now and 2020 will support an extra 4,000 jobs.

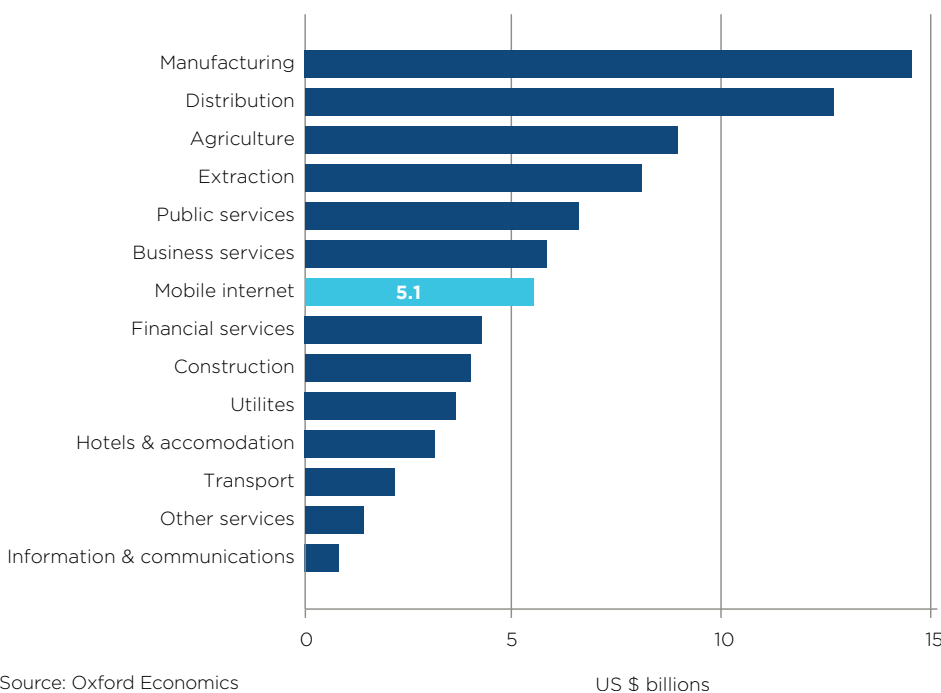
Overall, the impact in terms of job creation is expected to be substantial.

Our baseline forecast is that the growth of mobile internet during the next half-decade will generate close to an extra 145,600 formal jobs by 2020.

Higher growth and employment will provide a natural boost to public finances, which could be used to invest in social infrastructure.

The additional public finances generated by this extra activity would be enough to finance the primary education of almost 100,000 children, to fund the construction of over 860 km of new two-lane highway, or to cover the cost of implementing routine immunisation programmes for 20 years.

Fig. 13. Sectoral contribution to GDP growth 2015-2020³⁵



Source: Oxford Economics

US \$ billions

³⁵ It is important to note that the figures presented in this chart are not strictly comparable. For mobile internet, our figure refers to an impact on Vietnam's supply-side capacity whereas the sector values presented refer to forecast demand-side contributions due to the projected expansion of output of the relevant industry.



REAL WORLD EXAMPLE: THANH LY HANG CU, VIETNAM MOBILE INTERNET DRIVES BUSINESS EFFICIENCY

Thanh Ly Hang Cu produces new office furniture and also trades in second-hand and clearance furniture across Vietnam. Established in July 2010, the company has grown rapidly and now operates two production facilities and three warehouses in Ho Chi Min city and employs over 70 members of staff.

Mobile broadband has proved to be a vital tool for the company, enabling it to reach a broader range and number of customers very rapidly, and having a major impact on the efficiency of its operations. The mobile internet means Thanh Ly Hang Cu is able to deliver consumers with lower prices and better services, as well as creating wealth and jobs for Vietnam.

Our discussions with CEO, Nguyen Minh Phuc, suggested that the spread of mobile internet has been crucial in the company's growth, making it easier and quicker for customers to search for products and make purchases from the company. In response, the company has developed a dedicated Thanhlyhangcu app. It has also increased its use of mobile and social media adverts, which it regards as offering a promising opportunity.

Operationally, the company makes use of mobile internet day-in-day-out and has integrated internet use across its business processes. For example,



its sales people who are out and about throughout the country meeting sellers, use mobile internet to quickly compare goods and prices to ensure the right buy-in prices are offered, to liaise with those back at head office, and to confirm sales and send out invoices. Once deals have been concluded, sales representatives can immediately upload products to the company website so that they can be available to customers to purchase before they have even reached the warehouse. Logistics managers then use mobile GPS technology to manage the trucks that will go out and collect and deliver goods so that goods reach customers or warehouses

as quickly and efficiently as possible. Warehouse workers track inventories using tablets on site, and managers are able to keep real-time oversight of stock and product movements.

This degree of mobile internet integration into the company's operations has saved it both time and money. The company also reports that mobile internet has made managing its supply chains much simpler—again saving time and therefore cost—and that for managers, being able to use mobile internet while on the move has increased productivity as they are able to work from anywhere, without the constraints of fixed locations.

13. CONCLUSION

There is widespread recognition of the influence of smartphones on our daily lives through the extra choices and flexibility they have enabled. However, this report has demonstrated that the impact of mobile internet technology is much greater than this—higher take-up has resulted in huge economic benefits, boosting both GDP and jobs. Moreover, by acting through the economy's supply side, these benefits will be sustained for generations to come.

Our focus in this report has been the region of Southeast Asia. Here, the scale of benefits already accrued and those that we expect to see going forward is eye-catching. Overall, we expect the growth of mobile internet technology over the next half-decade to add US \$58.1 billion to regional GDP in 2020 whilst

supporting an additional one million jobs. Moreover, this boost to economic activity has the potential to finance vital investments in social infrastructure. For example, we estimate that the associated tax receipts would be sufficient to fund the primary school education of almost 1.3 million children, the construction of over 7,400 km of new two-lane highway or the cost of routine immunisation programmes for 22 years.

Such numbers demonstrate the vital role that mobile internet can play in raising prosperity throughout an area where the incidence of poverty remains high. However, fully exploiting this potential will require a supportive policy environment. The evidence presented in this report shows that the returns on such a policy approach will surely be substantial.

14. TECHNICAL APPENDIX

BACKGROUND LITERATURE

The advent of mobile devices has transformed the way in which consumers and businesses operate, and as such, it has increased economic growth through productivity gains. Whilst the direct impact of mobile technology on economic growth has received wide interest, few econometric studies have tried to measure the effect of mobile phones on productivity. Our study seeks to ascertain the direct impact of mobile phone

technology on productivity and labour participation.

Below, we present a short list of key studies that look at the impact of mobile phone on economic growth.

The literature suggests multiple channels through which mobile phone technology can stimulate economic growth. The first relates to the increased benefits such as mobility and security that mobile phones can provide to their owners.³⁶ Second, by using the radio spectrum,

mobile technology reduces a country's reliance on physical infrastructure such as roads, phone wires and the electrical grid. Third, mobile phones are easy to use and hence are accessible to a large segment of the population. Fourth, the fact that mobile phones can be used beyond the simple feature of voice communication, to transfer data, means that the technology can be applied across a wide range of sectors, for example, health, education, commerce and governance.³⁷

Articles	Methodology/Analysis	Key finding
Sridhar and Sridhar (2004)	These authors use a 3SLS approach to investigate separately the effects of main telephone lines and cell phones on GDP using data for developing countries.	A one percent increase in tele-density (total telephones per 100 population) increases national output by 0.14 percent. A one percent increase in cell phone penetration increases output by seven percent.
Roller and Waverman (2001)	These authors use a simultaneous equation approach to look at the effect of telecom infrastructure on economic development. A panel of 21 OECD countries over a 20-year period is used.	A one percent increase in the penetration rate, given by the number of mainlines per capita, increases economic growth by, on average, 0.05 percent.
Torero, Choudhary and Bedi (2002)	These authors use an Arrelano and Bond dynamic GMM approach to study the effects of telecom infrastructure on economic growth. A panel of 113 countries over a 20-year period is examined.	A one percent increase in the penetration, given by the number of mainlines per hundred inhabitants, increases economic output by 0.03 percent.
Waverman, Meschi and Fuss (2005)	These authors use a GMM approach to study the effect of mobile penetration on growth using a panel of developed and developing countries.	A unit increase in mobile penetration increases growth by 0.039 percent.

ECONOMETRIC METHODOLOGY

We use a number of econometric approaches to estimate the impact of mobile penetration on productivity and on the participation rate, respectively. These are: pooled Ordinary Least Squares (OLS), Random Effects (RE), Fixed Effects (FE) and Generalized Method of Moments estimator (GMM), namely the differenced- and system-GMM. The rationale for adopting this approach is to ensure that our results are not unduly influenced by our choice of econometric estimator.

For the static model specification, our tests show that the FE model is preferred to both pooled OLS and RE models. However, as a result of the failure to reject the null hypothesis of no serial correlation, we opted to use a dynamic model specification.

We do not estimate the dynamic version of our models using the pooled OLS, FE or RE estimators. This is because the simple pooled OLS estimate of the coefficient on the lagged dependent variable is likely to be inconsistent and biased upward, owing to the positive correlation between the lagged dependent variable and country fixed effects.³⁸ The FE estimator, produces the opposite, a downward bias with the extent of attenuation increasing when exogenous covariates are added.³⁹ Moreover, it has also been found that the coefficient

on the lagged dependent variable in our preferred model should be between the coefficient value estimated in the OLS and the within group estimator.⁴⁰ As such, the latter two values can be thought to represent lower- and upper-bounds for our estimated coefficient. The RE model is also likely to be inconsistent.

The system- or difference-GMM appear to be the best estimators available as they deal with the joint problem of serial and spatial endogeneity and correct for the potential endogeneity of other explanatory variables. The basic idea of the system GMM is to estimate each of our equations as a system of two equations. One is in first differences, which removes the fixed effects, and the other is in levels, which allows for the technical gains of additional level moment conditions and increased efficiency. Lagged first differences and lagged levels are used as instruments for equations in levels and for equations in first differences, respectively. The use of instrumental variables allows for consistent estimation of parameters even in the presence of measurement error and endogenous right-hand-side variables. On practical grounds, the system-GMM avoids the inversion of a high dimension spatial weights matrix (W). Moreover, the computation of its eigenvalues, as in the case of ML and QML, creates

³⁸ Hsiao, C. (2003). *Analysis of Panel Data*, 2nd edn. Cambridge University Press, Cambridge.

³⁹ Nickell, S. J. (1981). 'Biases in dynamic models with fixed effects', *Econometrica*, Vol. 49, pp. 1417-1426.

⁴⁰ Bond, S. R., Hoeffler, A. and Temple, J. (2001). *GMM Estimation of Empirical Growth Models*, CEPR Discussion Paper No. 3048, Centre for Economic Policy Research. Caselli, F., Esquivel, G. and Lefort, F. (1996). 'Reopening the convergence debate: a new look at cross-country growth empirics', *Journal of Economic Growth*, Vol. 1, pp. 363-389.

an issue with accuracy when W is large. Furthermore, the Monte Carlo investigation by Kukenova and Monteiro also recommends the application of system-GMM to the joint problem of serial and spatial endogeneity.⁴¹

Considering that the consistency of the system-GMM estimator depends on whether a selected set of lagged level and first-differenced values of the explanatory variables are valid instruments in the regression, three sets of specification tests are employed. First, the overall validity of the instruments is tested by the standard Hansen's J-test of over-identifying restrictions, which analyses the sample analogue of the moment conditions used in the estimation process. Second, following the recommendations in Roodman, difference-in-Hansen tests for the full set of instruments for the levels equation as well as for the subset based on the dependent variable are conducted.⁴² The number of instruments generated for the regressions is reported. Third, because significant second-order serial correlation of the first-differenced residuals indicates serial correlation in the original error terms and therefore misspecification of the instruments, we also test for first-order and second-order serial correlation in the first-differenced residuals. If the original error terms

are not serially correlated, there should be evidence of a significant negative first-order serial correlation in differenced residuals and no evidence of second-order serial correlation in the first-differenced residuals. In addition to the validity tests, a finite-sample correction to the two-step covariance matrix as suggested by Windmeijer is implemented.⁴³ Based on our tests, the difference-GMM is preferred to the system-GMM.

MODELLING RESULTS

The static version of our baseline equation is as follows:

$$\begin{aligned} \log \text{labour productivity}_{it} &= \text{constant}_i + \text{Mobile penetration}_{it} + \text{Corruption}_{it} \\ &+ \text{Capital formation}_{it} + \text{Education}_{it} + \text{Openness}_{it} \\ &+ \text{FDI inflows}_{it} + \text{Wage proxy}_{it} + \text{HDI}_{it} \\ &+ \text{country fixed effects}_{it} + \varepsilon_{it} \end{aligned}$$

The table below shows the definition of the variables used in our model and what we expect the sign of their respective coefficients to be.

Variables	Definition	Sign expectation
Mobile	Active mobile-broadband subscriptions per 100 inhabitants	Positive
Corruption	Index of corruption measured between 1 and 7 with 7 being the least corrupt.	Positive
Capital formation	Gross capital formation as a percentage of GDP.	Positive
Education	Gross enrolment ratio. Secondary. All programmes expressed as a percentage of the official secondary education age.	Positive
Openness	Ratio of the sum of exports and imports to GDP	Positive
FDI inflows	Foreign direct investment, net inflows (Balance of Payments in current US \$)	Positive
Wage proxy	Wage and salaried workers, total (% of total employed)	Positive
HDI	Health index from the International Human Development website.	Positive
Unemployment	Share of the labour force that is without work but available for and seeking employment—this is measured as a percentage of total labour force.	Negative
Labour productivity	Output per worker	Dependent variable

Source: Oxford Economics

Our key findings are as follows:

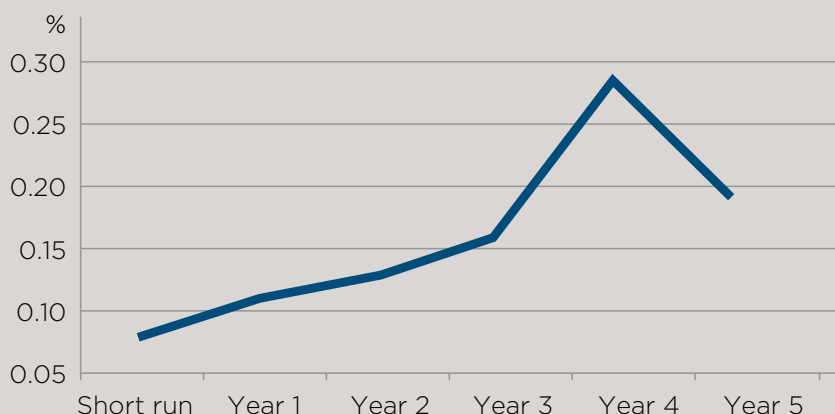
- One additional subscription per 100 inhabitants is associated with a 0.03 percent increase in labour productivity.
- A one unit increase in the index of corruption (i.e. recall that the highest score 7 means least corrupt) is associated with a 2.3 percent increase in labour productivity. Note that a one unit increase in this index is a relatively large shift.
- A percentage point increase in investment is associated with a 0.18 percent increase in labour productivity.
- The effect of education on productivity is not statistically different to 0.

Fig. 14. Econometric results: labour productivity model

	Static Models			Dynamic Models	
	POLS	RE	FE	DGMM	SGMM
Lag Productivity	-	-	-	0.5521***	0.8859***
Mobile	0.0001	0.0003	0.0006***	0.0003***	0.0001
Corruption	0.0811***	0.0275**	0.0111	0.0227***	0.0101***
Capital formation	-0.0019	0.0016	0.0022**	0.0018**	0.0001
Education	0.0032**	0.0011**	0.0011**	0.0002	0.0003
Openness	0.0401	0.0477*	0.0631***	0.0330**	0.0059
FDI inflows	0.05979***	0.0074**	0.0048**	0.0046**	0.0077***
Wage proxy	0.0186***	0.0111***	0.0031**	0.0022*	0.0019***
HDI	2.4807***	2.7784***	0.8283*	0.4684	0.1912
Constant	5.2637***	7.0020***	9.4308***	N/A	0.6777***
Number of observations					
Robustness tests					
Heteroscedasticity					
RAMSEY RESET test	Failed	N/A	N/A	N/A	N/A
Breusch Pagan test	RE model preferred to POLS				
Sargan-Hansen	FE preferred to RE model				
Serial correlation test	Serial correlation present				
Nickel Bias				Passed	Passed
Arrelano-Bond test AR (2)				Passed	Fail
Sargan test				Fail	Fail
Hansen Test				Passed	Passed

Legend: Our preferred model is highlighted. *, **, *** are significance level at the 10%, 5% and 1% respectively.

Fig. 15. Percentage increase in labour productivity following one additional mobile subscription per 100 inhabitants



Source: Oxford Economics

Next, we look at our labour participation model. The static version of our baseline equation is as follows:

$$\begin{aligned}
 \text{labour participation}_{it} &= \text{constant}_i + \text{Mobile penetration}_{it} \\
 &+ \text{Government efficiency}_{it} + \text{Education}_{it} + \text{Inflation}_{it} \\
 &+ \text{HDI}_{it} \\
 &+ \text{Female unemployment}_{it} + \text{Male unemployment}_{it} \\
 &+ \text{country fixed effects}_{it} + \varepsilon_{it}
 \end{aligned}$$

Our key findings are as follows:

- One additional subscription per 100 inhabitants is associated with a 0.006 percentage point increase in the participate rate.
- A one unit increase in the government efficiency score is associated with a 0.8 percentage point increase in labour participation.
- A one percentage point increase in education is associated with a 0.03 percentage point increase in labour participation.

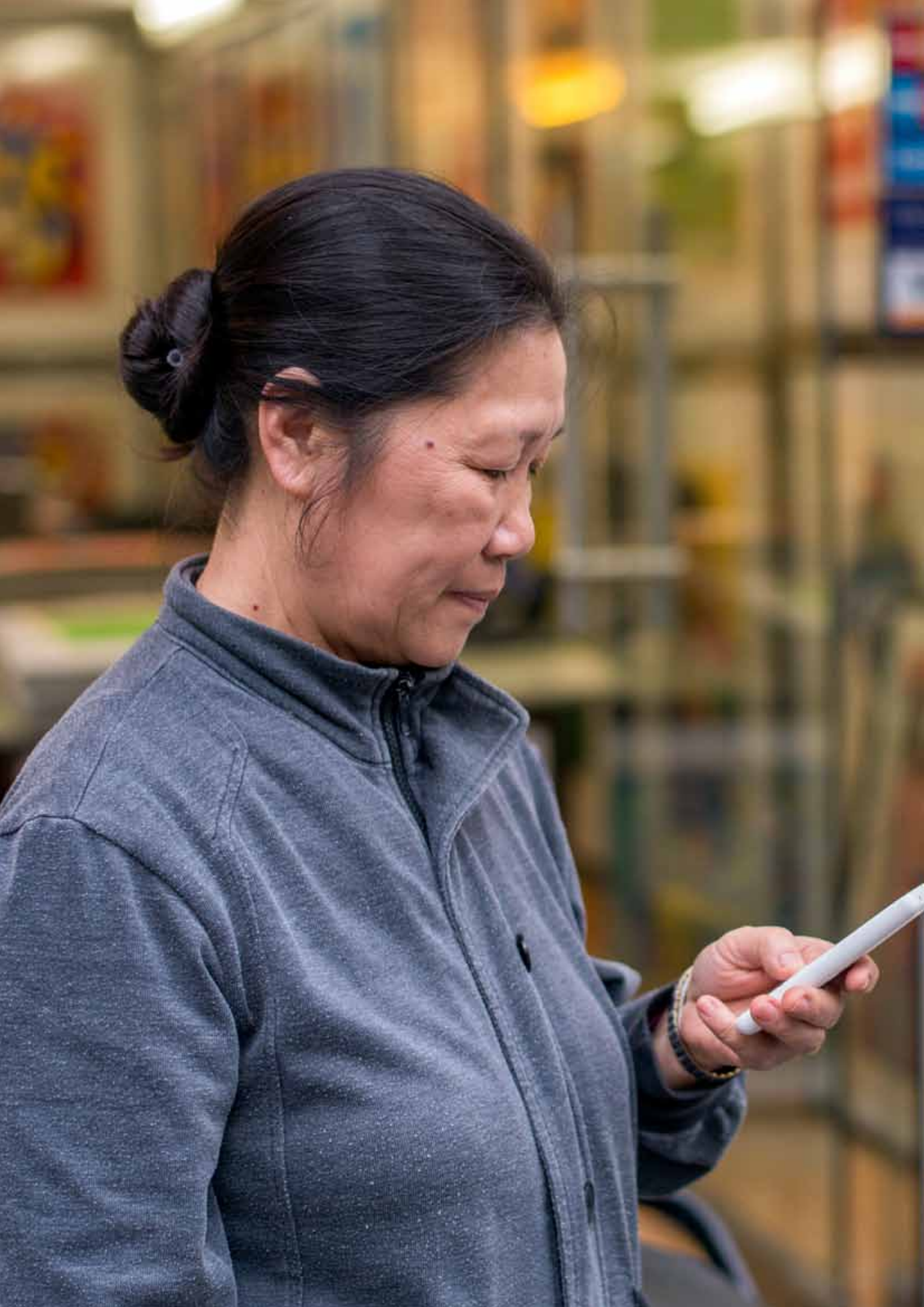
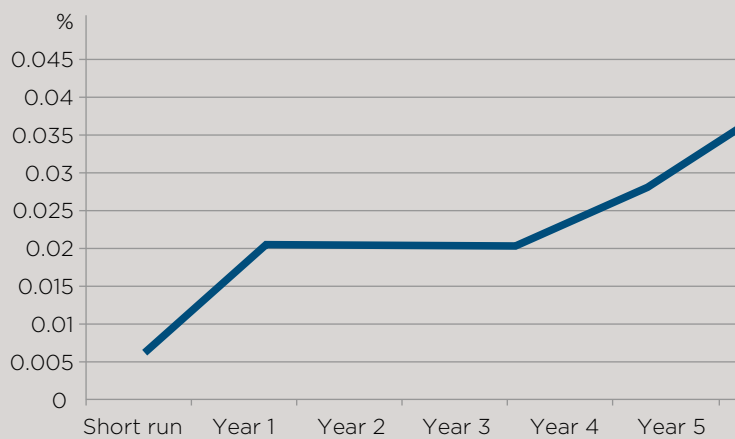


Fig. 16. Econometric results - Labour participation model

	Static Models			Dynamic Models	
	POLS	RE	FE	DGMM	SGMM
Lag Productivity	-	-	-	0.7094***	1.0087***
Mobile	0.0635***	0.0122*	0.0087**	0.0061**	0.0025
Corruption	2.5058***	0.7794**	0.8266***	0.3287**	-0.0746
Capital formation	-0.0285	0.0182	0.0241	0.0315**	0.0114**
Education	-0.1305	-0.0319*	-0.0305	-0.0097	-0.0039
Inflation	-20.2704***	9.2484	18.7818***	5.3386*	-0.4876
HDI	-0.8436***	0.0874	0.2637***	0.1717***	0.0277
Female unemployment	0.2965***	-0.0837	-0.1976***	-0.1511**	-0.0300
Male unemployment	83.9279	56.6172	47.9773	N/A	-0.8433
Constant	5.2637***	7.0020***	9.4308***	N/A	0.6777***
Number of observations	357	357	357	260	357
Robustness tests					
Heteroscedasticity					
RAMSEY RESET test	Failed	N/A	N/A	N/A	N/A
Breusch Pagan test	RE model preferred to POLS				
Sargan-Hansen	FE preferred to RE model				
Serial correlation test	Serial correlation present				
Nickel Bias				Passed	Fail
Arrelano-Bond test AR (2)				Passed	Passed
Sargan test				Passed	Fail
Hansen Test				Passed	Fail

Fig. 17. Percentage point increase in labour participation rate following an additional mobile subscription per 100 inhabitants



Source: Oxford Economics

OXFORD ECONOMICS

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June 2016

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