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Facebook's global economic impact

A report for Facebook

January 2015



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Executive summary

Facebook enables significant global economic activity by helping to unlock new opportunities through connecting people and businesses, lowering barriers to marketing, and stimulating innovation.

This study analyses how Facebook stimulates economic activity by providing tools for marketers, a platform for app developers, and demand for connectivity.

Facebook's broad economic impact enables far more revenue and jobs for global and local economies than Facebook's own company operations.

Facebook connects more than 1.35bn people with their friends and families around the world, and helps them discover new products and services from local and global businesses. It is a catalyst for economic activity in ecosystems composed of marketers, app developers, and providers of connectivity.

This study analyses how Facebook stimulates economic activity and jobs through three broad effects: as a tool for the biggest and smallest of marketers; as a platform for app development; and as a catalyst for connectivity. It estimates that through these channels Facebook enabled \$227bn of economic impact and 4.5m jobs globally in 2014. These effects accrue to third parties that operate in Facebook's ecosystem, and exclude the operations of the company itself.

Facebook's business model focuses on tools that allow businesses to reach new and existing customers through Pages and advertising. These tools help businesses – from the least technical to the most – grow their sales, and ultimately employ more people. Marketing effects, worth an estimated \$148bn, form the largest share of the economic impact facilitated by Facebook through third parties in 2014. In addition, Facebook developer tools that power and enhance 3rd party apps enabled an estimated \$29bn of economic impact. The purchases of mobile devices and connectivity services motivated by Facebook contributed an estimated \$50bn of economic impact.

Internet-based businesses such as Facebook facilitate broader economic activity across a series of economic agents. Such broad impact is far greater than these businesses' own size: in 2014 Facebook – a company with an approximately \$8bn cost base – enabled global economic impact of \$227bn.

This broad economic impact enables far more revenue and jobs for global and local economies than Facebook's own company operations. Other notable findings include:

- The United States is estimated to capture the largest share of economic impact, \$100bn;
- High rates of engagement enabled \$21bn of economic impact in Central and South America;
- The thriving app economy in EMEA has generated \$13bn of economic impact for the region; and
- Facebook has contributed \$13bn of economic impact in APAC, owing to demand for Facebook-motivated data usage and device purchases.

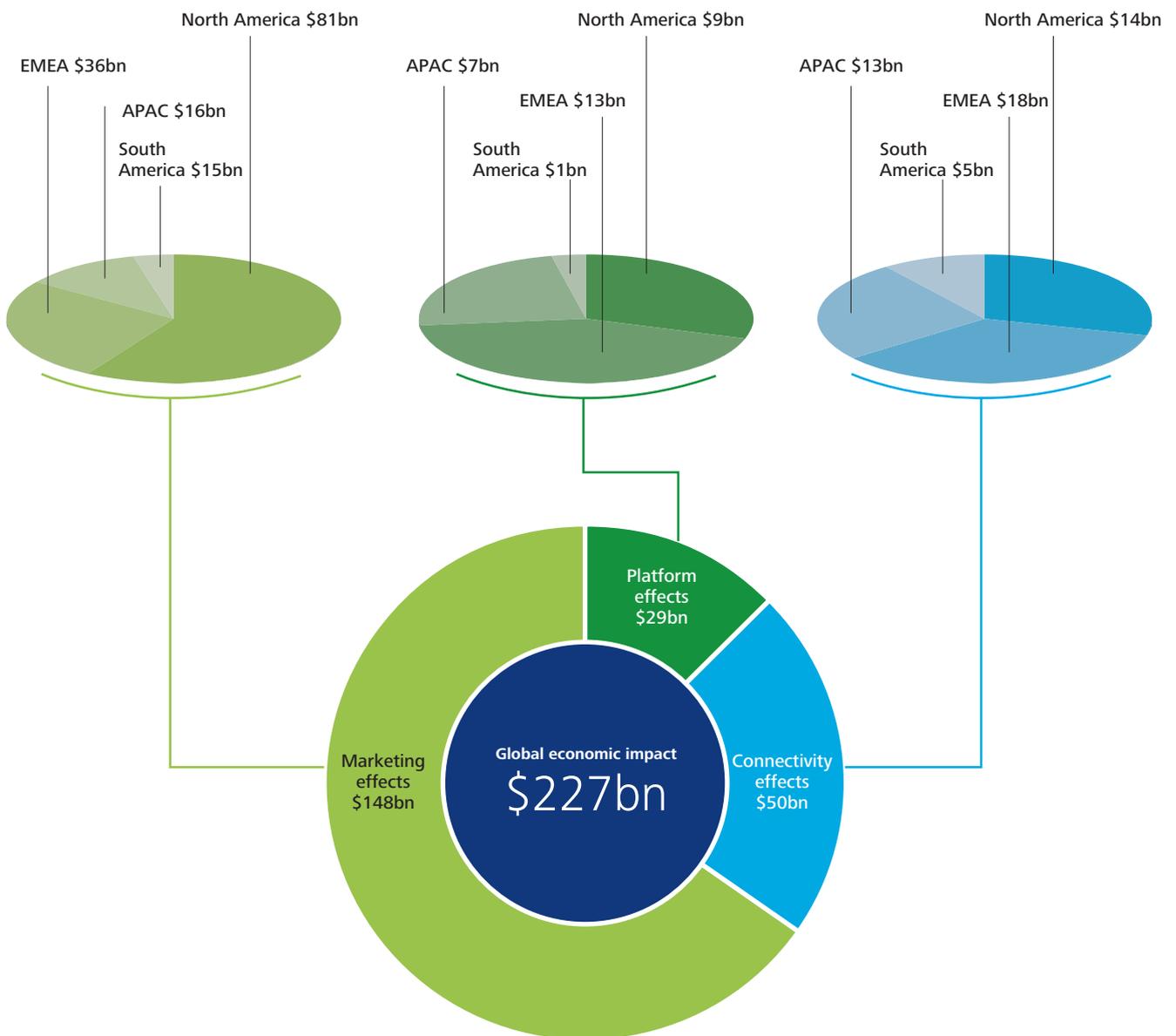
In addition, Facebook facilitates economic activity as it:

- Allows new and traditional businesses all over the world to reach customers locally, nationally, and globally;
- Reduces barriers to marketing by helping businesses of all sizes raise awareness of their brands and find the people most likely to be interested in their products and services;
- Supports entrepreneurship by providing a way for businesses to promote their activities;
- Enables new ecosystems such as the app economy that stimulate innovation and generate jobs; and
- Increases demand for mobile devices and internet services that carry positive spill-overs to other parts of the economy.

This study estimates the global economic impact and the number of jobs Facebook enabled in its ecosystem in 2014. By analysing the impact across North America, Central and South America, Europe, Middle East and Africa (EMEA), and Asia-Pacific (APAC), the study captures the diversity of Facebook's contributions across different regions.

The economic impact estimates include employee spending and economic activity generated in the supply chains of the companies directly active on Facebook, and exclude intermediate costs. A proportion of the economic activity supported by Facebook existed prior to Facebook's emergence. In order to attribute reasonable value to Facebook, economic impact and jobs figures presented in this study exclude activity estimated to have been displaced. As such, the results of the study are estimates of new economic activity enabled by Facebook in the relevant ecosystems.

Facebook-enabled economic impact



* Numbers may not sum due to rounding.

Macro-regional impact – All effects*

Region	Econ. Impact (bn)	Jobs ('000)
North America	\$104	1,160
Central and South America	\$21	570
EMEA	\$67	1,470
APAC	\$35	1,340
Total economic impact	\$227	4,540

* Numbers may not sum due to rounding.

Total country impact – All effects

Country	Econ. Impact (bn)	Jobs ('000)
US	\$100	1,076
Canada	\$5	82
EU-28	\$51	783
United Kingdom	\$11	154
Germany	\$7	84
France	\$7	78
Spain	\$4	52
Italy	\$6	70
Other EU-28	\$17	349
Brazil	\$10	231
India	\$4	335
Japan	\$3	34
Australia	\$6	62



1. Introduction

Facebook connects more than 1.35bn people and creates significant economic impact.

Facebook was started in February 2004 by Mark Zuckerberg as a social network for students at Harvard University. Within the busy university community, Facebook was envisioned as a space to connect with friends and promote openness for ideas and interests. The vision of making the world a more open place has remained with the company as it has grown into one of the largest in the world.¹

Following its launch at Harvard and other universities in the United States and abroad, Facebook expanded to the general population in 2006.² Its latest focus on improving the experience on mobile platforms and promoting connectivity has helped the company to grow in developing markets such as Brazil, Indonesia, and India. Facebook's expansion into new markets has unlocked new opportunities to enable economic impact within and outside of its platform.

In 2014 more than 1.35bn people around the world log into Facebook at least once a month, a 14% increase compared to a year ago. More than 83% of people active on the platform log in via their mobile devices and many of them return to check their News feed multiple times a day. In the United States, for example, Facebook accounts for nearly 20% of all time spent on mobile. Altogether people on Facebook represent the largest audience in the world that is reachable on a single platform.³

Through its wide reach and high user engagement, Facebook provides businesses of all sizes and technical sophistication with a significant opportunity to speak directly with their customers. As of June 2014, more than 30m small and medium-sized businesses (SMBs) have established a Facebook Page, and more than 1.5m companies actively use Facebook's targeted advertising system to reach potential customers.⁴ The number of active advertisers has grown by more five hundred thousand, or 50%, since June 2013.⁵ As a result, Facebook has become a hub that democratizes marketing: it facilitates economic activity for businesses of all sizes.

This study uses economic and econometric modelling to analyse the effects Facebook enables for third party businesses that use the platform. The study analyses Facebook's broad economic impact through:⁶

- *Marketing effects*: the economic impact of Facebook for businesses that use it as marketing platform to connect with consumers and build brand value;
- *Platform effects*: the impact in the developer app economy; and
- *Connectivity effects*: the impact created through the sale of mobile devices and internet connectivity.

These effects flow through new as well as traditional industries, impacting many businesses across sectors. In addition to direct economic impact experienced by businesses leveraging Facebook, the study also estimates the effects on companies in those businesses' supply chains and those with whom employees spend their income. These are referred to as indirect and induced effects respectively.

The study estimates the new economic activity enabled through Facebook's emergence and growth in the relevant ecosystems. It is expected that some of the economic activity currently supported by Facebook existed prior to the platform's development. In order to attribute reasonable value to Facebook, the results of the study estimate the economic activity enabled by Facebook after deducting pre-existing activity estimated to have been displaced.

The platform has other effects from supporting innovation to broader social benefits which go beyond the impact measured in this study.

Facebook has become a hub that democratizes marketing: it facilitates economic activity for businesses of all sizes.

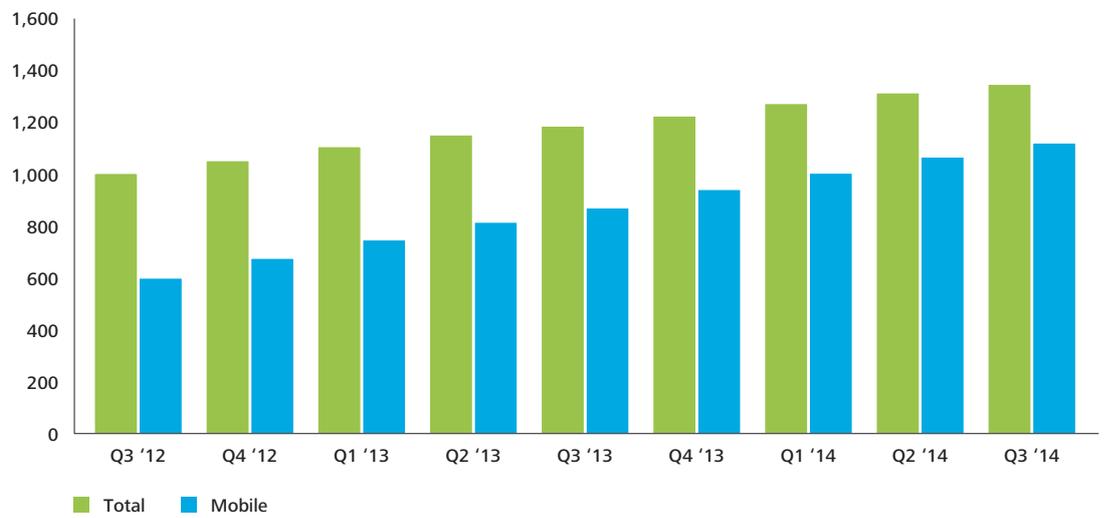
Facebook's broad economic impact flows through new as well as traditional industries, benefiting many businesses across sectors.

Economic impact is estimated in four macro regions: Europe, Middle East and Africa (EMEA), Asia-Pacific (APAC), North America, and Central and South America.⁷ In addition, results are disaggregated for a number of markets selected by Facebook.

Estimates in this study are based on Facebook data for the twelve month period between October 1, 2013 and October 1, 2014 and results are referred to as for the year 2014.

The methodology is described in detail in the Appendix.

Mobile and total Monthly Active People (MAP) on Facebook (m)⁸



2. Marketing effects

Facebook Pages and targeted advertising help businesses grow sales locally, nationally and globally; reduce barriers to marketing; and support entrepreneurship.

Marketing effects estimate the impact from businesses' use of Facebook marketing tools to drive online and offline sales, and to increase awareness of their brand.

Facebook gives marketers of all sizes the ability to reach an audience of more than 1.35bn people through a set of products that connect businesses and people, including Pages and targeted advertising.⁹

Businesses increasingly use Facebook's marketing tools to grow: via Pages and ads they can effectively acquire and retain customers and increase brand awareness. Conversely, people can use Facebook to discover new companies and brands or connect with businesses that they already know. Facebook's marketing tools are used by both online and brick-and-mortar businesses and are accessible globally. In addition to businesses, governments, non-profits and other civil society organizations also use Facebook to stay in touch with their members and constituents, which in turn enables economic and social value. These organizations benefit from the discovery and free flow of ideas that come from Facebook's open communication platform.

The report considers three sources of effects that create economic impact from marketing: Pages, targeted advertising and referrals.

Pages provide businesses with a way to establish or enhance their presence online across desktop, mobile and tablet. On Facebook people can discover Pages that are relevant to their interests. Targeted advertising, based on characteristics of Facebook's audience, allows marketers to deliver messages at scale to their most likely customers, which can increase return on advertising.

The cost-effectiveness of advertising for businesses is derived from the ability to target the relevant audience. Aggregated insights collected during their advertising campaigns allow businesses to further fine-tune their campaigns. Facebook's self-service, auction-based ad tool lets marketers of all sizes create campaigns at scale. These features lower the barriers to advertising and allow companies that would not be able to advertise in traditional channels to take advantage of promoting their products and services.

Furthermore, businesses also benefit when people share links to their websites with their friends. Sharing of links can have significant effects on sales and fundraising. For example, Facebook helped spread awareness about the "Ice bucket challenge" initiative that raised \$100m in donations to fund research for the cure of amyotrophic lateral sclerosis (ALS).^{10, 11}

Integration of advertising into Facebook's mobile platform gives marketers the ability to connect with people regardless of the device being used and capitalize on the high popularity of Facebook's app. In addition to providing a channel for discovery, businesses can also use their online presence on Pages to get customer feedback, crowdsource ideas, and recruit potential employees.

By using these marketing tools to reach their customers, businesses can increase sales locally, nationally, and globally and generate significant economic impact, no matter their size, location, industry, or technical sophistication.

Results

It is estimated that the marketing effect of Facebook in 2014 enabled \$148bn of economic impact and 2.3m jobs globally. North America, which contains Facebook's largest market, the US, captured nearly half of the overall global economic impact (\$81bn and 870,000 jobs) through a mix of active advertising spend and high page engagement.

After the US, Brazil ranks as second in terms of economic impact from marketing globally. The country's large population and highly engaged base of people on Facebook have contributed to an estimated economic impact of \$8.4bn and 189,000 jobs. Economic impact in the United Kingdom is estimated to be the third highest in the world at \$6.6bn and 89,000 jobs, as a result of active advertising and engagement in this region.

Businesses increasingly use Facebook's marketing tools to grow.

Governments, non-profits and other civil society organizations also benefit from the discovery and free flow of ideas that come from Facebook's open communication platform.

Macro-regional impact – Marketing effects*

Region	Econ. Impact (bn)	Jobs ('000)
North America	\$81	870
Central and South America	\$15	380
EMEA	\$36	620
APAC	\$16	450
Global total	\$148	2,300

* Numbers may not sum due to rounding.

Country impact – Marketing effects¹²

Country	Econ. Impact (bn)	Jobs ('000)
US	\$77.6	816
Canada	\$3.3	50
EU-28	\$27.7	388
United Kingdom	\$6.6	89
Germany	\$3.5	41
France	\$3.3	36
Spain	\$1.7	21
Italy	\$3.0	36
Other EU-28	\$9.6	165
Brazil	\$8.4	189
India	\$1.4	129
Japan	\$1.3	13
Australia	\$4.1	44



3. Platform effects

Facebook development tools encourage the creation of new features, services, and apps, which facilitate content distribution and stimulate innovation and new jobs.

Platform effects estimate the economic impact from 3rd party products and services built atop of the Facebook platform. The Facebook platform provides app developers with significant opportunities for discovery and monetisation of their apps, enabling economic activity and jobs.

The Facebook developer platform was first created in 2007 as a way for programmers to incorporate the Facebook experience into their apps.¹³ The platform, which originally only supported applications running within the Facebook website, has expanded to allow developers of native iPhone, Android and other platforms to “build, grow and monetise their apps” within and outside of Facebook.¹⁴ Apps of all types and audiences can both integrate Facebook features and power their infrastructure with Facebook cloud services. Through Facebook’s developer tools, app creators provide a consistent cross-platform experience within both Facebook and native apps.

The products on Facebook’s platform allow developers, with the person’s permission, to customize their apps. These features are especially powerful for gaming apps, for instance, which has led to a development of a new niche of social gaming as well as innovations in the travel and music industries.

Apps integrate with Facebook to enhance customer experience, acquisition, and retention and can use advertising to drive installs or engagement. These apps leverage the Facebook developer platform to enhance their business proposition and increase sales conversions. Furthermore, developers can extend their reach and monetise their apps with ads from Facebook’s advertisers through the Facebook Audience Network.

Facebook has helped to establish a new genre of apps centred on introducing social aspects into the experience by seamlessly allowing people to compete, collaborate, or compare themselves against their friends. The Facebook App Center serves as a hub for discovery of new apps that can be used on Facebook. Developers monetise their apps through in-app purchases within Facebook or through other channels, including in-app advertising or charging for downloads. Over 80% and 90% of top grossing apps in the United States on iOS and Android respectively are integrated with Facebook, which demonstrates the impact the platform has enabled for developers.¹⁵

Website owners use social plugins to embed Facebook’s sharing and commenting functionality into their sites, driving content distribution. By allowing their visitors to engage with content, website publishers can increase the time readers spend on their website, making it more valuable for advertisers. In addition, the sharing functionality brings more people to their websites and further increases sales conversions and advertising revenues.

The platform effects also include the economic impact of events that are organized through Facebook’s events feature. The simplified process of setting up an event and inviting friends allows higher participation and increased spending.

The app economy creates economic impact through the revenues enabled by the Facebook platform, in addition to traffic from social plugins. Through facilitating the creation, promotion, and monetisation of new applications, Facebook fosters entrepreneurial activity and generates employment in different places around the world.¹⁶

The Facebook platform provides app developers with significant opportunities for discovery and monetisation of their apps.

By facilitating the creation, promotion and monetisation of new apps, Facebook fosters entrepreneurial activity and generates employment.

Results

It is estimated that the platform effect of Facebook in 2014 enabled \$29bn of economic impact and 660,000 jobs globally. EMEA is the largest beneficiary of the platform effect, with estimated \$13bn of economic impact and 270,000 jobs. The impacts are driven primarily by the app economy, which benefited from successful companies such as Spotify or King.com, the developers of a music streaming platform and the Candy Crush Sage games, that are headquartered in EMEA. Additionally, clusters of entrepreneurs have emerged in cities such as Berlin, Minsk and Tel Aviv that focus on developing Facebook apps for their global audiences.

The US app economy generates the largest impact among individual countries, as a result of an active community both in Silicon Valley and the rest of the country, and contributes to the overall platform impact of \$8.2bn and 126,000 jobs to the overall platform impact.

While a portion of the economic impact was generated on the Facebook platform through apps that run within Facebook, a majority of the impact has been accrued by developers and publishers in the wider ecosystem. This is a consequence of an increasingly open integration of 3rd party applications into the Facebook developer platform.



Macro-regional impact – Platform effects*

Region	Econ. Impact (bn)	Jobs ('000)
North America	\$9	140
Central and South America	\$1	50
EMEA	\$13	270
APAC	\$7	200
Global total	\$29	660

* Numbers may not sum due to rounding.

Country impact – Platform effects

Country	Econ. Impact (bn)	Jobs ('000)
US	\$8.2	126
Canada	\$0.6	16
EU-28	\$10.5	198
United Kingdom	\$2.6	39
Germany	\$1.8	27
France	\$1.8	27
Spain	\$0.8	16
Italy	\$0.7	10
Other EU-28	\$2.8	79
Brazil	\$0.6	17
India	\$0.5	40
Japan	\$1	12
Australia	\$0.6	8

4. Connectivity effects

Facebook-motivated purchases of devices and internet connections drive demand for data usage. Improvements in connectivity spill over to the rest of the economy and stimulate economic growth.

Connectivity effects create economic impact through Facebook-motivated internet use and purchases of devices.

Facebook is among the most popular services on both desktop and mobile measured by the number of visits as well as the time spent on the platform. The Facebook mobile app is a particularly influential product. In the United States people spend nearly 1 in 5 minutes of their mobile time on Facebook.¹⁷ The company's growth in key emerging markets such as India and Brazil is also driven by usage of Facebook's mobile apps.¹⁸

More than 33% of people active on Facebook log into the platform exclusively with their mobile device and this share has been growing steadily.¹⁹ The Facebook app and the Facebook Messenger app rank among the top 10 most popular free apps in both Apple AppStore and on Google Play.²⁰

Innovations in mobile devices and internet infrastructure, and the growing number of services built atop of them, are facilitating the sharing of increasingly richer multimedia content. For example, people on Facebook often share high-definition videos captured by their mobile phones, post links to stream music, or view high-resolution photos. To access these services, consumers are buying faster connections and more generous data allowances.

In parallel, advances in computing, including faster processing power and more realistic graphics, accelerate a cycle of innovation that developers leverage to create applications on Facebook. The innovation loop motivates people to purchase new, more powerful mobile devices and higher data consumption.

Connectivity in developing countries allows people to take part in the digital economy, stimulates economic impact, and enables the transition to knowledge-based economies. People can then gain access to a broader digital ecosystem that includes health information, commercial data, and education. Access to information online, in turn, stimulates commercial and entrepreneurial activity beyond the effects captured in this study.

In efforts to bring internet connectivity to more people in developing countries, Facebook has developed partnerships with local operators and optimized its products for lower speeds and smaller data packages. In 2013 Facebook unveiled its Internet.org initiative, partnering with device manufacturers and connectivity providers to bring internet to currently unconnected people. It has launched the Internet.org app, which allows people in Kenya, Zambia and Tanzania to browse health, education and other information services without incurring data charges.

The improvements in broadband infrastructure, devices and general connectivity spill over to the rest of the economy, stimulating economic growth. Increased productivity facilitates more efficient business processes, new applications and services.²¹ These improvements also support wider benefits across health and education efforts.²²

Facebook-enabled economic impact of connectivity estimated in this study is captured by internet plan providers and local retailers of devices. As Facebook does not sell either of these products or services, the effects are accrued entirely by the members of its ecosystem.

Developers of Facebook apps create new features that fuel the innovation loop, which motivates people to purchase new, more powerful mobile devices and stimulates higher data consumption.

Connectivity in developing countries allows people to take part in the digital economy, stimulates economic impact, and enables the transition to knowledge-based economies.

Results

It is estimated that the connectivity effects of Facebook in 2014 enabled \$50bn of economic impact and 1.6m jobs globally in 2014. North America and EMEA, led by the United States and the European Union, were the main beneficiaries of this impact. This is due to their developed yet innovating internet infrastructure and relatively high disposable incomes that allow purchases of new mobile devices. For example, iPhones and high-end Android phones are more popular in the US and the European Union than elsewhere in the world.²² In contrast, uptake of Facebook in developing countries such as India or Vietnam is driven by feature phones that offer a streamlined interface, optimized for the slower speeds, and Facebook-specific data packages. In general, APAC is a significant beneficiary of these effects as a result of its large population that is rapidly embracing digital technologies and investing in connectivity infrastructure.



Macro-regional impact – Connectivity effects*

Region	Econ. Impact (bn)	Jobs ('000)
North America	\$14	150
Central and South America	\$5	150
EMEA	\$18	580
APAC	\$13	680
Global total	\$50	1,600

* Numbers may not sum due to rounding.

Country impact – Connectivity effects

Country	Econ. Impact (bn)	Jobs ('000)
US	\$13.8	135
Canada	\$1.1	15
EU-28	\$12.9	197
United Kingdom	\$2.1	26
Germany	\$1.4	16
France	\$1.6	16
Spain	\$1.2	14
Italy	\$2.1	24
Other EU-28	\$4.5	101
Brazil	\$1.3	25
India	\$2.1	165
Japan	\$1.1	9
Australia	\$1.0	11

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A1. Methodology overview

This study focuses on Facebook's *broad effects* that accrue to third parties in Facebook's ecosystem, and excludes Facebook's narrow effects caused by its day-to-day activities. As a platform for businesses to connect with customers, the broad effects are far more significant for a company like Facebook than the narrow effects.

This study analyses three broad impacts of Facebook:

- *Marketing effects*: helping grow sales online and in-store for businesses, increase brand value, and traffic to business websites through Facebook services that businesses use for marketing;
- *Platform effects*: developing an app community and enhancing the monetisation of apps, as well as enabling larger social activities; and
- *Connectivity effects*: boosting the demand for technology through increased sales of devices and broadband connections.

Economic impact refers to the contribution Facebook makes to economic output measured in terms of value added and jobs.²⁴ A proportion of the economic activity supported by Facebook existed prior to its emergence. To attribute reasonable value to Facebook, economic impact and jobs figures presented in the study exclude activity estimated to have been displaced or cannibalised. In this way the study estimates the extent to which Facebook has contributed to economic activity rather than simply displacing existing economic activity.

Examples include:

- New opportunities for businesses to engage with customers;
- New possibilities for gaming and social-enabled apps; and
- Additional demand for connectivity driven by the desire to stay connected to friends and family.

To assess the economic impact of Facebook the analysis:

- Estimates the 3rd party gross revenue supported by Facebook; and
- Converts this gross revenue supported into estimates of economic impact and jobs enabled by applying multipliers to capture the ripple effects,²⁵ and by excluding an estimate of activity displaced or cannibalised.

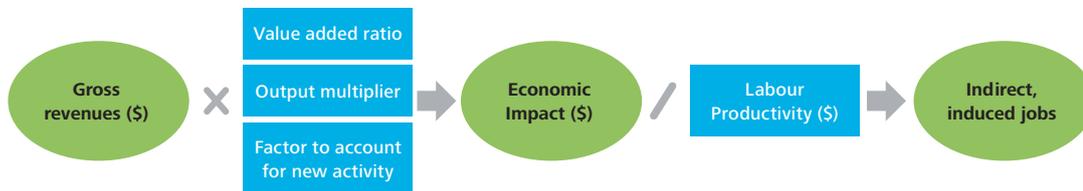
Study framework

Each effect generates value added to the economy through three channels:

1. *Direct impact (Direct effects)*: The initial and immediate economic impact generated by the gross revenues of businesses that use Facebook or whose products and services are used to access it.
2. *Supply chain impact (Indirect effects)*: The economic effects generated in the supply chain for businesses as a result of demand arising from the activities of businesses that use or leverage Facebook.
3. *Employee spending impact (Induced effects)*: The economic impact that arises from the consumer spending by those working at businesses that use Facebook and at their suppliers.

The report estimates economic impact and jobs enabled as follows:

- It first estimates gross revenue supported by Facebook, using different approaches and metrics across effects (described in section A1).
- Next it estimates economic impact enabled:
 - As the sum of direct, supply chain and employee spending effects. The supply chain and employee spending impact is estimated by multiplying gross revenue by two factors, an "output multiplier," to reflect how the initial spending ripples through the economy, and a "value added ratio" to convert output to economic impact (described in section A2).
 - By applying particular adjustments to capture new economic value Facebook enabled excluding value displaced (described in section A1).
- In the last step, jobs are estimated by calculating the number of jobs required to produce the economic impact estimated. This is calculated through metrics of economic impact per employee (referred to as 'labour productivity' in this study) (described in section A2).



The study assesses the economic value created by Facebook in four major macro regions:

- APAC;
- EMEA;
- North America; and
- Central and South America.

From those contributions, the economic impact and jobs enabled in 11 countries are estimated: these countries are USA, United Kingdom, Germany, France, Spain, Italy, Canada, Brazil, India, Japan, and Australia. The effects in the EU-28 as a whole are also presented. The results in the study use data on activity on Facebook for the period October 2013 to October 2014.

The methodology employs assumptions where exact data was not available from Facebook or public sources. The derivations of the assumptions have been consulted with Facebook employees and compared with existing research. The subsequent chapters of the methodology state the assumptions and provide their explanation. Where multiple values for assumptions were available, the analysis sought to employ conservative estimates.

Approach by effect

Marketing Effect

Through targeted advertising and Pages, Facebook allows firms to promote their brand, raise awareness and generate new sales. This study assesses Facebook's economic impact through its reach in three areas:

- *Pages*: using Facebook to build brand value.
- *Targeted advertising*: using Facebook to reach new and existing customers through paid advertising.
- *Referrals*: directing organic traffic from Facebook to external websites.

Page engagement

Sales from Page engagement are estimated as a product of the total sales of businesses with Pages and the sales uplift estimated due to their engagement on Pages (see section A3 for how elasticities are estimated by econometric methods). The total sales of the businesses that have a Facebook Page are estimated using the revenues of the private sector in the economy based on national statistics. Survey evidence is then used on the percentage of businesses with a Page in the US and the UK.²⁶

For the rest of the world, the value of a liking action of a Page is estimated using relative GDP per capita of each country to the UK and USA to reflect the local economic conditions.

The gross revenue supported by Pages is then the product of the number of Pages liked and the value of a liking action of a Page.



Targeted advertising

Businesses' direct sales from paid advertising on Facebook are estimated from the amount of advertising spend by businesses on the platform and estimated country-level average Return on Investment of advertising (ROI).

ROIs are estimated for selected countries as the ratio of the estimated enabled sales due to advertising on Facebook and the average advertising spend on Facebook:²⁷

- The sales due to Facebook advertising are the product of the number of businesses that advertise on Facebook, an estimate of their average revenues and the elasticities of sales to Facebook advertising (see section A3 for how elasticities are estimated by econometric methods).²⁸
- The average Facebook advertising spend of businesses is derived as the ratio of the sum of advertising funds spent by businesses and the corresponding number of businesses as set out above.

ROIs for the remaining countries are adjusted using Facebook penetration to reflect the potential reach of the advertising. Gross revenues are estimated as a product of advertising spend and ROIs. The gross revenues also include estimates of the revenue generated by advertising agencies from spend on Facebook, who typically take a commission on the advertiser's spend.



Referrals

Website owners can increase their revenues as a result of additional organic website traffic referred from Facebook. The approach to valuing links to third party websites varies by the type of website.²⁹ The values are multiplied by the total number of clicks provided by Facebook to estimate gross revenue from referrals:



Economic impact from Marketing Effect

Estimation of new activity

A proportion of the economic activity supported by total advertising and engagement on Facebook existed prior to Facebook. A proportion of digital marketing, and thus advertising on digital platforms such as Facebook, represents a shift away from traditional channels such as TV, radio, newspapers, etc. In order to attribute reasonable value to Facebook, the study estimates the economic impact and jobs enabled by advertising, pages and referrals by excluding activity displaced from offline media.

Facebook may enable economic activity and associated jobs by opening up new opportunities for businesses to engage with customers by complementing traditional advertising or by allowing businesses to advertise more due to Facebook advertising's lower upfront costs. At the same time, the return on some of the advertising switched from traditional media to Facebook can be higher, and this can further drive new economic activity.

Advertising

To estimate Facebook's economic impact excluding marketing activity shifted away from traditional channels such as TV, radio or newspapers, Zentner's 26 country panel-data displacement estimates for different offline media types resulting from internet penetration are used. Based on information on advertising spend per media type, the resulting displacement (substitution) of offline advertising with online advertising is estimated based on a number of countries. It is estimated that approximately two thirds of online advertising is a shift away from offline advertising, i.e. approximately one third of online advertising is new activity.³⁰ This result is consistent with other evidence that suggests that substitution between online and offline advertising is not complete, and that online and traditional advertising can have important synergies and beneficially coexist.³¹ The assumption of one third of online advertising being additional does not capture the higher effectiveness that some of the advertising diverted from traditional channels to Facebook can have in some circumstances, and/or the dynamic effects it can have on the economy as a result of businesses being able to use resources more efficiently, which can lead to positive effects beyond those measured by displacement only.

Businesses can use a range of platforms online to advertise, including Google AdWords, Bing Ads, or the Twitter Advertising platform, that exist alongside Facebook. While assessing precisely what businesses would have done in the absence of Facebook in 2014 is difficult and not estimated in this study, the platform has features that suggest that the platform creates value over other online platforms as well as over traditional media. Such features include the ability to market via the combination of Pages and paid advertising, and the ability to target based on characteristics, preferences and through friends' recommendations/networks (a more extensive description of Facebook features is presented in the main body of the report).

Pages

The creation of Pages represents a low-barrier marketing option for most businesses. Businesses may use Facebook Pages as one of the marketing tools before embarking into paid advertising. Page creation should thus displace some of the traditional advertising tools in a similar fashion to Facebook paid advertising. The report assumes the same degree of displacement of traditional advertising from Pages as from Facebook paid advertising and applies an adjustment factor to Pages of approximately one third to capture new activity. This assumption may be conservative because Pages are a lower cost marketing resource. Companies that do not have sufficient marketing budgets and that may not have been able to advertise before can promote themselves through Pages. The ability to promote a business through Pages and other features indicates the platform can have beneficial effects over other online platforms.

Referrals

Like Pages, referrals represent a low-barrier marketing option for many businesses, increasing the opportunities for their content to be found. Businesses may use referrals as one of the marketing tools before embarking into paid advertising. Facebook's large and engaged audience, special sharing options (for example the option to include thumbnails of websites), and other features motivate additional sharing. This report assumes the same degree of displacement from referrals as from Pages and applies an adjustment factor to referrals of approximately one third to capture new activity. This assumption may be conservative because referrals, like Pages, are a lower cost marketing resource and benefit from Facebook's scale.

Estimation of ripple effects

Output multipliers and value added ratios are applied to estimated gross revenues to calculate supply chain and employee spending effects.

Summary of parameters, inputs and assumptions

Total advertising spend on Facebook, total liking actions of Pages, total clicks by destination domains	<ul style="list-style-type: none"> Data provided by Facebook.
Advertising ROI	<ul style="list-style-type: none"> Values for selected countries are calculated using econometric analysis on a sample of over 2,000 businesses on an annual basis between 2008-2012, and estimates of the average share of revenue spent on advertising on Facebook by businesses that are active on Facebook. The econometric model uses proprietary firm-level data from Facebook, Kantar Media, Bureau van Dijk/Orbis and variables from the World Bank. See section A3 for further details. ROI factors are approximated for the rest of the world based on Facebook penetration by country.
Value of a Liking action of a Page	<ul style="list-style-type: none"> Deloitte econometric analysis as described above. See section A3 for further details. The values of a Liking action of a Page are estimated for the rest of the world based on national GDP per capita relative to the countries in the econometric analysis.
Value per click	<ul style="list-style-type: none"> Estimates based on approximate CPM for video, shopping, and social, and other websites.
Value added ratios, multiplier for the general economy, labour productivities	<ul style="list-style-type: none"> See section A2 for details.
Factor to account for new activity	<ul style="list-style-type: none"> The factor of one third is applied to capture new marketing activity on Facebook and exclude activity estimated to be displaced from other media.

Platform effects

App Economy

The Facebook platform allows developers to build plugins, apps, and games that people can use both within Facebook as well as on mobile devices and the rest of the web. The value of the app economy enabled by Facebook is estimated by considering three types products provided by the platform:

- Apps that are integrated with Facebook but do not use Facebook app install advertising or in-app purchases ('non-monetised apps');
- Apps that integrate Facebook's payment system for in-app purchases or use app install advertising on Facebook ('monetised apps');
- Social plug-ins for sharing of content from websites.

Value of Facebook-provided backend services, for example through Parse and other cloud computing offerings, are implicit in the calculations but not quantified explicitly.

Non-monetised Apps

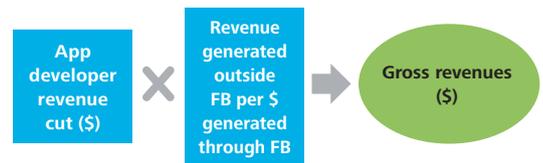
Facebook's developer platform allows app developers and publishers to incorporate selected Facebook functionality and data into their own products. The ability to integrate people's data, following their explicit permission, into the app enhances its functionality and increases usage, engagement or conversion rates, depending on the monetisation strategy of the app. The analysis considers apps with more than 1,000 monthly active people to exclude apps and products that may not be financially viable as advised by Facebook subject matter experts.

The approach followed to estimate the revenues of these apps is based on Facebook data for the average monthly number of developers who work on Facebook-related portions of the apps. The total number of employees supported by non-monetised apps is estimated by multiplying the number of employees in the country that work on the relevant apps by the support staff ratio.³¹ The total number of employees is multiplied by software sector labour productivity to estimate the gross revenues of these apps.



Monetised Apps

Revenue generated by canvas apps that use the Facebook payment processing system for in-app purchases is determined using Facebook data on total revenue from in-app purchases, excluding Facebook's 30% commission payment. Revenues generated outside of the Facebook payment processing system, for instance through in-app purchases processed by the Apple AppStore or Google Play, in-app advertising or payments for the sale of the app, are estimated using the Facebook revenues and approximated "out-of-Facebook" revenue multiplier as below:



Revenues of apps that use Facebook app install advertising are approximated using their advertising spend and an estimated ROI on app installs.

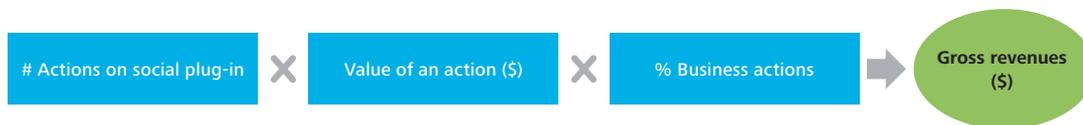


If apps use both in-app purchases and app install advertising, the approximated revenues due to advertising are subtracted from the total estimated revenues to avoid double counting of impact.

Social plug-ins

Social plug-ins give website developers and publishers the ability to incorporate Facebook's commenting, liking, and sharing features into their websites. Through these features social plugins can increase traffic, time spent on site, or sales conversions that grow website publishers' revenues.

To calculate gross revenue, the number of plug-ins actions (like, share, comments) is multiplied by their estimated value derived from Page engagement estimates. An assumption is applied to exclude actions not related to potential business or other economic activity through adjusting the total number of actions downwards by 20%.³³



Economic impact from app economy

Estimation of new activity

In order to capture new value enabled by Facebook in the app ecosystem, the following assumptions are applied.

Games within Facebook have helped to create a new genre of gaming where people can play with friends, compete against them, and share their achievements within a single platform. While this development has primarily enlarged the overall market, a portion of the existing gaming market targeted at a similar core customer group, for example companies developing Java games for mobile phones, Flash online games, or certain single- and multi-player simulation games, has been displaced by the emergence of Facebook. It is assumed that 80% of the estimated revenues of canvas games that use in-app purchases represent new activity. This reflects Facebook's strong proposition in the market for in-browser gaming.

The ratio of new activity for revenues earned outside of Facebook for multiplatform games is assumed to be 50% to reflect that these games also operate and affect activity in other channels. The lower percentage of new economic activity enabled by Facebook for these apps is based on the wider set of Facebook competitors that these apps can use for infrastructure (eg, Amazon AWS, Microsoft Azure), payment processing (eg, native processors, Square), or promotion and delivery (eg, Google Play, Apple App Store).

For apps that do not run on the canvas platform and do not use in-app purchases, the share of new activity is assumed to be 50% for the same reasons as for the revenues earned by multiplatform games outside of Facebook, as described above.

Estimation of ripple effects

Output multipliers and value added ratios are applied to estimated gross revenues to calculate the supply chain and employee spending effects.

Summary of parameters, inputs and assumptions

Apps	
Gross payments revenues generated by individual apps	• Data provided by Facebook.
App developer in-app revenue cut	• Facebook charges 30% commission on providing the payments processing functionality, with the developer retaining the rest. ³⁴
Out-of-Facebook revenue multiplier (Canvas apps)	• A multiplier has been estimated based on interviews with Facebook subject matter experts, and data from App Annie provided by Facebook for reference.
Advertising spending on ad install ads	• Data provided by Facebook.
App install ads ROI	• A conservative ROI was used to determine the return on app install ads. Depending on the app, the return can be generated through sale of the app, in-app purchases, or in-app advertising.
Viability threshold	• Apps with fewer than 1,000 monthly active users have been excluded from the analysis of non-monetised apps under the assumption of financial unviability of such apps. The assumption has been informed through interviews with Facebook subject matter experts.
Social Plug-In	
Data on actions that happen within the social plug-in	• Data provided by Facebook.
Value of plug-in actions	• The values of all plug-in actions are considered equal and assumed to have an approximate value of 1% of the value of liking actions on Pages to reflect the short-term lifespan of these actions.

Summary of parameters, inputs and assumptions (continued)

Common	
Locations, average MAUs, average numbers of developers	<ul style="list-style-type: none"> Data provided by Facebook.
Support Staff Ratio	<ul style="list-style-type: none"> Support staff is defined as any staff that does not directly work on the implementation of Facebook functionality. Examples of such staff may include designers, project managers, marketers etc. The ratio is based on a study by the University of Maryland,³⁵ where it was estimated to be 2.2 staff for every developer working on a Facebook app. For non-monetised apps, the ratio is assumed to be 50% lower to reflect that the business models of these apps may be less reliant on Facebook than canvas apps.
Factors to account for new activity	<ul style="list-style-type: none"> Assumptions for accounting for new activity have been verified with Facebook subject matter experts and are as follows: <ul style="list-style-type: none"> Revenue of canvas apps earned within Facebook: 80% Revenue of canvas apps earned outside Facebook: 50% Apps promoted with app install ads: 50% Non-monetised apps: 50% Social Plug-ins: one third
Value added ratios, multiplier for the general economy, labour productivities	<ul style="list-style-type: none"> See Appendix 2 for details.

Events

Social events on Facebook create economic value by stimulating additional consumer spend. Facebook users can invite each other to events covering a broad range of activities, from parties to sports.

The analysis only takes into account social events, i.e., events created by a person, not a business, with a minimum of five attendees. Facebook data on the number of expected event attendees is adjusted by the actual attendance rate, assumed at 50%, to reflect the uncertainty from non-binding acceptance.³⁶

The total estimated number of events attendees is then multiplied by the estimated average spend per event to give the gross revenue from social events, based on average spend per person per pub visit.^{37, 38} Spend estimates are adjusted by Purchasing Power Parity (PPP) data from the World Bank to account for differences in spending across the world.³⁹ While the spend is based on the cost of a visit to a pub, the estimate is likely to represent a lower bound for spending at different types of events including sports or concert tickets and associated spending (e.g. transport etc).



Economic impact from events

Estimation of new activity

An assumption is applied that 20% of the gross revenue associated with Facebook events represents new value enabled by Facebook. The new value is based on Facebook's ability to build attendance by leveraging a broad network of contacts, by facilitating the invitation of friends, and by increasing the visibility and discoverability of people going to events.

Estimation of ripple effects

Output multipliers and value added ratios are applied to estimated gross revenues to calculate the supply chain and employee spending effects.

Connectivity

Devices

Facebook enables demand for, and therefore generates value through, the sale of devices. The analysis estimates the value of smartphones, tablets and feature phone sales that are motivated by Facebook.

The approach uses country-level data provided by Facebook on active "monthly active people" (MAP, the number of people who use the service at least once per month) based on the mobile platform they use to access Facebook.

As some devices may be used by multiple people or a single person may have multiple devices, number of MAPs is adjusted by sharing ratios to estimate the number of unique devices used to access Facebook. The following assumptions are employed to estimate the number of unique devices:

- 1.2 people share one smartphone to access Facebook.
- 2 people share one tablet to access Facebook.
- 1.1 people use one feature phone to access Facebook.

While it is expected that tablets are shared by more than one individual in the household, material sharing of smartphones and feature phones is not expected due to their personal nature.

Summary of parameters, inputs and assumptions

Number of events on Facebook, Number of expected event attendees	<ul style="list-style-type: none"> • Data provided by Facebook.
Actual attendance rate	<ul style="list-style-type: none"> • It is assumed that 50% of people marked as "attending" or "maybe" will attend the event.
Average spend per event	<ul style="list-style-type: none"> • For the UK, the approach uses the average spend per person per visit to a pub (about \$25). The data is derived from the 2013 Leisure Wallet Report.⁴⁰ • For the other ten countries and for each region, the average cost of a pub a bar visit is calculated assuming an average consumption of three items (two drinks, one meal). • All figures are PPP adjusted. PPP indexes at country level are calculated based on World Bank data (2012).
Factor to account for new activity	<ul style="list-style-type: none"> • The adjustment factor of 20% is applied to capture the additional consumer expenditure at Facebook social events.
Value added ratios, multiplier for the general economy, labour productivities	<ul style="list-style-type: none"> • See section A2 for details.

Replacement rates are used to determine how many of those unique devices have been sold in the given period by dividing the number of unique devices by the replacement rate for the given type of platform and region. The replacement rates are assumed to be 2 years for smartphones and feature phones, and 2.5 years for tablets and likely understate the impact due to faster replacement cycle in certain markets.⁴¹

The value of these devices is then calculated by multiplying the number of unique devices purchased in the given year which are used to access Facebook by the weighted average selling price (ASP) for the platform and region. ASPs in the given categories are based on the pricing in different key countries in the region. The weighted ASP is assumed to be a weighted average of the low-cost and high-cost device. The price of the low-cost device is assumed to contribute 80% of the ASP and the high-cost device the remaining 20% to reflect the finding that more people adopt smartphones as they become more affordable.⁴²

Given the popularity of Facebook, it is assumed that a proportion of the demand for new devices using Facebook is driven by the desire to use Facebook. In order to apportion value from devices to Facebook, an assumption is accordingly applied based on the results of a survey by Ofcom which illustrates the relative importance of different smartphone services such as making phone calls, social networking and internet browsing, to smartphone owners of different ages.⁴³ On this basis, it is assumed that 16% of the value from unique devices purchased in the given year which are used to access Facebook may be attributable to Facebook.

The study captures the retail value stimulated by Facebook from device sales, as manufacturing of devices only happens in specific locations. To isolate this retail value, an approximation of a retail margin, consisting of, for example, operational expenses, taxes, or profits, is applied to the estimates.



Summary of parameters, inputs and assumptions

Unique monthly average user (MAU) per type of device, per OS	<ul style="list-style-type: none"> Data provided by Facebook.
Sharing of devices	<ul style="list-style-type: none"> One device may be used by a number of people to access Facebook. Similarly, one person may access Facebook from multiple of his devices, which can fall into the same category or span multiple categories. The assumption allows estimation of unique devices from the data on monthly average users. It is assumed that on average 1.2 people share a smartphone, 2 people a tablet, and 1.1 people a feature phone.
Replacement rates	<ul style="list-style-type: none"> A replacement rate of two years means that on average every other year people buy a new device and hence in every year, half of all devices are newly purchases. The average replacement rate for smart and feature phones is 2 years, for tablets 2.5 years.
Share of device value attributable to Facebook	<ul style="list-style-type: none"> It is assumed that 16% of the value from unique devices purchased in the given year which are used to access Facebook may be attributable to Facebook.⁴³
Average Selling Prices (ASP)	<ul style="list-style-type: none"> Prices are researched for each operating system in selected key markets in every region. Prices for low-end and high-end devices are considered. Weighted average selling prices are calculated using the weighted average of prices under the assumption of 80% market share of the low-end devices and 20% market share of the high-end devices.
Retail margin	<ul style="list-style-type: none"> Only a proportion of the value added by devices sales can be attributed to the country where the device has been sold. A retail margin of approximately 40% is applied which consists of operational costs, taxes and profits.
Value added ratios, multiplier for the general economy, labour productivities	<ul style="list-style-type: none"> See section A2 for details.

Broadband

Facebook stimulates the demand for broadband. The study estimates the impact of Facebook on broadband sales.

Mobile broadband

The value of broadband sales attributable to Facebook is based on the data consumed by different devices when accessing Facebook using the number of connections (sessions) made to Facebook and the estimated costs per megabyte for the bandwidth consumed.

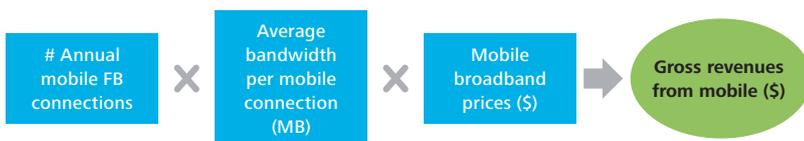
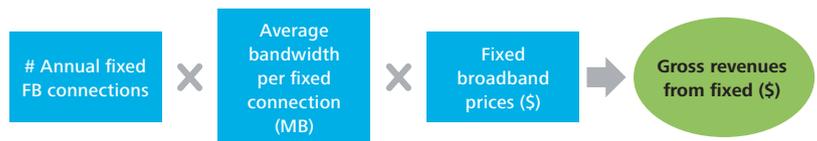
Data consumption per session is estimated using Facebook data on bandwidth consumption for Android devices. Estimated consumption for other platforms is derived using estimates of monthly data consumption on different mobile devices by Cisco under the assumption that the share of Facebook data usage in total is constant across platforms and equal to consumption on Android devices.⁴⁵ Adjustment is made for connections related to messaging to reflect their lower data intensity.

Gross revenue is derived by multiplying the estimated bandwidth consumption and average mobile broadband prices. Average mobile broadband prices per macro-region are estimated using data from Ofcom⁴⁶ and operators’ websites. Average prices are based on low-, mid- and high-end data plans under the assumption of 60-30-10 distribution of plans among customers. The assumption is based on affordability of data packages as a driver of internet adoption, implying price sensitivity of consumers and therefore preference for cheaper packages.⁴⁷ The analysis takes into account the characteristics of the mobile broadband markets in developing countries where a majority of mobile broadband services are prepaid and where Facebook-specific prepaid connections can be purchased on a daily basis and be charged at preferential rates compared to general unrestricted access.⁴⁸

Fixed broadband

The number of connections that use fixed broadband connectivity is estimated using Facebook’s country-level data on the numbers of monthly active users on mobile devices and computers, and connection data for mobile devices. Devices used to access Facebook using fixed broadband connections include desktop and laptop PCs.

The computation of gross revenues is analogous to the methodology for mobile broadband in the previous section. The prices used in the calculation are based on a combination of OECD⁴⁹ data and operators’ websites.



Economic impact from broadband

Estimation of new activity

Facebook users consume broadband across the range of activities they perform on the platform, from accessing their Newsfeed, to checking friends' updates, to uploading photos or videos, sending messages or using apps, to name a few. While these activities have stimulated broadband investment, services such as messaging have may have reduced usage of other telecommunication services. In order to capture the new economic activity enabled by Facebook in telecommunications ecosystems, the economic impact of Facebook is estimated net of such displacement effects.

Delta Partners Group estimate the approximate reduction of operators' SMS revenue due to instant messaging.⁵⁰ Taking account of Facebook's market share of instant messaging, the economic impact of Facebook by driving connectivity is calculated excluding value displaced.

Estimation of ripple effects

Output multipliers and value added ratios are applied to estimated gross revenues to calculate the supply chain and employee spending effects.

Summary of parameters, inputs and assumptions

Summary of parameters, inputs and assumptions for Mobile Broadband	
Average daily number of mobile connections per platform, Average Facebook data consumption for Android	<ul style="list-style-type: none"> Data provided by Facebook.
Mobile broadband prices per region	<ul style="list-style-type: none"> Mobile broadband prices are based on data from Ofcom for EU 5 (UK, Germany, France, Italy, and Spain) or are researched on local operators' websites for other countries and regions. The estimated impact uses the macro-regional average prices.⁵¹ Prices are a weighted average of per MB prices from Ofcom or local operators. Three data plans are considered: 1GB, 3GB and 5GB (or equivalents). An assumption is made that 60% of people choose the smallest plan, 30% choose the middle, and 10% choose the largest one. In countries labelled as developing, separate prices for pre-paid and post-paid are applied.
Switching factor	<ul style="list-style-type: none"> A switching factor is applied to mobile connections to account for multi-counting of sessions on mobile devices. The multi-counting results from devices automatically switching between wifi and 3G connections, changing mobile towers while the Facebook app is in use.
Summary of parameters, inputs and assumptions for Fixed Broadband	
Ratio of connections on mobile and fixed devices	<ul style="list-style-type: none"> Data provided by Facebook.
Fixed broadband prices per region	<ul style="list-style-type: none"> Fixed broadband prices are derived from OECD data⁵² and calculated based on three data plans (2GB, 0.25 MB/s and above, 42GB, 0.25MB/s and above, 42GB, 30MB/s and above). Regional prices are used. The average price is weighted assuming that 60% of people chose the lowest data plan, 30% the medium, and 10% the most expensive one. All prices are adjusted by PPP indexes at country level.⁵³
Average fixed data consumption per session	<ul style="list-style-type: none"> Estimated using Facebook data and outputs of a Cisco connectivity study.⁵⁴

Summary of parameters, inputs and assumptions (continued)

Summary of parameters, inputs and assumptions for Total Broadband

Estimate of new economic activity	<ul style="list-style-type: none">• To estimate new economic activity, displacement of messaging value is taken into account.
Value added ratios, multiplier for the general economy, labour productivities	<ul style="list-style-type: none">• See section A2 for details.

Facebook's cost base

The report references a Facebook cost base of approximately \$8bn. The inputs and sources are described below.

Summary of inputs

Facebook's cost and expenses, and provisions for income taxes	<ul style="list-style-type: none">• The costs and expenses are determined from Facebook's SEC filing for Q3 2014 (9 months year to date) and Q4 2013.⁵⁵ All costs and expenses (Cost of Revenue, Research & Development, Sales & Marketing, General & Administrative), and provision for income taxes, are included. Together these items amount to \$8.4bn.
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A2. Multipliers, value added ratios and productivities

This section describes the output multipliers, value added ratios, and labour productivities used to estimate economic impact and jobs from gross revenue in each of the effects described in the previous section.

Multipliers

The supply chain impact is the economic effect generated in the supply chain for businesses as a result of activity enabled in the Facebook ecosystem.

Employee spending impact is the economic effect which arises from the expenditures of the employees of companies that use Facebook or provide products and services to access Facebook and their suppliers.

The supply chain and employee spending impact is estimated by multiplying the direct impact by a factor ("multiplier") to reflect how the initial activity ripples through the economy. The main determinants of the size of the supply chain and employee spending impact are the:

- *Strength of supply chain of the local economy:* When the local supply chain is stronger, more inputs are sourced from the local economy, which leads to greater recycling of the initial spend and therefore to a stronger amplification of the direct economic impact.
- *Households' marginal propensity to consume:* When households consume more, their consumption propagates through the economy, which leads to higher employee spending effects.
- *Leakages of economic activity out of the local economy:* When spend and business profits exit the national economy, lower income can be recycled locally. This leads to lower supply chain and employee spending impact.

Name	Output multiplier
Australia	2.6
Brazil	3.1
Canada	2.0
France	2.2
Germany	2.0
India	2.5
Italy	2.2
Japan	2.8
Spain	2.2
United Kingdom	2.1
United States of America	2.7
EU28	2.5

Source: various sources⁵⁶

For the rest of the world where input-output tables were not available, average multiplier values in the respective regions are used.

Value added ratios

The value added ratio represents the proportion of value added in output and is used to convert the output to economic impact. Hence it is the ratio between the total value of production net of intermediate inputs and total value of production.

Name	Value added ratios
Australia	0.5
Brazil	0.6
Canada	0.6
France	0.5
Germany	0.5
India	0.6
Italy	0.5
Japan	0.5
Spain	0.4
United Kingdom	0.5
United States of America	0.5
EU28	0.5

Source: various sources⁵⁷

For the rest of the world, where input-output table are not available, average value added ratios in the respective regions are used.

Labour productivities

Productivities for labour are calculated from the US Bureau of Economic Analysis, Eurostat and Conference Board's productivity data.⁵⁸ Where not available, labour productivities are estimated by dividing the national GDP by total number of people employed. This translates into the production value of an average worker in a country.

Name	General labour productivity (\$)
Australia	92,600
Brazil	44,200
Canada	66,400
France	92,500
Germany	84,100
India	10,700
Italy	82,800
Japan	100,600
Spain	79,100
United Kingdom	74,200
United States of America	95,000
EU28	70,300

Source: various sources⁵⁹

For the countries where labour productivity estimates are not available, the productivity from a benchmark country in the region is used and adjusted to reflect country differences using a ratio of GDP per capita in the country and the benchmark country.

A3. Econometric analysis

Econometric modelling is used to identify the relationship between Facebook advertising, Page engagement, and business sales.

The econometric model estimates the impact of traditional and Facebook advertising on annual company sales revenue. The effectiveness of Facebook Pages is also considered by measuring the number of people who liked the Page.

The study follows the recent academic literature in marketing effectiveness and specifies a hierarchical Dynamic Linear Model (DLM) that is estimated using Bayesian methods.⁶⁰ This approach provides a flexible mechanism to determine how advertising and page related activity impacts sales over time. The model comprises four observational equations for revenue, advertising (digital & traditional) and page data and four latent or state-variable equations for changes in baseline-values. This approach conforms to a structural time-series framework and provides a means to separate both short-run from long-run influences.

The econometric model has several advantages. First of all, it deals with the potential endogeneity of advertising.⁶¹ It includes firm level time-invariant effects, economy wide controls and also uses the lagged advertising and page engagement values as instruments to provide consistent estimates in the presence of contemporaneous endogeneity. It further accommodates heterogeneity across companies and markets, dynamic advertising effects, unobserved goodwill, and multivariate dependent variables.

The advertising elasticities together with revenue uplifts, marginal and average effects are computed from the parameters of sales equations.⁶² As such, a sufficient understanding of the computations contained in this report can be achieved through an examination of these equations in isolation. The remainder serve to address the issues aforementioned and will not be described in this Appendix (see references for further details of multivariate DLMs).

Let $\ln s_{jt}$ denote the logarithm of sales of company j in year t , and h_{jt} a set of controls that influence sales in the same period. The model describing $\ln s_{jt}$ is given by:

$$\ln s_{jt} = \alpha_{jt} + h_{jt} + v_{jt} \quad (1)$$

where α_{jt} denotes baseline sales, h_{jt} includes a time trend and controls for country GDP and deflator (retail price index \times exchange rate), and v_{jt} is an error-term that contains all other contemporaneous unobserved factors. Baseline sales are allowed to vary over time according to the following specification:

$$\alpha_{jt} = \Delta_j + \psi_j \alpha_{j,t-1} + \lambda_{j1} \ln(1 + Ad_{jt}) + \lambda_{j2} \ln(1 + Likes_{jt}) + \lambda_{j3} (1 + FB_{jt}) + w_{jt} \quad (2)$$

Ad_{jt} is traditional advertising spend, $Likes_{jt}$ are the number of people who liked the Page and FB_{jt} is advertising spend on Facebook. The λ_j 's measure the effect of the marketing-mix variables on baseline sales and are the central parameters of interest in this analysis. The remaining terms Δ_j and ψ_j denote the constant and the decay-rate of the marketing effects respectively. A value of ψ_j close to zero implies that the effect of marketing occurs in one year, whereas a value closer to one, implies that the effect of the strategy is longer lasting. Finally the error term w_{jt} is included to allow for unobserved marketing that will also influence baseline sales.

Elasticities, Uplifts and Return On Investment Advertising

The λ -terms in equation (2) denote the short-run effects. For the long-run or cumulative impact of marketing activity, it is necessary to involve the decay-parameter. In particular it can be shown that a 1% rise in FB_{jt} leads to a total percentage rise in sales of:

$$\frac{\lambda_{j3}}{(1-\psi_j)(1+FB_j)} = \eta_{j1} \frac{FB_j}{(1+FB_j)} \quad (3)$$

Another quantity of interest concerns the uplift in revenue that has been brought about by the total spend. Again focusing on the steady-state this difference is simply $sj(FB) - sj(FB = 0)$. Expressed as a percentage of current revenue, the formula is given by:

$$PE = \frac{\Delta s_j}{s_j} = \frac{(1+FB)^{\eta_{j1}} - 1}{(1+FB)^{\eta_{j1}}} \quad (4)$$

An identical process follows for the remaining variables Ad and Likes.

Estimation

The dataset used in this analysis contains observations for over 2000 SMBs and non-SMB companies observed annually between 2008-2012 in a sample of countries. To estimate the parameters of the sales equations (and the remainder) it is necessary to specify a process for the coefficients. At one extreme it could be assumed that the parameters are identical across companies. In this case $\lambda_j = \lambda$ and the data could be 'pooled' across organizations. This would have the effect of increasing the efficiency of estimates but at the expense of a single effect representing the population-average. At the other extreme, we could assume no commonality and estimate the model for each j in isolation. Although immaterial when the time periods are large, the dataset in this analysis contains a maximum of just 5 years per company. As such estimation without some form of pooling would be impossible.

The approach adopted by Deloitte specifies a structure between the parameters (i.e. marketing and other effects) across companies and is referred to as a hierarchical model. This explains the variation in the effects due to company, e.g. SMB vs. non-SMB, and sector specific factors contained in z_j . To illustrate this process, consider a model for the λ 's which is expressed as follows:

$$\lambda_j = \Pi z_j + u_j \quad (5)$$

where $\lambda_j = (\lambda_{1j}, \lambda_{2j}, \lambda_{3j})$, Π contains the effects of the variables in z_j and u_j is an error-term that permits deviations from the predicted value Πz_j .

Then using Bayesian methods, the full model in (1), (2) and (5) is estimated simultaneously (in addition to the equations for the marketing mix variables). This hierarchical process is often referred to as "partial pooling" as the resulting estimate of marketing effectiveness will be a weighted average of Πz_j , and an estimate that also considers the sales data for company j in isolation. Hence if no observations are available for a particular company, then equation (3) provides the 'best-guess' or a 'prior' view in Bayesian terminology. For a modest number of observations, the estimate of λ_j is a weighted average, whereas for a large number (e.g. 100 periods per company) the estimate of λ_j will not involve (3). As such this process accommodates both heterogeneity in the effectiveness of marketing and other activities across companies, while exploiting the benefits of a common structure to maximize the efficiency of the estimator.

Estimated elasticities are generated for every business in the sample. From those, the average elasticities for SMBs and non-SMBs are calculated as well.

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