

FACEBOOK, INC.

INTERNET/ADVERTISING

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COMPANY REPORT

5 JANUARY 2017

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A case of high sustainable growth

...with no end at sight

▪ We initiate our Facebook's coverage with a **BUY recommendation** given our YE17 weighted average **price target of 156 dollars per share**, corresponding to an **overall upside of 29%** compared to the current price. We believe the market is underestimating Facebook's **tremendous growth opportunities**.

▪ Facebook's total revenue grew 58% in 2014 and 44% in 2015 and it is expected **to grow 55% in 2016** showing no signs of slowing down. **Instagram's revenue** is estimated to have grown **199% in 2016** and to grow **110% in 2017**. **WhatsApp and Messenger are yet to be monetized**. We do not anticipate Facebook's revenue growth slowing down any time soon.

▪ **Video is exploding** on FB and leading **TV ad dollars towards digital**. **Snap** is growing, but **we don't see it as a threat to Facebook's revenue growth** mostly due to reachability and ad target abilities.

▪ **Valuation:** We model the YE17 target price using a DCF, forecasting revenue for each platform the Company owns with a **WACC of 9,1%** and a **terminal growth rate of 4,2%**. Our forecast period goes until 2030, from where we assume Facebook's revenue will stabilize.

▪ **Key risks:** 1) Failed acquisitions; 2) Market sensitivity 3) Low engagement & user growth; 4) Advertisers trust on Facebook; 5) Governments action; 6) Brand image; 7) Snap IPO.

Company description

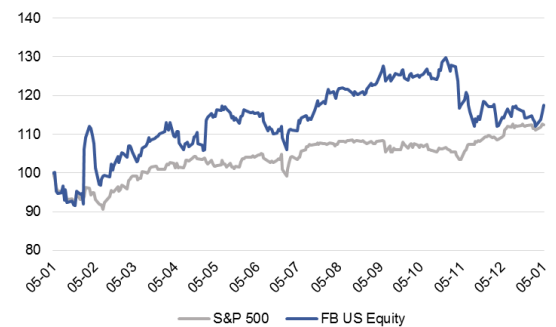
Facebook operates the world's largest social network. It builds tools that enable users to share, connect and communicate with each other or with brands; enables businesses to use a set of products to engage with users. Facebook was founded in 2004 and is headquartered in Menlo Park, California, USA.

Recommendation: BUY**Price Target YE17: 156 \$****Price (as of 5-Jan-17) 121 \$**

Reuters: FB.O Bloomberg: FB

52-week range (\$)	94 - 133
Market Cap (\$M)	351 753
Outstanding Shares (M)	2 915
Expected shareholder return (%)	29

Source: Bloomberg; Company Reports; Analyst estimates



Source: Bloomberg

(Values in \$ millions)	2015A	2016E	2017F
Revenues	17 928	27 835	39 804
EBITDA	11 221	18 019	25 388
Net Income	3 688	7 144	10 206
EPS (\$)	1,29	2,44	3,49
EBITDA margin (%)	63	65	64
Operating margin (%)	35	42	41
Products revenue			
Facebook	16 625	24 306	32 959
Instagram	854	2 552	5 365
Oculus	0	213	671
Messenger	0	0	119

Source: Company reports; analyst estimates

THIS REPORT WAS PREPARED BY DUARTE BAROSA, A MASTERS IN FINANCE STUDENT OF THE NOVA SCHOOL OF BUSINESS AND ECONOMICS, EXCLUSIVELY FOR ACADEMIC PURPOSES. THIS REPORT WAS SUPERVISED BY ROSÁRIO ANDRÉ WHO REVIEWED THE VALUATION METHODOLOGY AND THE FINANCIAL MODEL. (SEE DISCLOSURES AND DISCLAIMERS AT END OF DOCUMENT)

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Facebook, Inc. Valuation summary

The approach we used to value Facebook's operations was the discounted cash flow method. By doing so, we capture the most important drivers of revenue and potential drivers of future revenue, modelling them according to our estimates. We also estimated the cost structure and changes in balance sheet items to reach the value of the unlevered free cash flows from operations. We discounted these cash flows at a WACC estimated in line with our expectations, of 9,1% and used a growth rate of 4,2% to forecast a terminal value. Exhibit 1 summarizes the results regarding the valuation of Facebook, Inc.

Exhibit 1: Valuation Summary
(millions of dollars)

Facebook DCF Valuation (\$ millions)	Historical Financials		Forecasted Financials																															
	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F																	
Free Cash Flows Calculation																																		
Total Revenue	12 466	17 928	27 835	39 804	51 904	62 829	73 462	83 920	96 009	107 947	119 515	130 614	141 452	151 631	161 181	170 188	178 627																	
y/y Growth %	58%	44%	55%	43%	30%	21%	17%	14%	14%	12%	11%	9%	8%	7%	6%	6%	5%																	
EBIT	4 994	6 225	11 618	16 387	21 701	26 466	31 754	36 629	41 700	46 802	51 844	56 686	61 424	65 882	70 074	74 041	77 772																	
EBIT Margin	40%	35%	42%	41%	42%	42%	43%	44%	43%	43%	43%	43%	43%	43%	43%	44%	44%																	
Operating Taxes	1 638	2 247	4 438	6 260	8 290	10 110	12 130	13 992	15 929	17 878	19 805	21 654	23 464	25 167	26 768	28 284	29 709																	
NOPLAT	3 356	3 978	7 180	10 127	13 411	16 356	19 624	22 637	25 771	28 923	32 040	35 032	37 960	40 715	43 306	45 757	48 063																	
Depreciations and Amortizations	1 242	1 950	2 667	3 449	4 221	4 897	4 908	5 374	6 072	6 742	7 371	7 952	8 500	8 993	9 432	9 825	10 171																	
Changes in Working Capital	(1 113)	(1 011)	(3 017)	(3 378)	(3 109)	(2 495)	(2 185)	(1 973)	(2 113)	(1 862)	(1 564)	(1 235)	(965)	(621)	(301)	(16)	258																	
Capex	(2 008)	(2 940)	(5 130)	(6 364)	(7 088)	(7 310)	(7 779)	(8 259)	(9 366)	(9 902)	(10 334)	(10 695)	(11 087)	(11 314)	(11 504)	(11 678)	(11 804)																	
Changes in other assets	(19 746)	641	848	1 012	828	540	368	225	218	82	(51)	(172)	(267)	(364)	(443)	(505)	(555)																	
Unlevered Free Cash Flow	(18 269)	2 618	2 548	4 847	8 263	11 988	14 936	18 003	20 582	23 983	27 462	30 883	34 142	37 409	40 489	43 383	46 133																	
DCF Valuation Assumptions												2031F			2032F			2033F			2034F			2035F										
Valuation Date																	Unlevered FCFs			48 896			51 652			54 382			57 065			59 479		
Cost of Equity	9,10%		Value of Operations 2017 - Base Scenario																															
Cost of Debt	-		NPV of Cash Flow projections																176 668															
Tax Rate	35%		NPV of Terminal Value																265 969															
Target D/E	-		Marketable Securities																20 650															
WACC	9,10%		Enterprise Value																463 287															
																			Equity Value Sensitivity: WACC vs LT-GR															
																						3,73%			4,23%			4,73%						
																			8,10%			173			192			216						
																			8,60%			158			173			192						
																			9,10%			143			156			171						
																			9,60%			135			145			158						
																			10,10%			126			135			146						
Terminal Value																									Scenario Analysis			Probability			Price			
WACC	9,10%		Equity Value																463 287															
Long-term Growth rate	4,23%		Weighted Average Fully Dilluted Shares																2 915															
WACC - g	4,86%		Equity Value per share																159															
2036E FCF	61 996																																	
NPV of Terminal Value	265 969																																	

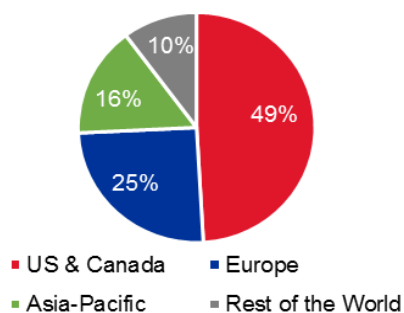
Source: Company reports;
Analyst estimates

We highlight our **buy recommendation with a target price for Facebook at 156\$ per share for year-end 2017**, which implies a 29% return in a 12-month period.

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Company overview

Exhibit 2: FB Geographical revenue distribution - 2015



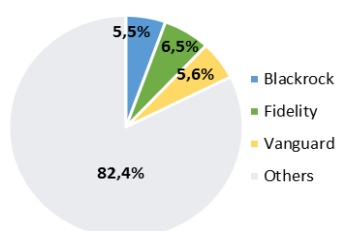
Source: Company reports

Facebook, Inc. (FB) is a company that enables its users to connect with other people through mobile devices and computers, allowing them to share opinions, pictures, videos, and others. Its products include **Facebook** (mobile and desktop), **Instagram**, **Messenger**, **WhatsApp** and **Oculus**. The Company was founded in 2004 in the United States by Mark Zuckerberg, CEO ever since, and 4 other co-founders who are no longer in the Company. Initially it started only with Facebook for desktop, increasing its range of products by **acquisitions** (Instagram, WhatsApp, Oculus) or by **product development** (Facebook mobile, Messenger). The Company operates on a **global scale**, dividing its geographies into four segments: US & Canada, Europe¹, Asia-Pacific and Rest of the World².

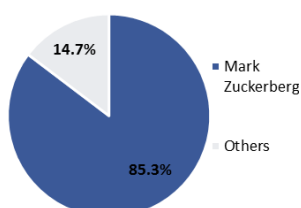
Ownership Structure

Exhibit 3: FB Ownership Structure

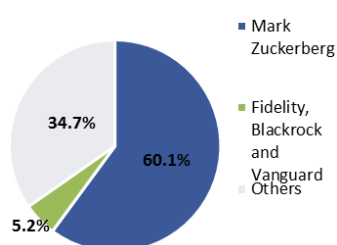
Class-A Biggest Share Owners



Class-B Biggest Share Owners



Voting Power



Source: Company reports

As of January 2016, Facebook had a dual-class share system, with Class-A representing the floating shares, and Class-B being mostly held by Facebook executives. Class-B common stockholders are entitled to ten votes per share and Class-A common stockholders are entitled to one vote per share. There are 4x more Class-A shares than Class-B shares.

This structure allows Mark Zuckerberg to have only 0,17% of Class-A shares while keeping 60,1% of the voting rights, controlling the Company's decisions. Moreover, in June 2016, the Company investors approved the issuance of 5,7 million Class-C company stock, with the only difference from the other classes being the fact that it will not have any voting rights. Under the proposed introduction of the third category of common stock, all Facebook shareholders will get two C shares for each A or B share they currently hold. This structure will be similar to the one Google currently has, with more than one class trading in the market and will allow Zuckerberg to make annual charitable donations of its shares while keeping control over the Company. Zuckerberg's leadership solved the issue of mobile monetization transition, made a highly successful acquisition of Instagram and was able to continuously grow its active users at an incredible rate, overcoming any other social network. Therefore our view is that Zuckerberg's power over Facebook decisions has proved to be a good thing. If by any reason Zuckerberg leaves the Company, his Class-B shares would be converted into Class-A shares, reducing significantly his voting power and being considered no more than a regular shareholder. He would not be able to name

¹ Including Russia and Turkey

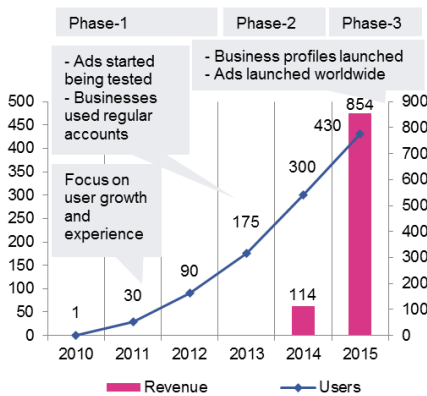
² Includes Africa, the Middle East and Latin America

his successor and Facebook would be free to choose a new CEO without Zuckerberg's influence, allowing the Company to attract highly qualified CEOs in the future.

Core strategy

Facebook has been developing and using a strategy to grow its products organically, with the purpose of guaranteeing user engagement and being able to monetize them without jeopardizing their experience. This strategy revolves on three phases: 1) **Expand and increase the engagement of the user community**: Constantly increase its user base across geographies; Invest in initiatives that allow the product's availability to the maximum number of people (e.g.: Internet.org, lite versions); continuously improve the user experience in its platforms by adding new features to it. The main purpose is building a solid large user base that provides a wider range to marketers. 2) **Enable people to organically interact with businesses**, mostly by allowing businesses to create a page/profile in the platform, which can reach users that, by their initiative, choose to interact with them (by liking or following their page); 3) **Provide businesses the opportunity to use paid tools for them to reach more customers**, increase interactions and create commercial opportunities. At this stage the Company starts heavily monetizing the platform, so far by selling several types of ad products to the businesses present in the platform. Our view is that FB applies the same strategy to every product, but according to different views on the key metrics. As an example, Instagram entered phase three with 430 million MAUs while WhatsApp has more than 1 billion and is still at phase one. **FB is currently at a mature stage three**, representing 91% of the Company's revenues (2015). **Instagram entered stage three** in 2015, when it presented its first significant revenue, which the Company didn't officially disclose, but it is estimated to have represented 5% of total revenue³. **Messenger is early in the second phase**, with businesses starting to interact with customers, and finally **Whatsapp will enter in the second stage in 2017**. **Oculus is a consumer product which started being sold to the public earlier this year**.

Exhibit 4: Example of FB's product development strategy – Instagram (values in millions of dollars)



Source: Company reports; eMarketer; Analyst estimates

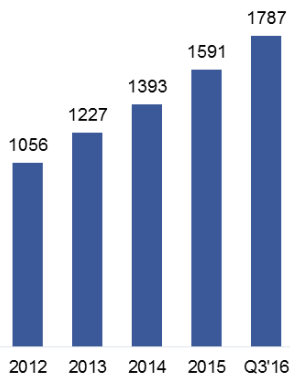
Products overview

- **Facebook**

Facebook is the first product the Company developed and the reason for its existence. It consists of a website and mobile application that allows people to connect, share, discover and communicate with each other and with brands in

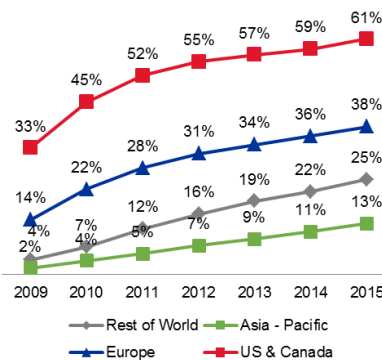
³ Source: eMarketer

Exhibit 5: FB's MAUs (millions)



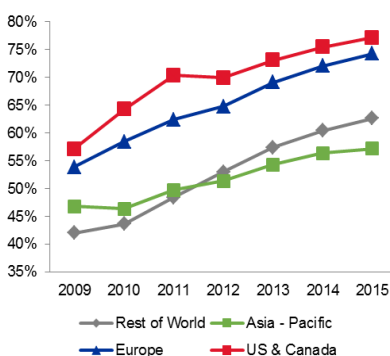
Source: Company Reports

Exhibit 6: MAUs penetration across each geography's population



Source: Company reports; World Bank

Exhibit 7: Engagement ratio (DAUs/MAUs) across geographies



Source: Company Reports

several ways. People engage on the platform in different ways, being the most important one the News Feed, which displays algorithmically-ranked series of content from friends or pages and advertisements individualized for each person.

Facebook users have been increasing steadily, at high rates, since its conception. **Between 2013 and 2015, monthly active users (MAUs)⁴ grew, on average, 13,8% per year.** Mobile monthly active users (MMAUs)⁵ grew 27% on average in the same period, proving the increasing importance of mobile and that FB successfully followed this shift trend. In September 2016 the Company reported 1787 million MAUs and 1658 million MMAUs, of which 1050 million are mobile only monthly active users (MOMAUs)⁶, the double when compared with the 526 million MOMAUs the Company had in 2014. The shift to “mobile only” is good for FB because, although it isn't able to display as much ads on mobile as it is on desktop, the higher prices it charges on mobile allows it to have a positive impact. **In terms of geographies**, in 2015, 34% of MAUs were from Asia-Pacific, 32% from Rest of the World, 20% from Europe and 14% from the US and Canada. Asia-Pacific and the Rest of the World MAUs have been increasing at a higher rate than the other two geographies, increasing its importance. We expect these geographies to continue to drive most of MAUs growth, as Europe and US & Canada are already at a more mature stage, growing at lower rates (7% and 5% in 2015, respectively vs. 20% in Asia-Pacific and 17% in Rest of the World). 61% of US & Canada's population is already active on FB whereas in Europe it is 38%. In comparison, only 13% of Asia-Pacific population is active on FB (2% in 2009), since FB has been banned from China, and 25% is active in the Rest of the World. However it is important to note that, the geographies with lower penetration, are also those where population has less internet access. In 2015, 83% of US & Canada had access to internet, 68% in Europe, 37% in the Rest of the World and 39% in Asia-Pacific. What we infer from this is that, as internet penetration increases across Asia-Pacific and the Rest of the World, naturally the number of FB MAUs will also increase. To assess user engagement, we used information from daily active users (DAUs)⁷ to compute a ratio with MAUs, and the pattern is clear: **engagement is also increasing. Between, 2009 and 2015 the engagement ratio increased every year since 2009, in all geographies, and globally from 51% to 65%.**

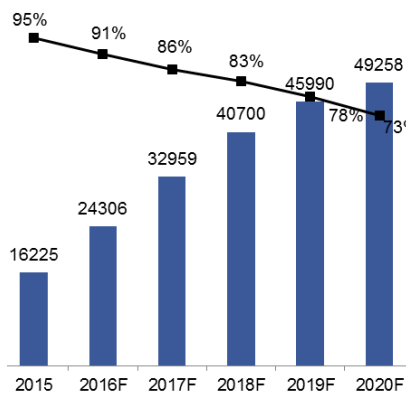
⁴ MAUs: Registered FB user who logged in and visited FB through the website or a mobile device, or used Messenger in the last 30 days as of the day of the measurement

⁵ MMAUs: Registered FB user who logged in and visited FB through a mobile device, or used Messenger in the last 30 days as of the day of the measurement

⁶ MOMAUs: Registered FB user who logged in and visited FB solely through a mobile device, or used Messenger in the last 30 days as of the day of the measurement

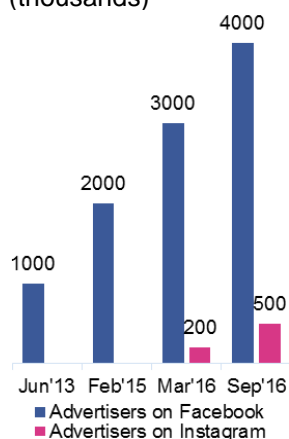
⁷ DAUs: Registered FB user who logged in and visited FB solely through a mobile device, or used mobile Messenger in the last 24 hours of the day of the measurement

Exhibit 8: FB ad revenue
(millions of \$ and as % of total revenue)



Source: Company Reports;
Analyst estimates

Exhibit 9: Advertisers on FB
(thousands)



Source: Company Reports

In terms of **revenue**, Facebook has **two sources: advertising, and payments and other fees**. Advertising revenue is generated by displaying ad products on Facebook (website and mobile). Advertisers pay for these products based on the number of clicks or actions made by people or the number of impressions delivered to people. Not only it represents most of the Company's revenue but also has been increasing its importance, accounting for **89%, 92% and 95% of total revenue in 2013, 2014 and 2015**, respectively. It has constantly been increasing since the company went public in 2012, with an impressive **average annual growth rate of 48%**, totalizing 16 225 million dollars in 2015. For the future we see Facebook's ad revenue decreasing its % of total revenue with the growing monetization of the other platforms, especially Instagram in the near term. One of the factors stimulating this growth is the substantial increasing number of advertisers on Facebook in an accelerating rate. On June 2013, the Company reported to have 1 million advertisers on Facebook. Almost 2 years later, on March 2015, the number grew to 2 million, increasing to 3 million after one year and to **4 million advertisers** only 6 months later. These advertisers represent only 7% of all the **60 million business profiles Facebook currently has** (85% active on mobile). A significant part of these advertisers are SMBs that see on Facebook an easy and affordable opportunity to connect with their customers using targeting ads. These are businesses that otherwise would have difficulties in setting up an online business given the high cost of setting up a website or mobile app, and Facebook provides them with an alternative form of online presence. In the US, where the digital presence is higher than most countries, 35% of SMBs still don't have a digital presence⁸, which represents a great opportunity for Facebook.

Advertising revenue on Facebook is driven by 3 different factors: 1) **MAUs growth**, which, since 2013, has had an annually average increase of 13,8% 2) **Ad Load**, which represents the amount of advertising the platform is displaying and can be summarized by **the total number of impressions delivered** to every users in a certain period. It is highly related with engagement, since the more time users spend on the platform, the more impressions will be delivered. This metric decreased substantially between 2013 and 2015 mostly due to a product change Facebook underwent that decreased the number of ads displayed but increased the prominence of each, and to a less extent also because of the shift towards mobile where people are shown fewer ads as compared to personal computers. In 2016 this metric **started growing again**, although the Company recently announced it was **expected to largely cease to do so from mid-2017 onwards**. 3) **Price per ad**, a metric that has been highly volatile, given its

⁸ Facebook's 2016 1st earnings call

Exhibit 10: ARPU growth (\$)

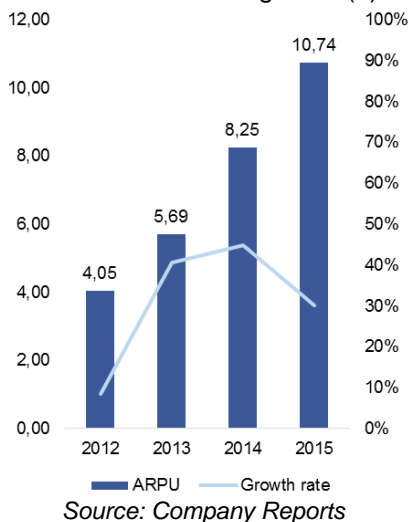
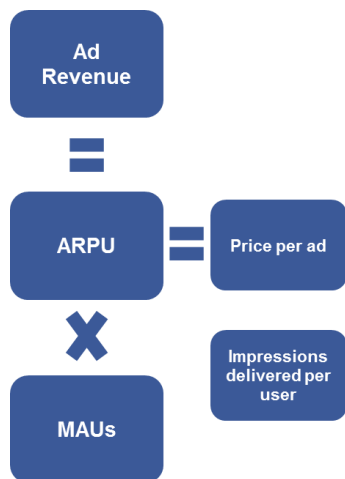


Exhibit 11: Ad Revenue Model



complexity in terms of products each advertiser can choose and also because of differences in prices between ads on desktops and mobile devices, in average more expensive in this last case. Although its volatility, it grew every period year on year. The increase in price per ad more than compensated for the decrease in ads displayed, with ARPU increasing an average of 39% YoY between 2012 and 2015, from 4,1 to 10,7. In the model delivered in this report, we estimate these three different drivers, aggregating ad load and price per ad as **average revenue per user (ARPU)**, whose growth, alongside with **MAUs growth will drive our future revenue advertising forecasts.**

Payments and other fees consist of fees from developers when people make purchases on FB using its payment infrastructure, mostly consisting of payments generated from game applications. Its importance has been decreasing (5% of total revenue in 2015 vs 8% in 2014), and in 2015 its revenue decreased, for the first time, by 13% to 849 million dollars, and it is expected to continue to decrease. However, **Oculus**, the virtual reality company FB acquired by 2 billion \$ in 2014, is integrated in this metric, being expected to offset its revenue decline by the end of 2016, when its sales started, and to **drive future revenue for this metric.**

As for **future revenue growth drivers**, we believe the Company will continue to **diversify and innovate in ways to monetize its main platform**, being able to continually increase the ARPU it generates annually. In the second semester of 2016 the Company launched several new Facebook products (Workplace by Facebook, Facebook marketplace, Events from Facebook) that serve as example of new ways to increase revenue not only by new types of monetization, but also by increasing traffic and therefore the number of impressions delivered. Also, Facebook is increasing its efforts on **prioritizing video first**, not only on Facebook platform, but also on its family of apps, since video sharing has been increasing significantly. One way the Company is doing it is through live video on Facebook, which increased 4x between May 2016 and September 2016⁹. This is an important bet by Facebook, under the premise that in the future people will mostly consume video online rather than television, creating the opportunity to sell more video ads by **getting the ad dollars from TV advertisers**, a market whose size is estimated to achieve 233,9 billion dollars by 2020¹⁰.

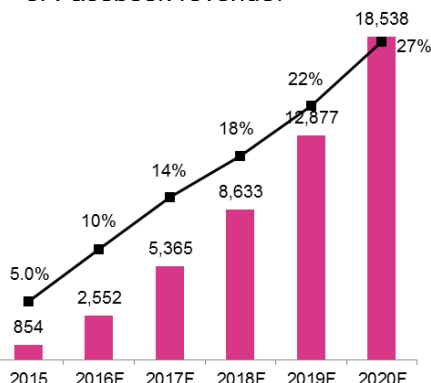
- **Instagram**

Instagram is a mobile application that allows its users to share photos and videos with friends and followers in a photo feed, or send them directly to friends. Users

⁹ Source: Facebook's 3rd quarter 2016 call

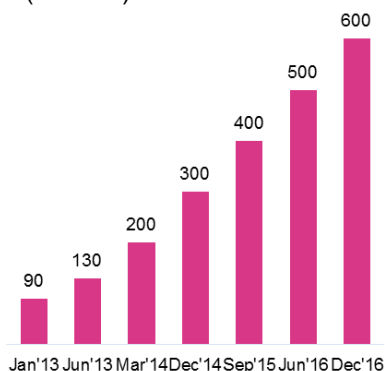
¹⁰ Source: Mckinsey Global Media 2015

Exhibit 12: Instagram ad revenue (millions of \$ and as % of Facebook revenue)



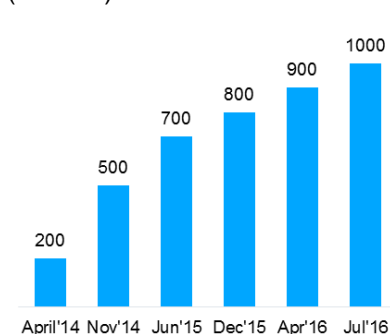
Source: eMarketer; Analyst estimates

Exhibit 13: Instagram MAUs (millions)



Source: Company Reports

Exhibit 14: Messenger MAUs (millions)



Source: Company Reports

can follow their friends, celebrities and brands. It was acquired by Facebook in April 2012 for approximately 1 billion dollars in cash and stock. It started generating revenue to the Company in 2015, when it launched advertisement in the platform. It is estimated that in its **first year its revenue was around 5% of Facebook's mobile revenue**, representing 854 million dollars¹¹. While some of its revenue may come from cannibalization from Facebook, the Company acknowledged that most of it is incremental, with advertisers opting to advertise on both platforms. In 2015 its revenue was responsible for 7% of the 43% revenue growth the Company had and we estimate in 2017 it will be responsible for 10% of the 43% Facebook revenue growth we are forecasting.

Its user base has also been increasing consistently throughout the years, having reached **600 million MAUs in December 2016** and more than 300 million DAUs (last update from June 2016), compared to 300 million MAUs in December 2014, and reported to have **more than 1,5 million business profiles on the platform**. Also, it doubled the number of companies advertising on Instagram between February and September 2016, reaching **500 thousand advertisers**. Recently it launched Instagram Stories, which has reached already 100 million DAUs, with the purpose of competing with Snapchat.

- **Messenger**

Messenger is a messaging application available as a mobile application for devices and as an integrated part of Facebook for websites. It allows people to communicate with each other or to contact businesses. Businesses are continuously getting new ways to engage with customers within the platform, being bots the most relevant new way. Bots are online applications that interact automatically with users that send them messages. Nowadays, Messenger has more than 33.000 bots¹² built from businesses that are able to interact with users.

The product was launched in 2011 and it reached **1 billion MAUs in July 2016**, compared with 500 million users it had in November 2014. In terms of revenue, Messenger is still early on phase 2 and its importance resides mostly on **follow-ups of interactions between users and businesses from the news-feed**, being **complementary** to the revenue FB is generating with advertising on the News Feed. In addition, the Company announced in November that it started allowing businesses to buy ads in the Facebook News Feed to reach people they've interacted with on Messenger. This new metric is very strong for advertisers and could have a significant importance driving ads pricing in the future. For the long-term, we believe FB wants to start creating interactions from

¹¹ Source: eMarketer

¹² Company announced it at 3rd quarter earnings call

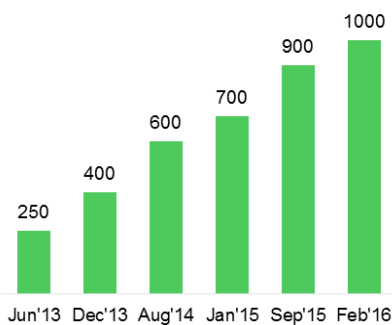
Messenger itself, allowing at that point to generate revenue directly from this platform. **We believe monetization in Messenger will come essentially from charging businesses for transactions with consumers.** By assuming 1 to 2 dollars of ARPU Messenger as the potential app revenue, it could start contribute to FB's total revenue with significant billions in the next years.

▪ WhatsApp

WhatsApp is also a mobile messaging application with the main difference from Messenger being the fact that each account isn't connected with Facebook, but instead with a cell phone number, which, in our view, is a reason why WhatsApp has more monetizing potential than Messenger: its users grew organically instead of being forced to install the app by their Facebook accounts.

Facebook acquired WhatsApp in 2014 in a deal valued at 21,8 billion dollars, of which 4,59 billion was cash in addition to the issuance of 177.8 million Class-A shares to WhatsApp's shareholders. At the time of the acquisition, WhatsApp was generating revenue of 10 million dollars annually, but after the acquisition, Facebook announced it would stop charging customers by 1 dollar annually to focus on organic user growth – step 1 of the monetization strategy. Currently WhatsApp is still at phase 1, but the Company announced it would start working on the second phase in 2017. In terms of users, WhatsApp was launched in 2009 and reached **1 billion MAUs in February 2016**. The growth rate has been slowing down, but it is still above two digits, with an 11% growth in the last semester of 2015. Since June 2013, the Company has been able to add, on average, 150 million new MAUs per semester. For the long term, we believe FB will try to **monetize WhatsApp with features including organic advertising, payments, e-commerce and gaming**, like WeChat is doing in China. By doing so, we think it could, in the long-term, reach around 4 to 5 dollars of ARPU.

Exhibit 15: WhatsApp MAUs (millions)



Source: Company Reports

Key risks

Facebook has been performing very well since its IPO, and our view is that it will continue to do so. However, there are some key risks that, if verified, could undermine our vision and forecasts on Facebook's operations:

- **Acquisitions:** Facebook's past acquisitions of Instagram, WhatsApp and Oculus required a big investment from Facebook, and it is unclear when and if it will generate a positive IRR. Instagram, acquired in 2012 for 1 billion dollars is estimated to have generated 854 million dollars of revenue in 2015 and to continuously grow over the years. We estimate this investment to have an IRR of 52%. WhatsApp, acquired in 2012 for 22 billion dollars, is still unclear when and if it will successfully generate a positive return. In our base scenario we forecast it

to start generating revenue by 2018 (328 million dollars, correspondent to 0,5 ARPU) and to grow to 13 584 billion dollars in 2030 (4,5 of ARPU). If this scenario materialises then the acquisition would only generate an IRR of 5%. Still, we want to highlight that, despite the low return it may generate, the opportunity cost of not acquiring the platform could be higher than the acquisition cost, as the platform was already on its way to become the biggest mobile messaging platform, and, if following the success of WeChat in China, it could potentially harm Facebook's business. At the time of the announcement of the acquisition, FB's market cap grew 8 873 billion dollars (5,2%), showing that the market considered this acquisition to generate value. For Oculus, acquired in 2014 by 2 billion dollars, we estimate an IRR of 26%. In addition, at the time of the acquisition, FB's market cap increased 17 393 billion dollars (9,8%), which is an important sign of the investors' expectations from this investment. Overall, our estimates bear a high level of uncertainty, and if the investments don't demonstrate to have generated positive returns, investors could consider them as destroyed value. The same applies to future acquisitions, especially those the market may not perceive as such good investments.

- **Market sensitivity:** After the dot.com bubble of 2001, investors are more careful when it comes to investing in tech companies. Any signs of a decline in the sector, justifiable or not, could have a negative impact over FB's stock price. In early February 2016, LinkedIn announced its year expectations, which were well below market consensus and as a consequence, most of tech companies stock price plunged, with Facebook losing 4,3% of market cap.
- **Engagement and user growth:** One of the reasons FB has been able to attract millions of advertisers every month is due to the user engagement metrics they deliver. If advertisers see this decreasing, it could cause them to question the added value of advertising on FB. This could be caused by fatigue, saturation or alternative new platforms, which highlights the importance of innovation by FB. Also, our target price is highly dependent on the assumptions of continuous high growth of MAUs. If by any reason this metric slows down significantly we would be forced to lower our expectations and perhaps our recommendation. At the sensitivity analysis section of this report we challenge this assumption.
- **Advertisers trust on Facebook:** It has recently been reported the Company was overestimating the number of views its video ads had on FB. Consequently, the stock price fell by 2%. More situations like this could undermine the ability to keep advertisers on FB. In addition, the lack of an advertising third party measurement is delaying the shift of video ad dollars toward digital. Having not this guaranteed could set an upside limit growth for Facebook. To overcome this

problem, Facebook announced in the third quarter third-party agreements with several agencies to measure how Facebook ads drive business results.

- **Government action:** Recently, Facebook was prohibited to collect WhatsApp data from its users in Europe, consequently losing 1% of stock price after the announcement. Also, there is uncertainty regarding regulatory policies Trump's administration may impose that could negatively affect Facebook's earnings.
- **Brand image:** FB is highly exposed to global scrutiny and media coverage, which could harm its image on investors, making its share price not reflect its true value. Recently, on the aftermath of the US elections, the findings that several fake news were shared on FB, potentially influencing the election results, affected its share price, falling 7,4% in the following days to 4-month minimums, despite being something that does not have any direct link to its business.
- **Snap IPO:** The parent company of Snapchat is set to go public in 2017, and its potential investors could come from Facebook's investors, harming its stock price. Still, similar concerns were heard when Twitter had its IPO, but Facebook's share price, although losing 7% on the following days, recovered less than one month later.

The Sector

Facebook operates in several markets. Most of its revenue comes from advertisement, but also from payments and other fees, which, in our estimates, will mostly consist of revenue from virtual reality (VR) devices sales. Furthermore, its advertising revenue is directly connected to its users. The reason why advertisers use Facebook is to reach its user base. Therefore, in order **to assess Facebook presence in the market, we analyse two different perspectives: Revenue and users.** In terms of revenue, Facebook is operating in the advertising sector, more specifically in the digital advertising industry, and also in the VR market. In terms of users, Facebook competes with social media applications and with other mobile messaging platforms.

Advertising

In 2015, the global advertising sector reached 513 600 million dollars, after increasing, on average, 5% per year since 2012. **Digital advertising was the industry that mostly drove to this growth, with an average growth of 20% per year, the only industry that showed a growth rate above average¹³.** The pattern here is clear. Digital advertising, the industry where Facebook is

¹³ According to Mckinsey Global Media Report, the only other subsector that showed a positive growth, throughout the same period, at a rate below the average was TV, with 3,2%

operating, is increasing substantially in importance, driving the market with its lower cost targeted solutions and taking away advertisers from the classic channels. This growth in digital advertising is expected to slowdown in the next years, although continuing at double digit levels, with an average of 16% until 2020, **increasing its importance in the advertising sector from 32% in 2015 to 46% in 2020 (compared to 21% in 2012)**, and surpassing television as the biggest advertising subsector of the industry by 2018.¹⁴

Exhibit 16: Global advertising shares by category (total in millions of \$)

	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F
Digital advertising	93 000	110 600	133 500	161 800	194 600	229 300	269 800	304 300	335 500
YoY growth rate		19%	21%	21%	20%	18%	18%	13%	10%
Global advertising	438 900	460 300	486 800	513 600	550 500	591 100	642 900	687 200	724 100
Digital % of total	21%	24%	27%	32%	35%	39%	42%	44%	46%

Source: eMarketer

Exhibit 17: Global digital advertising market shares (total in billions of \$)

	2012	2013	2014	2015
Facebook	5%	7%	10%	13%
Google	40%	41%	42%	41%
Microsoft	4%	4%	4%	4%
Yahoo	5%	4%	3%	3%
Twitter	0%	1%	1%	2%
Others	45%	44%	39%	37%
Total*	82	94	110	130

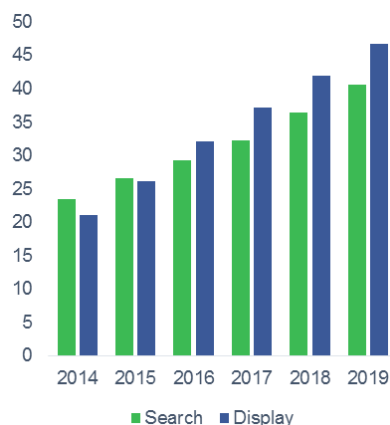
Note: Not including China
Source: eMarketer; Company reports

In terms of market players, there are essentially two companies that are taking advantage of this massive growth the digital ad industry is facing: **Google and FB**. Google, a company that has been dominating this market in the last decade, decreased its presence for the first time in 2015, to 41%, compared to 42% in 2014. **FB on the other hand, increased from 5% in 2012 to 13% in 2015**. Together, both companies are getting **0,54 cents per ad dollar that goes to the digital market**. And although both companies compete in areas such as video advertising, most of its business is complementary, with the majority of advertisers opting to use both channels. Google's most ad revenue comes from search ads (83%) while FB's from display ads, and advertisers usually bet on both channels. The acquired market shares comes essentially from other minor players, that lost 8pp of the market between 2012 and 2015, while other big players showed minor changes in their market share.

On **digital display advertising**, where FB operates, the third-party agency Kenshoo reports a **YoY growth of 47% in the 2nd quarter of 2016**, being the growth driven by **mobile** mostly, which accounted for **64% of total spending**. The agency also reports that users are now more likely to click ads, with **overall clicks on social networks rising by 21% since Q2 last year**, again with mobile having an important part on this, from where are 77% of the clicks. **Video ads** are attracting greater interest, accounting for **19% of all spend on social media**, compared to 8% in 2015, which confirms FB's interest on betting on this area. On **search advertising**, where Google mostly operates, overall search advertising **expenditure grew 10% YoY in the 2nd quarter of 2016**, which compares with the 47% display advertising growth, demonstrating its growing importance as a digital advertising channel. This trend towards display advertising is verified in the US, where this market is at its most mature stage, and in 2016 is expected to have a higher revenue than search advertising, of 32

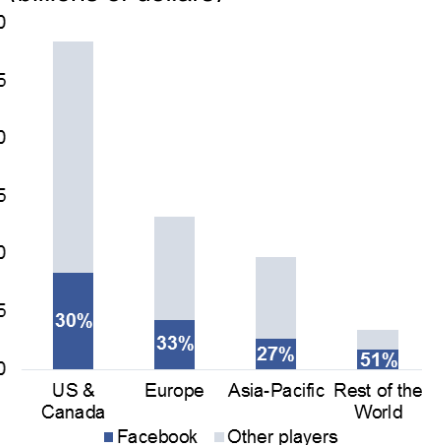
¹⁴ Source: Mckinsey Global Media Report

Exhibit 18: US digital ad spending (billions of dollars)



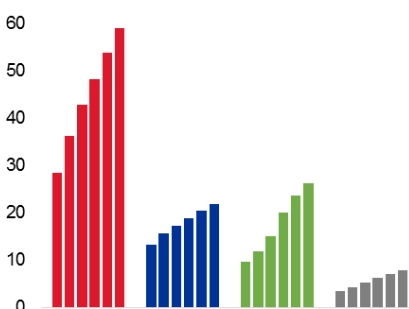
Source: eMarketer

Exhibit 19: Display advertising market share by region, 2015 (billions of dollars)



Note: Not including China
Source: eMarketer; Company Report

Exhibit 20: Display advertising market growth by region, 2015-2020 (billions of dollars)



Note: Not including China
Source: eMarketer

billion dollars compared to 29 billion dollars¹⁵, a gap that is estimated to continuously increase. This paradigm change in the digital advertising industry is being driven mostly by the increased importance of video ads (14,3% of total digital ad spending in 2016 vs 12,8% in 2015) and by the shift to mobile. **Globally, display advertising is expected to surpass search advertising by 2018.** In this submarket, **FB had in 2015 a global market share of 31%.** Asia-Pacific is the geography where this market is expected to grow faster until 2020, by an average of 22% per year. Although it is the geography where FB has the lowest presence, of 27%, we expect this to be quite good for FB, since the Company has been able to significantly increase its market share in the last two years (15% in 2013). The Rest of the World, where the Company has the best position (51%), is the second geography where this market is expected to grow the most, by 18% per year, followed by US & Canada with 16% per year, from where the Company had a market share of 30% in 2013 compared to 17% in 2013. Finally, Europe is the geography where the market is expected to grow slower, by 11% per year, where FB had a market share of 33% in 2015 compared to 21% in 2013.

▪ The case of China

In our analysis of the market shares, we didn't consider the digital advertising revenue from China, since most of the major players of the industry are banned from the country, basically because of censorship issues and protectionism. As a consequence, it enabled the development of a parallel digital advertising industry with big players, such as Alibaba, Baidu and Tencent, that have a minor role in the digital advertising industry outside China, to dominate the Chinese market, evaluated at 31,5 billion dollars in 2015, representative of 20% of the Worldwide digital advertising market. For Facebook, returning to China might be a priority for the next years, given its importance in digital advertising industry, and Zuckerberg has relentlessly showed his interest to do so. However, the Company would still be a **latecomer** within the Chinese already developed social-media ecosystem, mostly **dominated by the Tencent family of social platforms**, which include WeChat, QZone and QQ, and **past experiences** from tech companies, such as Yahoo, Microsoft or Google, that were not banned from the country, **failed to attract users and withdrawn from the country**, mostly because of the government action to prioritize local companies, already established and able to meet the local cultural demands, significantly different from the westerns ones. Furthermore, local companies don't raise issues on obeying the censorship required by the government. It is also important to note

¹⁵ Source: eMarketer

that QZone's user growth, the Facebook equivalent in China, decreased 3% YoY in Q1 2016 to 648 million MAUs, mostly because of WeChat's success, a mobile messaging app that is being seen as a standalone app to do everything, including social networking, estimated to have almost all internet users in China (762 million MAUs by Q1 2016). This demonstrates that Facebook's social network model is not meeting the Chinese demands. Given the high level of uncertainty not only of the likeliness of being allowed to access the market, but also of succeeding in a mature market, especially for the near term, **we are currently not modelling the potential value of entering the Chinese market.**

Virtual Reality

The VR market is a new one. FB's Oculus started selling its high-end VR headsets earlier this year, alongside with HTC and Sony, which also entered the market with high-end products, and Samsung, Google and other brands that entered with smartphone-based VR headsets. We believe the low priced headsets will create the awareness necessary to upsell users to higher quality VR experiences, such as the one Oculus offers. It is also important to mention that Oculus VR headsets require a high-end PC, which is less than 1% of the PC installed base according to Gartner, and is expected to cost 1000 dollars. The market for VR hardware is estimated to reach 2 billion dollars by the end of 2016, and to grow at a year average of 46% until 2025, when is set to reach 45 billion dollars¹⁶. Given the premature state of the market, there are **two big questions** that address the big uncertainty it represents: 1) **Which brand**, or brands, will **take on the position as market leaders for hardware**, where most of the developers will focus to build the necessary software to drive demand for the headsets (Oculus announced to have 200 000 developers, HTC didn't disclose this data); 2) If this product fulfils the **expectations of becoming a mass product** used both by businesses to market their products and by consumers to increase experience (not only in gaming). Although no data was yet revealed, **Oculus is expected to have sold around 350 thousand headsets in 2016**¹⁷.

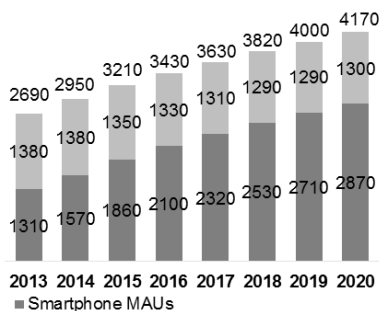
Social Media

What drives value of social media platforms for advertisers are its users and their engagement. The potential number of users for each Social Media is **internet penetration**. In 2016, it is estimated there will be 3,4 billion MAUs of internet, compared to 2,7 billion MAUs in 2013. This number is expected to grow, on average, 5% per year, to reach 4,2 billion MAUs in 2020. Most of this growth will come from Asia-Pacific and the Rest of the World, which are expected to

¹⁶ Goldman Sachs Global Investment Research

¹⁷ SuperData Research

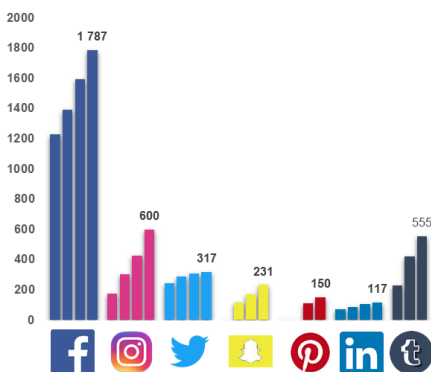
Exhibit 21: Worldwide internet MAUs (millions)



Source: eMarketer

grow, on average, 7% (excluding China) and 6%, respectively. Considering that these are the regions where the Company has been able to grow faster in recent years, this clearly benefits FB, allowing them to have high growth rates in both areas. Also, other trend that is driving the growth of social media, especially engagement, is **smartphones penetration**. In 2015, 1,9 billion people used a smartphone at least once in a month, which represented **58% of internet users**, and this number is expected to grow annually 9% until 2020, when it is expected to reach 2,87 billion MAUs, 69% of all internet users. Given that smartphones are much cheaper than computers, this trend allows low-income households to be able to access internet, therefore being able to be active on social media. In fact, in 2015, 29% (16% in 2013) of low-income households in the US accessed internet only via mobile, compared to 15% of higher income families.¹⁸

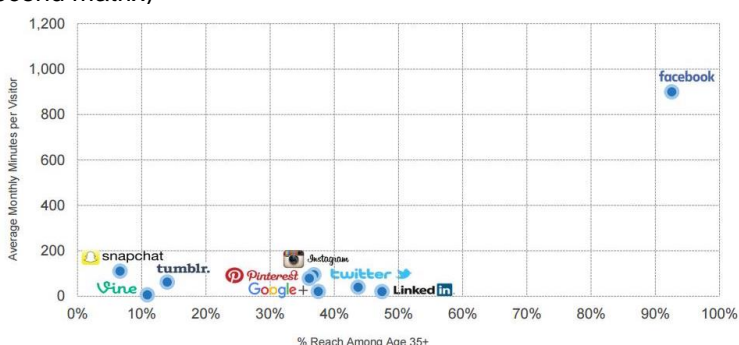
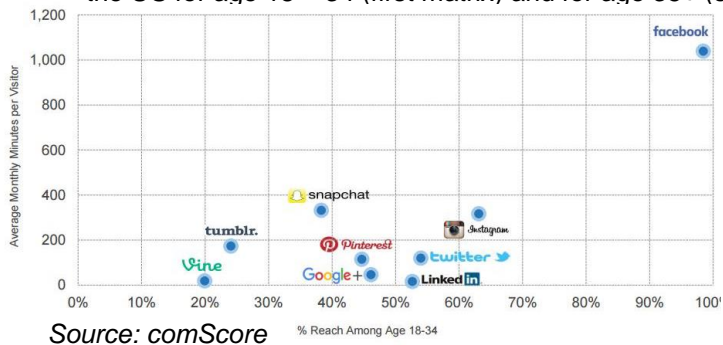
Exhibit 22: MAUs across Social Media players; 2013 – 2016 (millions)



Note: Most recent update on user stats from each platform
Source: Company Reports; Analyst estimates

Comparing MAUs across all social media platforms, FB is clearly the leader. It has 1,8 billion MAUs, a number that has been growing at double digits every quarter, which is remarkable given the user base they already have. In second place comes another FB platform: Instagram. They recently reached 600 million MAUs, overcoming Tumblr's 550 million MAUs, consequence of the 56% average growth per year since 2013. Twitter, considered in the past one of the biggest threats to FB has been struggling to gain new users, with a growth below the double digits, with 4% YTD. In terms of time spent on social media, worldwide users spent an average of 109 minutes daily on social media in 2015¹⁹, of which **50 minutes were spent on FB's apps family**, excluding WhatsApp. In the US (2015), a country where most of the social networks have their strongest presence, FB has, by far, the largest penetration across social media users (**98% in the 18-34 audience and 93% in the 35+ audience**), and Instagram comes as second for the younger audience with 63%, whereas for 35+ LinkedIn is the second with 47%. Also, FB is the platform where users spent more time, almost 3x more than 18-34 people spend on Snapchat, and more than 4x than 35+ spend on any other social media platform.

Exhibit 23: Penetration across total social media users vs Monthly time spent on each social network in the US for age 18 – 34 (first matrix) and for age 35+ (second matrix)



Source: comScore

¹⁸ Source: U.S. Census Bureau's Computer and Internet Use Supplement

¹⁹ Source: Statista

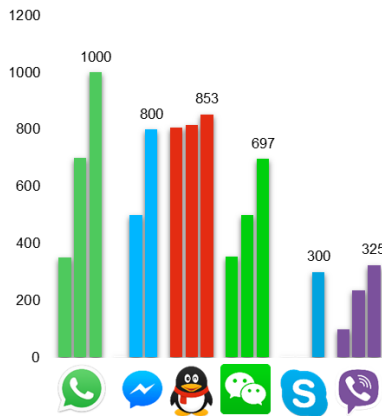
Snapchat is considered by many the new threat, with its younger audience and high engagement levels, which is attracting many advertisers, and it is expected to deliver revenue of 367 million dollars in 2016²⁰, compared to the 59 million it had on its first year displaying ads. But in our view, **it doesn't represent a real threat: FB's engagement levels have also been increasing** (currently at 66% compared to the estimated 65% of Snap), and it has **more than 2x audience than Snap in the US and more than 2x monthly time spent in the platform**, in addition to the **much more targeted products Facebook currently offers to advertisers**, which is one of the greatest advantages FB has: it utilizes user data to improve their ad experience, allowing advertisers to reach exactly the type of consumers they want. Snap isn't doing that, which will always translate into lower returns for advertisers. Also, in the past FB faced many similar threats, and it was always able to continuously grow where many others failed to do so, which in our view is a consequence of **FB being constantly improving its portfolio of products, through 3 different ways: 1) Product innovation**, which is why the Company is spending so much on **R&D** (13% of total revenues in 2015); **2) Acquisitions**, which includes the acquisitions **of companies that could steal its thunder** (WhatsApp or Instagram) and are kept as a different platform, **or mostly of companies with products that can improve FB's platform** with its technology, and FB has made so far **more than 60 of them**; **3) By copying rivals** most popular platform's features and **then leveraging the fact that they are able to reach much more users than any other platform**, keeping most of its users out of the other platforms. FB is doing exactly that to compete with Snapchat, especially on Instagram. Recently the Company created a new feature called **Instagram Stories**, very similar to My Story from Snapchat, its most popular feature, but **allows users and businesses to reach much more people**. For example, Nike featured a story on the first day of Instagram Stories and reached 800 000 people, compared to the 66 000 people reached on Snapchat on their best story. **While FB has much more users than any other platform and the capacity to successfully innovate, copy its best features, or even acquire them (FB tried to acquire Snap) no social media rival will be able to successfully compete with them.**

In terms of ARPU, in 2015 Facebook had 10,7 dollars, while Twitter showed an ARPU of 6,5 dollars, the second biggest of social medias. Snap, at its immature stage, had 0,3 dollars of ARPU but is expected to grow to 1,6 this year.

²⁰ Source: eMarketer

Mobile Messaging

Exhibit 24: MAUs across Mobile Messaging players, 2013-2015 (millions)



Note: Most recent update before YE 2015 on user stats from each platform
Source: Company Reports; Analysts estimates

The mobile messaging landscape includes all mobile applications that allow users to send messages, photos and videos to other users. With the increased penetration of smartphones, there has been a shift from using SMS to use mobile messaging applications. By the end of 2015, **WhatsApp was leading in terms of MAUs, having 1 billion. Messenger was close and it also reached 1 billion MAUs in July 2016.** QQ Mobile, the leading messaging app in China, has been growing more slowly, reaching 853 million MAUs by the end of 2015, since they are almost reaching the maximum penetration rate in China, where they operate. WeChat will face a similar problem, although they are trying to reach more people outside China, but not very successfully so far. Skype and Viber have both around 300 MAUs and have not yet been able to show the high growth rates the other apps have faced.

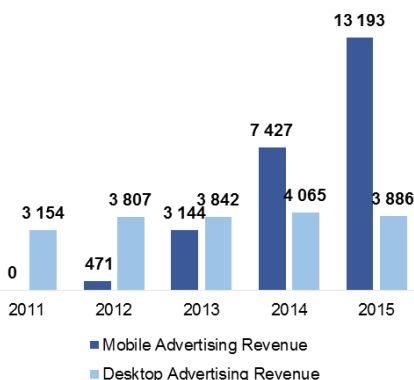
WeChat in China operates its most advanced version of the app, a version that could **serve as a proxy for what is the future of mobile messaging outside China**, which is dominated by Facebook messaging apps. We consider that **WhatsApp's acquisition was made in order to replicate this model**, especially the option to make payments from within the app (either to other users or to companies, that have a profile in the app) or the option to interact with companies (in WeChat, it is possible to order a cab). **WeChat failed to offer these features outside of China because they didn't have the user base to attract businesses to create a profile, interact with customers and allow them to make payments from the app.** But WhatsApp has that user base, and has been growing at constant high rates, therefore we believe we will see the app introducing these features in the medium-term, monetizing from there.

Revenue Model

Advertising: Facebook and Instagram

Since its IPO in 2012, **Facebook has been able to sustain high growth rates in terms of revenue, mostly driven by advertising.** It has been able to consistently capture a great share of the money most companies have in their digital advertising budget, which has been increasing significantly. **Advertising revenue increased, per year, since 2012, 53%, from 4,3 billion dollars in 2012 to 17 billion dollars in 2015, and in the first 9 months of 2016 it has been already reported to have reached 18 billion dollars,** and one should note that usually the **4th trimester is the one where companies spend more money on digital advertising and where Facebook scores its best quarter of**

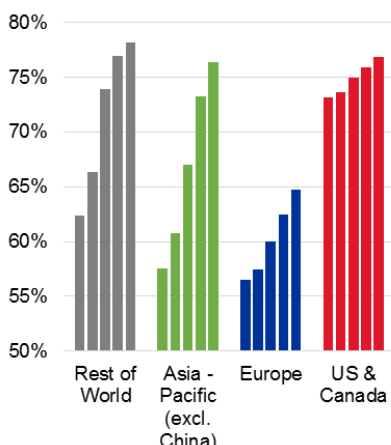
Exhibit 25: Mobile Advertising Revenue vs Desktop Advertising (millions of dollars)



Note: Mobile revenue includes both Facebook mobile and Instagram
Source: Company Reports

the year, with an average increase from the third quarter of 26%. Mobile advertising, which represented only 11% of advertising revenue in 2012 (471 million dollars), represented 77% of advertising revenue in 2015 and in 2016 we estimate it represented 83%. It has been the main driver for Facebook's revenue growth in the last 4 years and it is expected to be the most important growth driver for the next years. Desktop revenue has grown slowly at a 3% rate per year, until 2015, where it showed the first decrease, of 4%, given the shift from most users to mobile and more importantly, to mobile only. Mobile only MAUs represented 52% of total MAUs in 2015 compared to 42% in 2013. We model advertising revenue by forecasting the number of MAUs, which includes Facebook users, both mobile, desktop, and Instagram, and by forecasting the average revenue each user returns to Facebook, taking into account how price per ad and how the number of impressions delivered will evolve.

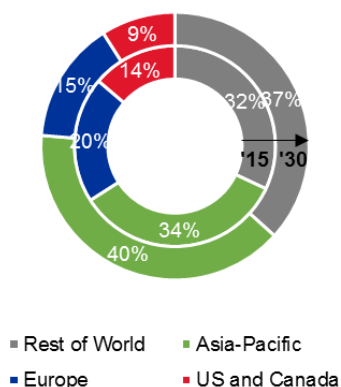
Exhibit 26: MAUs penetration across internet active users, by region, 2014 - 2018



Source: Company Reports; eMarketer; Analyst estimates

MAUs: Facebook's number of MAUs has been growing at a constant rate, higher than the growth rate of internet MAUs worldwide, increasing every year its penetration of internet users. In 2015, 63,3% of the people worldwide, excluding China from where Facebook is banned, who accessed the internet at least one time per month, accessed their Facebook account that month, which compares to 60,7% in 2014. Geographically, this number breakdowns into: 74% of internet users from US & Canada, 66% of internet users from the Rest of the World, 61% of internet users from Asia-Pacific (excluding China), and 58% of internet users from Europe.²¹ Based on the past trends each geography demonstrated, we estimate them to reach 83%, 84%, 83% and 80% of internet users, respectively, by 2030. We assume a deceleration on the growth, as we consider not all internet users will be active on Facebook. The increased penetration across internet users is an important driver for the growth of FB's MAUs, but what drives most of it, is the growth of internet users across each geography. US & Canada is already at a mature stage of 86% of all population (2015), and we estimate it will slowly grow to 88% by 2030. Also, 68% of European population had access to internet in 2015, and we estimate it will grow until 84% in 2030. Asia-Pacific (not including China) had a 33% of internet penetration and the Rest of the World 37% (2015). Both are expected to grow at a higher rate, to reach 56% and 55% by 2030.²² Using this methodology, we estimate that most of the growth of FB MAUs comes from Asia-Pacific and the Rest of the World. Both are expected to grow from 587 million and 629 million in the third quarter of 2016 to 1441 million and 1260 million in 2030, respectively.

Exhibit 27: FB's MAUs geographic breakdown



Source: Company Reports

²¹ Europe has the lowest penetration mostly because of Russia and Germany that have 87 and 63 million internet active users and a penetration of only 22,6% and 37%, respectively. Without them this ratio would be 68%.

²² Estimates based on forecasts from eMarketer and World Bank

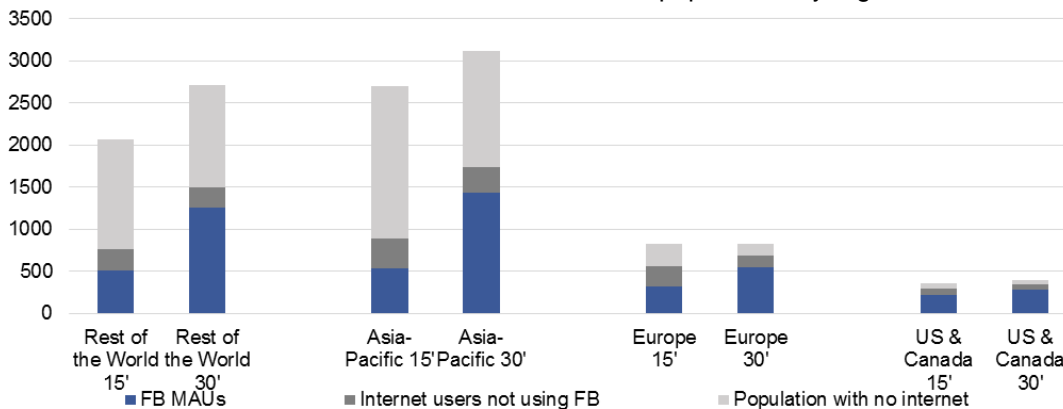
Europe and US and Canada, are expected to grow at a slower pace since they are at a more mature stage, from 342 million and 229 million to 555 million and 286 million. Also, one important trend we are capturing in our forecast, is the **shift from mobile MAUs to mobile only MAUs**. In 2014, MOMAUs represented only 44% of MMAUs, compared to 63,3% in 3Q2016. We estimate this number **will continue to grow to 85% in 2030**.

Exhibit 28: FB's MAUs growth (millions)

	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
Rest of World	304	376	435	509	614	683	735	778	822	866	910	953	997	1041	1085	1129	1173	1216	1260
Asia - Pacific	298	368	449	540	657	781	878	959	1026	1083	1136	1185	1230	1271	1309	1345	1378	1409	1441
Europe	261	282	301	323	350	374	394	411	430	445	460	474	487	499	511	523	534	545	555
US & Canada	193	201	208	219	230	237	243	245	248	253	257	261	265	269	273	276	280	283	286
Total	1056	1227	1393	1591	1852	2075	2250	2393	2526	2647	2763	2873	2980	3081	3179	3273	3364	3453	3542
Mobile	680	945	1189	1442	1734	1984	2181	2341	2486	2615	2737	2852	2960	3064	3163	3257	3349	3438	3526

Source: Company Reports; eMarketer; Analyst estimates

Exhibit 29: Penetration of internet and FB across total population, by region, 2015 – 2030 (millions)



Source: Company Reports; eMarketer; WorldBank; Analyst estimates

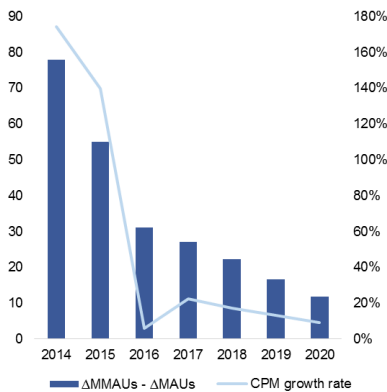
ARPU: As we explained earlier in this report, we divide ARPU into two major components, **number of impressions delivered per user** and **average price per ad**. Facebook doesn't disclose the actual numbers of both metrics, only disclosing the growth rates each one is having when comparing to the homologue period.

Year on year, CPM²³, which represents price per 1000 impressions, increased in every period from 2012 onwards, mostly due to the structural change in the way Facebook displays the ads, decreasing its amount but increasing its prominence and therefore its price, and also by the shift to mobile, where ad prices are higher. **From 2016 onwards, the change was completed and therefore the price growth stabilized, averaging 7%.** The number of impressions delivered has also been volatile, decreasing both in 2014 and in 2015 on average 39%. **In 2016 it also stabilized at an average of 50% growth**, boosted by the increase on the amount of ads shown on Facebook Mobile and Instagram.

The starting point of our model is average CPM. We arrive at an **average annual CPM of 4,2 dollars** for 2015 using estimates of Facebook's CPM from

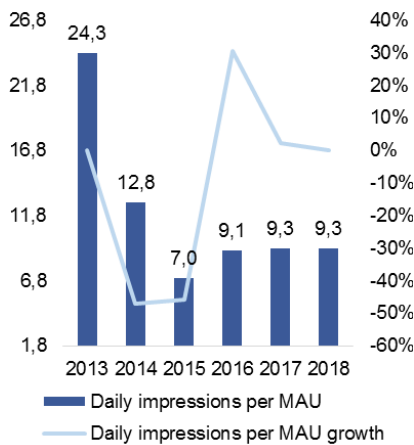
²³ CPM: Cost-per-mille. For each 1000 displays of an ad to a user, Facebook receives a certain fee.

Exhibit 30: ΔMMAUs - ΔMAUs vs CPM growth rate (millions)



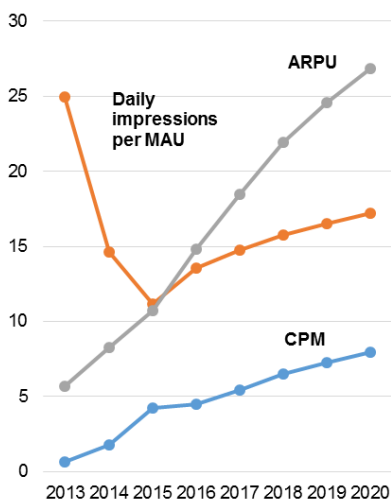
Source: Company Reports; Salesforce Advertising Index 2015; Analyst estimates

Exhibit 31: Daily impressions per MAU growth (units)



Source: Company Reports; Analyst estimates

Exhibit 32: ARPU main drivers (units)

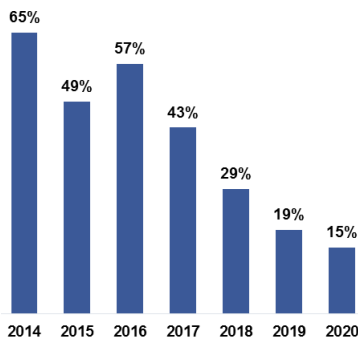


Source: Company Reports; Analyst estimates

the Salesforce Advertising Index. From that point we estimated the average CPM for each period and also the number of impressions delivered each year per MAU, in accordance with Facebook's growth rates. To forecast for the future, we model **two main drivers for CPM: the growth in the digital display advertising market and the shift from personal computers to mobile, where prices are more expensive.** The difference between the increase in MMAUs and the increase in MAUs represent a good proxy for the number of users shifting to mobile that cause average CPM to increase, as it is shown in exhibit 30. Therefore we use our forecasts of MAUs and MMAUs to compute the additional increase in CPM that is not being driven by the growth in the digital display advertising market. On total, between 2016 and 2023, **we estimate the average CPM will increase by 2 dollars as a consequence of the shift to mobile.** As for the other growth driver, we **estimate the average CPM will grow alongside the digital display advertising market,** excluding the effect of user growth that also drives this market, to a point when the market stabilizes and it will grow with inflation only. Our view is that since ad load will stop growing and as Facebook prices its ads on an auction base, with the growing number of advertisers, and the stabilized inventory of ads, the average price will continuously increase with the growth in the demand for digital ads and the stabilized supply. As a result, **we estimate CPM to grow from 4,46 dollars in 2016 and to reach 12,3 dollars in 2030,** the last year of our forecast period.

We forecasted the **number of daily impressions delivered** to MAU by assuming Facebook's statement that **from mid-2017 onwards ad load will lose its relevance as a growth driver,** therefore increasing from 7 in 2015 to 9,1 in 2016 and to 9,3 in 2017, where we expect it to be kept constant in the future. Time spent by users on FB could drive this metric as well in the future, but in the last update the Company disclosed it to be around 50 minutes per user in 2015. Our view on this topic is that Facebook has almost reached user capacity and it will not cross the 60 minutes' line. Facebook has been able to keep its users engaged, and even increasing the engagement, by keeping innovating and adding new products, and it will continue to do so. But that **innovation will probably serve more as a way to sustain this high level of daily engagement than to increase it.** We highlight however that this is a very unpredictable topic. With these forecasts, **we arrive at an ARPU of 14,8 in 2016,** compared to 10,7 in 2015 and 8,2 in 2014, and with the expectation of continuously increase throughout the years, mostly boosted by growth in CPM, to **42 in 2030.** This represents an average annual growth of 16% between 2017 and 2020, compared to the 38% between 2013 and 2016.

Exhibit 33: Ad Revenue growth



Source: Company Reports; Analyst estimates

Exhibit 34: Ad Revenue Build Up
(revenue in millions of \$, users in millions, CPM and ARPU in \$)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
MAUs	1227	1393	1591	1852	2075	2250	2393	2526	2647	2763	2873	2980	3081	3179	3273	3364	3453	3542
CPM	0,64	1,76	4,22	4,46	5,5	6,5	7,3	7,9	8,6	9,1	9,7	10,2	10,7	11,1	11,5	11,8	12,0	12,3
Digital ad market growth	9%	5%	12%	18%	13%	13%	8%	7%	6%	6%	5%	5%	4%	4%	3%	3%	2%	2%
ΔCPM from mobile shift	0,2	1,1	2,5	0,2	0,4	0,3	0,3	0,2	0,1	0,1	0,1	0	0	0	0	0	0	0
Daily impressions per MAU	24,3	12,8	7,0	9,1	9,3	9,3	9,3	9,3	9,3	9,3	9,3	9,3	9,3	9,3	9,3	9,3	9,3	9,3
Annual impressions per MAU	8874	4690	2546	3320	3381	3381	3381	3381	3381	3381	3381	3381	3381	3381	3381	3381	3381	3381
ARPU	5,7	8,2	10,7	14,8	18,5	21,9	24,6	26,8	28,9	30,9	32,8	34,6	36,1	37,6	38,8	39,8	40,7	41,5
Ad Revenue	6986	11492	17079	26858	38325	49333	58867	67796	76614	85451	94251	102961	111248	119377	126966	134043	140679	147150
y/y growth rate	63%	65%	49%	57%	43%	29%	19%	15%	13%	12%	10%	9%	8%	7%	6%	6%	5%	5%
FB News Feed	6986	11492	16225	24306	32959	40700	45990	49258	55665	62086	68479	74807	80829	86735	92249	97390	102212	106914
% of ad revenue	100%	100%	95%	91%	86%	83%	78%	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%
Instagram	0	0	854	2552	5365	8633	12877	18538	20949	23366	25772	28153	30419	32642	34717	36652	38467	40236
% of ad revenue	0%	0%	5%	10%	14%	18%	22%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%
FB's share in digital ad market	6%	9%	11%	14%	17%	18%	19%	20%	21%	23%	24%	25%	26%	27%	28%	28%	28%	28%

Source: Company Reports; Analyst estimates; eMarketer; Salesforce Advertising Index 2015

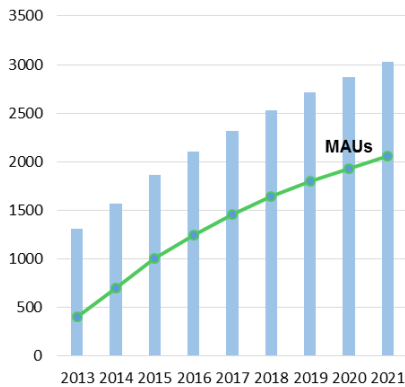
According to these estimates, **we project Facebook's growth of core source of revenue to slowdown, which is consistent with the Company's expectations, averaging 33% of annual growth between 2016 and 2020**, in comparison with the 53% the Company reportedly had between 2012 and 2015 and to finally slowdown to single digits in 2024. These estimates come alongside our premise that Facebook will continue to grow its presence in the digital advertising market capturing a great share especially from minor players. **Advertisers turn to Facebook mostly due to its increasing user base and engagement, its continuously improving targeting ads capabilities and also for how easily the platform allows customers to interact with businesses after being displayed an ad, by using Messenger. We estimate the market share to grow in 5 years to 20% and in 15 years to 28%.**

Mobile Messaging – WhatsApp and Messenger

As we explained earlier in this report, WhatsApp is still at the first stage of Facebook's monetizing strategy, and it will only enter phase two in 2017. Therefore, it will still take some time to start earning revenue from this platform that cost 22 billion dollars. Messenger is already at phase 2 and could reach monetization earlier. **We believe in the potential of both apps to be successfully monetized in the future and to become an important source of revenue to Facebook.** Our believes are sustained by the successful revenue model that WeChat implemented in China, one that wasn't able to replicate in the rest of the world due to its lack of user base to attract international businesses. It is estimated that in 2015²⁴ **WeChat generated 1,8 billion dollars in revenue, which stands for 2,58 dollars of average revenue per each of the 697 million MAUs it had in 2015** (now they are up to 846 million MAUs). The way they manage to do so is by offering a set of features that include advertising, e-commerce, digital content, online-to-offline services and finance, all in a mobile messaging app. And here we have different views on the potential of Messenger

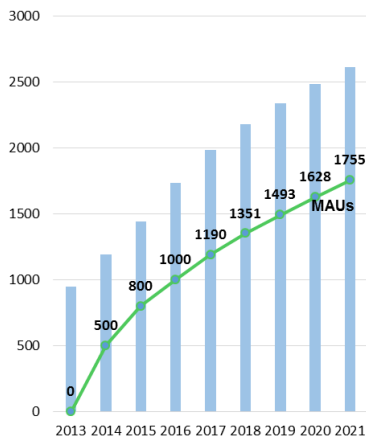
²⁴ According to BDA China Limited

Exhibit 35: WhatsApp MAUs penetration across smartphone users (millions)



Source: Company Reports; eMarketer; Analyst estimates

Exhibit 36: Messenger MAUs penetration across FB mobile users (millions)



Source: Company Reports; Analyst estimates

Exhibit 37: Whatsapp and Messenger estimated revenue breakdown (revenue in M\$, users in millions and ARPU in \$)

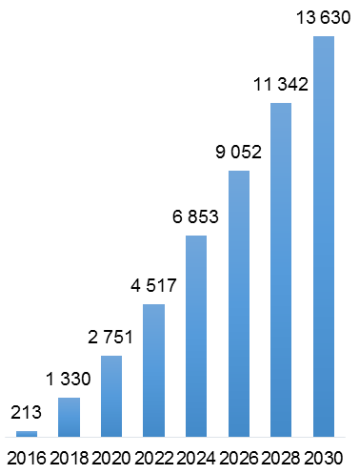
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
MAUs	400	700	1000	1246	1455	1640	1795	1928	2055	2176	2292	2405	2514	2620	2723	2824	2922	3019
Smartphone Users	1310	1570	1860	2100	2320	2530	2710	2870	3027	3182	3333	3481	3626	3768	3907	4042	4175	4306
Penetration	31%	45%	54%	59%	63%	65%	66%	67%	68%	68%	69%	69%	69%	70%	70%	70%	70%	70%
ARPU	0	0	0	0	0	0.20	0.46	0.87	1.41	2.00	2.58	3.09	3.52	3.85	4.09	4.28	4.41	4.50
WhatsApp revenue	0	0	0	0	0	328	826	1679	2888	4349	5910	7436	8837	10077	11152	12078	12881	13584
MAUs	0	500	800	1000	1190	1351	1493	1628	1755	1878	1997	2111	2221	2328	2431	2531	2628	2724
FB MMAUs	945	1189	1442	1734	1984	2181	2341	2486	2615	2737	2852	2960	3064	3163	3257	3349	3438	3526
Penetration	0%	42%	55%	58%	60%	62%	64%	66%	67%	69%	70%	71%	73%	74%	75%	76%	76%	77%
ARPU	0	0	0	0	0.1	0.22	0.33	0.45	0.57	0.68	0.8	0.92	1.03	1.15	1.267	1.383	1.5	1.5
Messenger revenue	0	0	0	0	119	293	498	733	995	1283	1597	1935	2296	2677	3080	3501	3942	4086

Source: Company Reports; eMarketer; Analyst estimates

and WhatsApp. We see Messenger as the complementary messaging app to Facebook’s core platform, to where users are redirected to contact businesses and vice-versa, and therefore it is already indirectly creating value. We expect monetization in Messenger to come essentially from payments from users to businesses, charging businesses for that service. WhatsApp, on the other hand, is a stand-alone app that has the potential to replicate WeChat model for its users, offering a set of features similar to WeChat, and therefore generating more revenue than Messenger.

Applying a similar method to the one we used to forecast Facebook MAUs growth, we see that in **2015**, where it almost reached 1000 million MAUs, **WhatsApp had penetrated smartphone users market by 54%**, compared to 45% in 2014 and 31% in 2013. **We estimate WhatsApp has the potential to reach around 70% of this market by 2021** and to maintain its share throughout the future, **according to our expectations that it will have a prominent role as WeChat has in China**. In terms of ARPU, we have a conservative view, mostly because Facebook doesn’t want to jeopardize the customer experience of the app, and therefore it won’t force advertising into its users, which would obviously be the most lucrative way (if one assumes no MAUs loss) to monetize the app. Therefore, **we believe revenue will come from the interactions between customers and businesses in the form of a fee, mostly from payments**. We forecast monetization to start slowly in 2018 with 0,2 dollars of ARPU and to reach a **potential 4,5 dollars in 2030**, contributing with 13 584 million dollars to the Company. For Messenger, we estimate its users to grow alongside Facebook mobile users, given that the app is a complementary part of FB mobile. **In 2015 58% of FB mobile MAUs were Messenger MAUs, compared to 55% in 2014**. We estimate it to continuously grow at slower rates, and **to reach 77% by 2030**. In terms of **ARPU**, we estimate it to slowly start growing in 2017 at 0.1 dollars and reach **1,5 dollars by 2030**, generating 4 086 million dollars for the Company. However, we highlight the uncertainty surrounding both forecast, as it uses WeChat’s as a proxy and it is not yet fully clear how Facebook intends to monetize the application, and if its users will continue to grow organically as they did in the past.

Exhibit 38: Oculus estimated revenue (millions of \$)



Source: SuperData Research; Goldman Sachs Investment Research; Analyst estimates

Payments and other fees

Virtual reality - Oculus

Oculus started selling its VR high-end headset earlier in 2016, and the company did not publish any data on the units sold yet. It is already competing with other brands for this new market, therefore it is unclear how well it will go for Facebook's Oculus. Still, **the market for hardware VR headsets is estimated to have reached 2 billion dollars by the end of 2016, and it is estimated to reach 45 billion dollars by 2020²⁵.** The product started selling at 599 dollars and IHS Markit Technology estimates the production cost of the headsets to be around 206 dollars. Given the high-price of the Oculus VR and its PC requirements, we believe initial adoption will be slow. That being said, the estimated amount of units to be sold by 2016 end is at 350 thousand, which compares to the HTC projected 420 thousand units, which also requires high-end PCs, and PS VR 750 thousand units, which only requires a PS4²⁶. **However, we believe there is room for Oculus VR, especially in the PC gaming industry, which corresponded to 150 million users in 2015 in developed markets, where they have easier access to high-end computers.** Based on the current estimates, **Oculus is set to have a market share of 11% this year**, increasing at a slow pace with the shift from smartphone-based devices to high-end devices and as the base of high end computers increases. **We believe it can dominate 20% of the market by 2020**, and we assume it to keep that market share for the rest of the forecast period as the product focus more on PC gamers, but the market also includes video gamers (230 million in 2015), regular consumers and VR for other type of experiences. **With these forecasts we predict Oculus to achieve 13 630 million dollars revenue by 2030, representing 8% of Facebook's total revenue.**

Exhibit 39: Oculus revenue and profit breakdown (market size, revenue, total cost and profit in millions of dollars; units sold in millions; price in dollars)

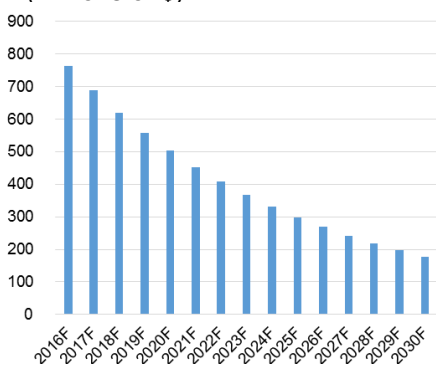
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Hardware VR Market size	2 000	5 000	8 000	11 000	14 000	19 000	28 000	35 000	40 000	45 000	49 922	54 700	59 280	63 624	67 703
Growth rate	0	150%	60%	38%	27%	36%	47%	25%	14%	13%	11%	10%	8%	7%	6%
Units sold (Oculus Rift)	0,355	1,121	2,220	3,473	4,592	4,958	7,541	9,718	11,441	13,246	15,112	17,015	18,934	20,853	22,755
Price	599	599	599	599	599	599	599	599	599	599	599	599	599	599	599
Revenue	213	671	1 330	2 080	2 751	2 970	4 517	5 821	6 853	7 935	9 052	10 192	11 342	12 491	13 630
Market share	11%	12%	13%	14%	15%	16%	16%	17%	17%	18%	18%	19%	19%	20%	20%
Cost	73	440	872	1 365	1 804	1 948	2 963	3 818	4 495	5 204	5 937	6 685	7 439	8 193	8 940
Margin	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%	65,6%
Profit	139	440	872	1 365	1 804	1 948	2 963	3 818	4 495	5 204	5 937	6 685	7 439	8 193	8 940

Source: Goldman Sachs Global Investment Research; SuperData Research; Analyst estimates

²⁵ Goldman Sachs Global Investment Research

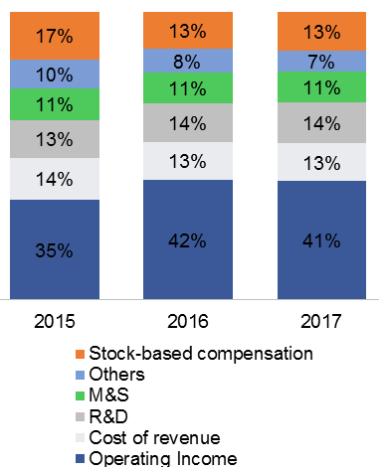
²⁶ SuperData Research

Exhibit 40: Revenue from payments and other fees (millions of \$)



Source: Analyst estimates

Exhibit 41: Cost structure and operating income as % of revenue 2015 - 2017



Source: Company Reports; Analyst estimates

Exhibit 42: Comparison of operating metrics of FB with peers – 2015 (millions of \$)

	FB	Twitter	Google	LinkedIn
Revenue	17 928	2 218	74 989	2 991
EBITDA	11 221	558	30 071	780
CoR	2 597	688	27 358	370
R&D	2 371	405	9 595	543
M&S	1 985	714	8 148	952
G&A	974	178	5 275	346
SBC	2 969	682	5 253	510

Margins

	FB	Twitter	Google	LinkedIn
Operating	47%	-20%	26%	-5%
EBITDA	63%	25%	40%	26%

%revenue

	FB	Twitter	Google	LinkedIn
CoR	14%	31%	36%	12%
R&D	13%	18%	13%	18%
M&S	11%	32%	11%	32%
G&A	5%	8%	7%	12%
SBC	17%	31%	7%	17%

Source: Company Reports

▪ **Payments and other fees**

Payments and other fees have been losing its importance throughout the years. **It accounted for 16% of revenue in 2012, but with the mobile shift, it declined to 5% of revenue in 2015**, when it also decreased 13% over year. Our view is that with the shift to mobile as a major trend for Facebook, where game applications operate solo, **this will continue to decrease throughout the forecast period**. We estimate a revenue of 765 million dollars for 2016, a decrease of 10% YoY, and **to continue to decrease on average 10% per year**.

Financials

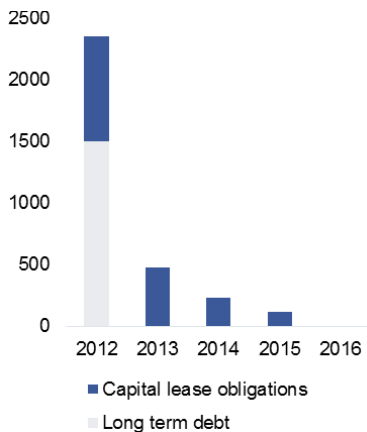
Facebook has always shown to be solid and financially disciplined. Since its IPO, **it always reported positive operating income**, and we do not see any reason why it will not continue to do so. Its **cost structure is well balanced, and highly connected to revenues**. Cost of revenue as % of total revenue has always decreased since 2012, **from 25% to 14%**, well below Google (36%) and Twitter (31%), and close to LinkedIn (12%). We think it will continue to decrease, but at a slower pace, and also that it might be affected by the Oculus business, if it performs as we are forecasting in this report. **Research and development has been an area of strong importance for Facebook, with product innovation and creation being completely dependent on this area**. Its weight on revenue has increased every year since the IPO and we expect it to continue to increase, but at a slower pace since we are not modelling potential future acquisitions (given its high level of uncertainty) and acquisitions are related with the increase of R&D. In 2015 it represented 13% of total revenue, similar to Google levels, and below Twitter and LinkedIn (18%), mostly due to the much higher revenue Facebook and Google have. For 2016 we are expecting 14%, which includes the announcement made by the Company of an additional 250 million dollars investment in the Oculus VR. From 2017 onwards, we are also modelling Facebook's announcement of high level activity on hiring more engineers, and we expect **15% of weight on revenues**. The other operational expenses are expected to grow in line with revenues as they did in the past. Comparing to the most relevant peers, a part from cost of revenue, Facebook has a cost structure very similar to Google's, the only other company with positive operating income from the companies assessed.

We estimate Facebook to present **non-GAAP EBITDA in 2016 of 18 019 million dollars**, a YoY growth of 60%. This represents an **EBITDA margin of 65%** comparing with 63% in 2015. We forecast this ratio to decline in 2017 to 64% and to continuously decline towards 62% in 2030, mostly due to the Oculus business cost of goods sold. The **operating margin is expected to increase in 2016 to**

42% from 35% in 2015, returning to 2014 levels, and to continue at this rate throughout the forecast period, mostly driven by the decrease in the weight of stock based compensation expenses in total revenue, a recurrent cost that is mostly connected to revenues, but also to acquisitions, which we are assuming will not happen, decreasing this ratio (13% in 2017 vs 17% in 2015).

During 2016, Facebook’s repaid all the debt it had on its books. It has been doing so, not increasing its level, since 2012 (the year of IPO). Given its cash levels (we estimate cash and cash equivalents to reach 7 billion dollars in 2016 and marketable securities to reach 16 billion dollars) **we do not expect Facebook to contract debt, and we take that into consideration in our model. Also, the Company never distributed dividends to its shareholders and doesn’t intend to do so in the near future.** We are modelling this expectation, although we highlight that this policy, along with the high levels of cash the Company has in its books, has inherent the risk that Facebook’s management might be pressured to make more acquisitions, ending up acquiring companies that won’t fit in Facebook’s strategy or whose product doesn’t add any value to what Facebook already has, making it difficult to return a positive IRR. Still, we consider that in the long-term Facebook may start distributing dividends.

Exhibit 43: FB’s total debt 2012 – 2016 (millions of \$)



Source: Company Reports; Analyst estimates

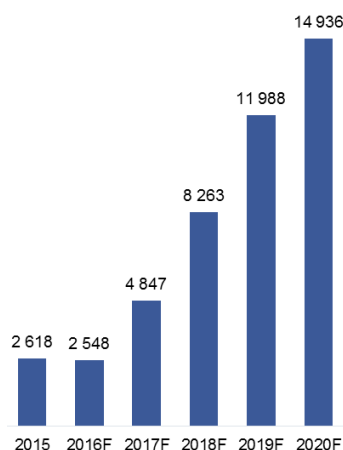
Valuation

We value Facebook using a DCF approach, with a **WACC of 9,1%** and a **terminal value growth rate of 4,2%**, achieving a weighted-average value per share of 156 dollars. We chose this approach because we think it is the only one that **captures all Facebook’s main growth drivers and the potential monetization of its platforms, as well as the sales from Oculus**, while allowing for a scenario analysis, given the uncertainty of the forecasts. Our forecast period ends in 2030, but for the period 2031 – 2035 we estimate cash flows to grow at a decelerating rate, reaching 4,2% in 2035. From there onwards we estimate the value of Facebook as a perpetuity, growing at 4,2%.

WACC Approach

Since we are forecasting no debt for Facebook, our WACC is equal to the cost of equity. We forecast the cost of equity using the CAPM method²⁷. The risk-free rate is assumed to be 2,42%, equivalent to the yield of the US Generic Government 10 year index, perceived as a risk-free asset.²⁸ As market risk-premium, we use the widely accepted 5,5% average as suggested by common

Exhibit 44: FB’s unlevered FCFs (millions of \$)



Source: Analyst estimates

²⁷ CAPM: Risk Free + Beta_{unlevered} X (Market Risk Premium)

²⁸ Source: Bloomberg (06/01/2017)

Exhibit 45: WACC estimation

Beta unlevered	1,21
Market return	5,50%
Risk-free rate	2,42%
Cost of equity	9,1%
Tax rate	35%
Debt / Equity + Debt	0
Equity / Equity + Debt	1
WACC	9,1%

Source: Bloomberg; Mckinsey Valuation; OECD; Analyst estimates

literature²⁹ and an unlevered beta³⁰ of 1,21. The beta we considered was computed using the weighted-average³¹ unlevered rolling (2 years)³² beta of the industry peers, which include Facebook, Google, Twitter, LinkedIn and Yahoo. Since we expect no debt in the future, there is no need to re-lever the computed beta. Taking these assumptions into consideration, we arrive at a **cost of equity, which is equal to the WACC, of 9,1%**. As a growth rate for the terminal value, we use 4,2%, correspondent to the estimated annual average growth of global GDP between 2035 and 2060³³, incorporating the inflation expectations we arrive by computing the difference between US 10 year Government bonds and US 10 year Treasury Inflation Protected Securities.^{34 35}

Valuation Outcome

Our model assigns a **buy recommendation to Facebook at a YE 2017 target share price of 156 dollars**, which represents an **upside of 29%** to its current share price of 121 dollars³⁶. The correspondent equity value is 463 287 million dollars, which includes marketable securities of 20 650 million dollars, in comparison to an equity value of 351 753 million dollars as of January 2017³⁷. The value of the discounted operations corresponds to 176 668 million dollars and the terminal value is 265 969, corresponding to 57% of the total value of the company.

Valuation Scenarios

We are aware that our model is highly dependent on our assumptions, most importantly on MAUs growth, CPM growth and estimation of the potential revenue of platforms that are not yet monetized or whose market potential and market players are highly uncertain (virtual reality). Therefore, we computed a set of three scenarios in order to assess the risk behind our assumptions. Our **base scenario** is the one we presented in the report and the one we think it is more likely to happen (60%): continuous growth with a high but decelerating pace both of MAUs and CPM, monetization of WhatsApp and Messenger to a point where both will together represent around 10% of Facebook's revenue, and successful implementation of the Oculus VR as a market leader for computer gamers, getting a market share of 20%. With these assumptions, we get a **share price**

²⁹ Source: Mckinsey Valuation – “Measuring and Managing the Value of Companies” – 5th Edition

³⁰ Unlevered beta is computed through: $\text{Equity Value} / (\text{Debt} + \text{Equity}) \times \text{levered beta}$

³¹ Market cap of each company used as a correspondent weight

³² Period considered: 26/12/2014 – 30/12/2016

³³ Source: OECD, real GDP growth based on 2010

³⁴ Date: 05/01/2016

³⁵ $g = (1 + \text{GDP real growth rate}) \times (1 + \text{inflation rate})$

³⁶ Date: 02/12/2016

³⁷ Source: Bloomberg; Date: 05/01/2017

for YE 2017 of 159 dollars, an upside of 32% to its current price. In our **worst case scenario** (25%), we expect MAUs and CPM to continue to grow, but at a slower pace, especially MAUs and CPM driven by a slower growth of the digital display advertising market. But the main point in this scenario is the unsuccessful monetization of WhatsApp and Messenger, including the costs of its implementation, but not including most of the upside it should generate, therefore, destroying value. We also revise downwards our expectations of both platforms MAUs growth. As for the Oculus VR, we assume will only get 11% of the market share, not being able to increase from its current levels, and also that the market will grow at a slower pace. With these assumptions, we get a **share price for YE 2017 of 138 dollars**, which still represents an **upside of 14%** from the current share price, **which would reiterate our recommendation to hold.** Finally, our **best case scenario** (15%), considers a higher penetration for the future in terms of MAUs/worldwide internet users (69% globally³⁸), as well as a more accelerated growth of the digital display advertising market. For WhatsApp and Messenger, we maintain our base case scenario estimates, with a slight increase of the expected future ARPU, and also a slightly higher user penetration rate across Smartphone users/FB Mobile users. As for the Oculus VR, we maintain our base case assumptions of market share, but we predict a more accelerated growth of this market, as we know our first assumptions are conservative when compared to other forecasts by research companies. With these assumptions, we get a **share price for YE 2017 of 175 dollars**, which represents an **upside of 45%** from the current share price, **reinforcing our buy recommendation. Taking into consideration the assumed probabilities of each scenario, we get a target price YE 2017 of 156 dollars per share.**

Exhibit 46: Scenario Analysis – Assumptions for 2030 (CPM in units, market sizes in M\$, MAUs in millions, share price in \$)

	MAUs / Internet users	CPM	Digital Display Advertising Market	WhatsApp ARPU	WhatsApp MAUs	Messenger ARPU	Messenger MAUs	Oculus VR Market share	Oculus VR Market size	Share Price	Probability
Base Scenario	67%	12,3	522 425	4,5	3 019	1,5	2 724	20%	67 703	159	60%
Worst Scenario	65%	11,6	449 005	1,0	2 721	0,5	2 487	11%	58 603	138	25%
Best Scenario	69%	13,2	553 007	5,0	3 202	2	3 126	20%	71 955	175	15%

Source: Analyst estimates

Sensitivity Analysis

In addition to computing different scenario analysis to test our model assumptions, we also computed a sensitivity analysis of the price relative to the WACC and to the terminal growth rate. Regarding the WACC, we are testing its sensitivity to the unlevered beta. As a lower bound, we considered Facebook's beta, of 1,07³⁹, which is lower than the one we computed with the considered peers. As an upper bound, we considered 1,33, correspondent to Facebook's

³⁸ Including China

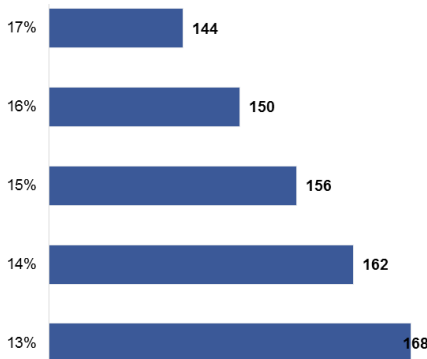
³⁹ Source: Bloomberg. Unlevered rolling beta (2 years)

Exhibit 47: Sensitivity Analysis: WACC vs terminal growth rate

		Growth rate		
		3,7%	4,2%	4,7%
WACC	8,3%	173	192	216
	8,7%	158	173	192
	9,1%	143	156	171
	9,4%	135	145	158
	9,7%	126	135	146

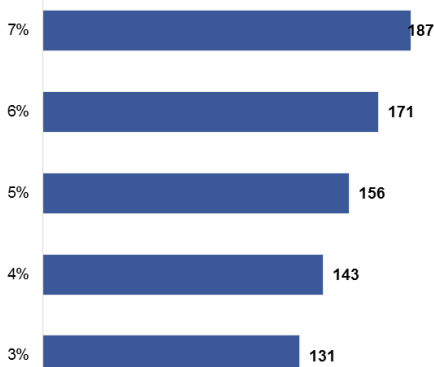
Source: Analyst estimates

Exhibit 48: Sensitivity Analysis: Target price (\$) variation with R&D (%)



Source: Analyst estimates

Exhibit 49: Sensitivity Analysis: Target price (\$) variation with FB MAUs growth rate (%)



Source: Analyst estimates

industry⁴⁰. Regarding the growth rate, we set a confidence interval of 1% given its unpredictability. What we see here is that the price is quite sensible to variations of both values, varying between 126 and 216 dollars per share. The lower price shows a significant variation from our target price (19%), and would reiterate our recommendation from buy to hold (8% of upside). However, most of the computed values wouldn't change our recommendation, which gives us the idea that the **valuation is within a reasonable range**.

Other assumption that we are challenging with a **sensitivity analysis is the % of revenue spent on R&D**. Facebook's core business has a major focus on product innovation, and they have been investing every year more of its revenue on R&D. Although in 2015 this ratio was the biggest ever recorded (13%), we are forecasting it to be 15% due to the 3rd quarter call announcements. Still, we assume this value might be higher (or lower – in the past the Company made similar comments but it wasn't verified). What we see is that, within the range of 13% to 17% of revenue, the price range varies from 147 to 171, which is expected and doesn't challenge our recommendation of the target price. We justify this fluctuation with the capacity of Facebook's to generate the same level of revenue with different levels of investment.

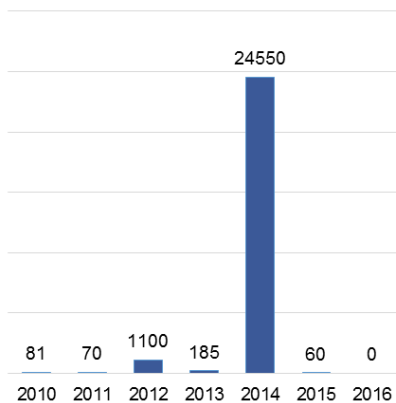
Finally, we also computed a **sensitivity analysis to the growth rate of FB's MAUs**. According to our estimates, throughout the forecast period, MAUs are expected to grow at an average of 5% per year. With this sensitivity analysis, what we see is that, within the range of 3% to 7% of average growth rate, the price ranges between 133 and 191, showing how dependent of this growth Facebook is, and why we considered it as one of the key risks.

Acquisition's assumption

One of the major assumptions in our model is not forecasting future acquisitions from FB. However, we know this assumption will not be verified. In fact, the Company has in its core strategy acquisitions as one important pillar. The reason why we make this assumption is because they are completely unpredictable. A look at the historic of acquisitions proves it: FB, since 2012, acquired 37 Companies and disclosed (most of the minor acquisition's value was not disclosed) to have spent around 26 billion dollars on those acquisitions (22 just on WhatsApp). Furthermore, the amount spent each year is highly volatile, from 25 billion dollars reported in 2014 to 60 million dollars in 2015. Our point is: FB doesn't have an acquisition budget, but they have a big amount of cash and marketable securities available (not counting on the issuance of common stock

⁴⁰ Source: Damodaran

Exhibit 50: Disclosed amount spent on acquisitions (millions of dollars)



Source: Company announcements

they made in past acquisitions) and if they find a company that fits their strategy (either of product improvement or product diversity) they will acquire it, as they did in the past. In addition, from most acquisitions there is no way of measuring if they generated a positive ROIC, as they are fully integrated in the Company and it is not possible to identify the incremental revenue generated and the additional costs required. Therefore, our major assumption here is that, these acquisitions which, in our view, are one of the reasons why FB is and will be able to keep a sustainable high growth rate, are not being accounted for, and that is why the growth rates of the revenue we forecast decreases gradually until stabilizing throughout the forecast period. Still, we include a balance sheet item to what we called “Cash available for acquisitions”, which includes cash that in our view will likely be used for acquisitions throughout time, and that, if not separated from cash and cash equivalents, would highly inflate this item.

Multiples Valuation

Exhibit 51: Multiples valuation

	P/E
Facebook	28,8x
Google	23,0x
Twitter	33,1x
IAC	26,5x
WebMD	19,9x
Criteo	22,5x
Average	25,0x
Implied share price	103

Source: Bloomberg
Date: 03/01/2017

We also computed a multiples valuation to assess FB’s value relative to the market perception on other companies from the same industry. We were able to identify five companies that serve as comparables, since they all are internet companies with digital advertising as one of the most important sources of revenue. We used trailing adjusted P/E ratio to make this assessment and arrived at a share price of 103\$ for FB’s stock, which is lower than its current price of 121\$. However, our view is that Facebook should be more valuable than most of other companies from the industry because it accounts for the potential higher growth opportunities the Company has (only comparable to Google’s), therefore having a P/E higher than the industry’s. These growth opportunities are not all connected to the digital advertising industry, and that is why we think a DCF valuation captures the value of FB in a much more proper way.

Final valuation remarks

Facebook’s potential upside is obvious. The Company has been able to successfully generate revenue from the platforms it developed and we don’t see any reason why it shouldn’t succeed monetizing the platforms it still has to monetize. Still, in this report we point out that the target price is for YE 2017. However, given its uncertainty, there is the risk that investors do not price the potential monetization of Facebook’s platforms such as WhatsApp or Messenger without seeing real results. And therefore, our target price would not be fully achieved by the end of next year. And for this reason we were conservative in some of the assumptions we made for both platforms, in order to mitigate this risk. Still, **we reinforce our buy recommendation for Facebook, as we do believe on the high potential upside it can achieve in the long-term.**

Appendix

Financial Statements – Income Statement

	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
Revenue	3 711	5 089	7 872	12 466	17 928	27 835	39 804	51 904	62 829	73 462	83 920	96 009	107 947	119 515	130 614	141 452	151 631	161 181	170 188	178 627
Advertising	3 154	4 278	6 986	11 492	17 079	26 858	38 325	49 333	58 867	67 796	76 614	85 451	94 251	102 961	111 248	119 377	126 966	134 043	140 679	147 150
Payments and other fees	557	811	886	974	849	765	689	620	559	503	453	408	368	331	298	269	242	218	196	177
Cost of revenue	860	1 367	1 862	2 065	2 680	3 714	5 400	7 123	8 784	10 390	11 741	14 036	16 183	18 138	20 067	21 986	23 838	25 621	27 339	28 983
Gross profit	2 851	3 722	6 010	10 401	15 248	24 121	34 404	44 781	54 045	63 072	72 179	81 973	91 764	101 377	110 546	119 466	127 793	135 560	142 850	149 644
Research and development	390	1 427	1 411	2 641	4 782	6 511	9 829	12 703	15 258	17 761	20 332	22 980	25 651	28 298	30 814	33 255	35 526	37 635	39 609	41 443
Marketing and sales	393	905	999	1 574	2 313	3 459	4 922	6 388	7 696	8 955	10 181	11 591	12 969	14 289	15 539	16 745	17 861	18 891	19 847	20 726
General and administrative	312	851	651	873	1 198	1 759	2 490	3 214	3 850	4 455	5 037	5 701	6 342	6 946	7 508	8 042	8 525	8 959	9 352	9 703
Amortization of intangibles	0	0	145	319	730	775	775	775	775	146	0	0	0	0	0	0	0	0	0	0
Depreciations (included in S&G and CoR)	303	566	857	923	1 220	1 892	2 674	3 446	4 122	4 762	5 374	6 072	6 742	7 371	7 952	8 500	8 993	9 432	9 825	10 171
Total operating expenses	1 095	3 184	3 206	5 407	9 023	12 503	18 016	23 080	27 580	31 318	35 550	40 273	44 962	49 532	53 861	58 042	61 911	65 486	68 809	71 872
Operating Income	1 756	538	2 804	4 994	6 225	11 618	16 387	21 701	26 466	31 754	36 629	41 700	46 802	51 844	56 686	61 424	65 882	70 074	74 041	77 772
Interest and other income/(expense), net	-61	-44	-50	-84	-31	35	69	95	119	138	154	168	183	196	206	213	217	219	217	213
Income before provision for income taxes	1 695	494	2 754	4 910	6 194	11 653	16 456	21 796	26 584	31 892	36 783	41 868	46 985	52 041	56 892	61 637	66 099	70 293	74 258	77 986
Provision for income taxes	695	441	1 254	1 970	2 506	4 508	6 251	8 188	9 925	11 622	13 343	15 188	17 044	18 878	20 638	22 360	23 978	25 500	26 939	28 291
Net income	1 000	53	1 500	2 940	3 688	7 144	10 206	13 608	16 660	20 270	23 440	26 680	29 941	33 162	36 254	39 277	42 121	44 793	47 320	49 695

Financial Statements – Balance Sheet

	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
Assets																				
Cash and cash equivalents	1 512	2 384	3 323	4 315	4 907	7 340	10 098	12 649	14 684	16 434	17 934	19 558	20 910	21 956	22 688	23 156	23 307	23 163	22 755	22 097
Marketable securities	2 396	7 242	8 126	6 884	13 527	15 925	20 650	28 676	35 947	42 030	48 014	54 930	61 760	68 378	74 728	80 929	86 753	92 217	97 370	102 198
Cash available for acquisitions	0	0	0	0	0	0	201	636	5 656	15 155	27 977	42 552	60 723	82 689	108 443	137 702	170 692	207 204	246 996	289 933
Accounts receivable	547	719	1 109	1 678	2 559	3 883	5 552	7 240	8 764	10 248	11 706	13 393	15 058	16 672	18 220	19 732	21 152	22 484	23 740	24 917
Prepaid expenses and other current assets	149	922	512	513	659	703	780	769	707	618	540	471	405	343	288	239	196	159	129	104
Total current assets	4 604	11 267	13 070	13 390	21 652	27 852	37 282	49 970	65 758	84 485	106 172	130 903	158 856	190 038	224 367	261 757	302 099	345 227	390 991	439 250
Property and equipment, net	1 475	2 391	2 882	3 967	5 687	8 924	12 614	16 255	19 443	22 460	25 346	28 640	31 800	34 763	37 506	40 092	42 414	44 486	46 339	47 972
Goodwill and intangible assets, net	162	1 388	1 722	21 910	21 272	20 514	19 739	18 964	18 189	18 043	18 043	18 043	18 043	18 043	18 043	18 043	18 043	18 043	18 043	18 043
Other assets	90	57	221	699	796	1 398	2 000	2 607	3 156	3 690	4 216	4 823	5 423	6 004	6 562	7 106	7 617	8 097	8 550	8 974
Total assets	6 331	15 103	17 895	39 966	49 407	58 689	71 634	87 797	106 547	128 679	153 777	182 410	214 122	248 848	286 478	326 999	370 173	415 853	463 923	514 239
Liabilities and stockholders' equity																				
Accounts payable	63	65	87	176	196	268	390	514	634	750	847	1 013	1 168	1 309	1 448	1 586	1 720	1 848	1 972	2 091
Partners payable	171	169	181	202	217	263	334	384	414	428	422	441	444	435	420	402	381	358	333	309
Accrued expenses and other current liabilities	296	423	555	866	1 449	2 049	2 929	3 820	4 624	5 407	6 176	7 066	7 945	8 796	9 613	10 411	11 160	11 863	12 526	13 147
Deferred revenue and deposits	90	30	38	66	56	123	176	229	277	324	371	424	477	528	577	625	669	712	751	789
Total current liabilities	620	687	861	1 310	1 918	2 702	3 828	4 947	5 949	6 908	7 816	8 944	10 033	11 067	12 058	13 024	13 930	14 780	15 583	16 335
Long term debt and capital lease obligations	677	2 356	476	233	114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other liabilities	135	305	1 088	2 327	3 157	4 624	6 238	7 673	8 762	9 664	10 415	11 240	11 922	12 452	12 837	13 115	13 262	13 299	13 247	13 116
Total liabilities	1 432	3 348	2 425	3 870	5 189	7 326	10 066	12 620	14 711	16 573	18 231	20 184	21 955	23 519	24 895	26 138	27 192	28 079	28 829	29 451
Common and convertible preferred stock	615	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Additional paid-in capital	2 684	10 094	12 297	30 225	34 886	34 886	34 886	34 886	34 886	34 886	34 886	34 886	34 886	34 886	34 886	34 886	34 886	34 886	34 886	34 886
Accumulated other comprehensive (loss) income	-6	2	14	-228	-455	-455	-455	-455	-455	-455	-455	-455	-455	-455	-455	-455	-455	-455	-455	-455
Retained earnings	1 606	1 659	3 159	6 099	9 787	16 931	27 137	40 745	57 405	77 675	101 115	127 795	157 736	190 898	227 152	266 429	308 550	353 343	400 662	450 357
Total stockholders' equity	4 899	11 755	15 470	36 096	44 218	51 362	61 568	75 176	91 836	112 106	135 546	162 226	192 167	225 329	261 583	300 860	342 981	387 774	435 093	484 788
Total liabilities and stockholders' equity	6 331	15 103	17 895	39 966	49 407	58 689	71 634	87 797	106 547	128 679	153 777	182 410	214 122	248 848	286 478	326 999	370 173	415 853	463 923	514 239

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Financial Statements – Cash Flow Statement

Cash flow Map	2011	2012	2013	2014	2015	2016F	2017F	2018F	2019F	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
NOPLAT	1 045	172	1 587	3 356	3 978	7 180	10 127	13 411	16 356	19 624	22 637	25 771	28 923	32 040	35 032	37 960	40 715	43 306	45 757	48 063
Depreciations	303	566	857	923	1 220	1 892	2 674	3 446	4 122	4 762	5 374	6 072	6 742	7 371	7 952	8 500	8 993	9 432	9 825	10 171
Amortization of intangibles	0	0	145	319	730	775	775	775	775	146	0	0	0	0	0	0	0	0	0	0
Gross cash flow	1 348	738	2 589	4 598	5 928	9 847	13 577	17 633	21 253	24 532	28 010	31 843	35 666	39 410	42 984	46 460	49 707	52 737	55 582	58 234
Change in operating working capital		-1 750	-745	-1 113	-1 011	-3 017	-3 378	-3 109	-2 495	-2 185	-1 973	-2 113	-1 862	-1 564	-1 235	-965	-621	-301	-16	-258
Net capital expenditures		-1 482	-1 348	-2 008	-2 940	-5 130	-6 364	-7 088	-7 310	-7 779	-8 259	-9 366	-9 902	-10 334	-10 695	-11 087	-11 314	-11 504	-11 678	-11 804
Intangible net assets		-639	-227	-3 365	-47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Investments in goodwill		-587	-252	-17 142	-45	-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decrease (increase) in other LT operating assets		203	619	761	733	865	1 012	828	540	368	225	218	82	-51	-172	-267	-364	-443	-505	-555
Gross investment		-4 255	-1 953	-22 867	-3 310	-7 299	-8 729	-9 369	-9 265	-9 596	-10 008	-11 261	-11 682	-11 949	-12 101	-12 318	-12 299	-12 248	-12 199	-12 101
Free cash flow from operations	1 348	-3 517	636	-18 269	2 618	2 548	4 847	8 263	11 988	14 936	18 003	20 582	23 983	27 462	30 883	34 142	37 409	40 489	43 383	46 133
Total free cash flow available to investor	1 348	-3 517	636	-18 269	2 618	2 548	4 847	8 263	11 988	14 936	18 003	20 582	23 983	27 462	30 883	34 142	37 409	40 489	43 383	46 133
Interest expense, net of tax shield	-25	-16	-32	-15	-15	-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Change in LT debt and capital lease obligations	1 679	-1 880	-243	-119	-114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flows to debt holders	-25	1 663	-1 912	-258	-134	-121	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest income	0	0	11	18	33	28	43	59	73	85	95	104	113	121	127	132	134	135	134	132
Other income (expense)	-19	2	-7	-59	-38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nonoperating taxes	16	-105	-59	-360	-270	-57	36	138	231	561	708	806	904	1 001	1 095	1 186	1 271	1 352	1 428	1 500
Decrease (increase) in marketable securities		-4 846	-884	1 242	-6 643	-2 398	-4 724	-8 026	-7 271	-6 083	-5 984	-6 916	-6 830	-6 618	-6 350	-6 201	-5 824	-5 464	-5 153	-4 828
Decrease (increase) in cash for acquisitions		0	0	0	0	0	-201	-435	-5 021	-9 499	-12 822	-14 575	-18 170	-21 966	-25 755	-29 258	-32 990	-36 512	-39 792	-42 937
Cash flows from/to financing parties	-3	-4 948	-939	841	-6 918	-2 427	-4 847	-8 263	-11 988	-14 936	-18 003	-20 582	-23 983	-27 462	-30 883	-34 142	-37 409	-40 489	-43 383	-46 133
Dividends	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Changes in equity	0	6 803	2 215	17 686	4 434	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flows to equity holders	0	6 803	2 215	17 686	4 434	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Research Recommendations

Buy	Expected total return (including dividends) of more than 15% over a 12-month period.
Hold	Expected total return (including dividends) between 0% and 15% over a 12-month period.
Sell	Expected negative total return (including dividends) over a 12-month period.

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