

## Apple

### Time for Apple Picking: Initiate OW on Compelling Services Transformation, Ripe Installed Base, Core Capital Deployment

We are initiating on Apple (AAPL) with an Overweight rating and December 2019 price target of \$272, implying +23% upside from current levels. While Apple's leadership position in the premium smartphone market is well understood by investors, we still see considerable upside to the stock from current levels led by a combination of: **1)** faster-than-expected transformation to a services business; **2)** stronger-than-expected price increases in the core iPhone business; **3)** underappreciated position for continued robust growth in the installed base; **4)** continuous innovation disrupting new end-markets; **5)** boost to earnings growth from a normal course of share repurchases; and **6)** optionality available from the use of a strong balance sheet for either outsized share repurchases or M&A.

- **Faster-than-expected transformation to Services.** The mix of Services revenue rose from 8% in FY12 to 13% in FY17, and is forecast to further increase to 20% by FY21E. We believe the transformation to services, led by growth in both installed devices and service revenue per device, is tracking better than investor expectation, including achieving revenue target of \$48bn by FY20E ahead of schedule.
- **Growth in installed base underappreciated.** While investors have been overly concerned about the modest growth in device sales (JPMe FY17-21E CAGR of +1%), we believe the robust high-single-digit growth in the installed base, which is a key contributor to Services revenue growth, has been underappreciated.
- **Capital deployment provides option value to investors.** Apple has a target to be net cash neutral long-term and the availability to deploy up to \$291mn (cash on hand + free cash flow) by FY21E or ~30% of the market cap through a combination of dividends, share repurchases, and M&A provides enormous option value to investors in terms of potential upside to earnings.
- **M&A opportunities to prioritize large installed base.** Apple's interest in entering new end-markets is likely to be evaluated based on the opportunity to offer services on a large installed base. Certain end-markets in our view could be of interest, including gaming services, automotive services, and smart speakers.
- **See catalyst for multiple re-rating** in the acceleration in revenue growth to a forecasted +10% CAGR over FY17-FY21E vs. + 8% CAGR in the last five years.
- **Initiate at OW with Dec-19 price target \$272, implying +23% upside.** We base our valuation on a blended target P/E multiple of 17.5x, led by a SOTP approach, which leads us to arrive at our Dec-19 price target of \$272.

#### Apple Inc. (AAPL;AAPL US)

FYE Sep	2016A	2017A	2018E	2019E	2020E	2021E
EPS (pro forma) (\$)						
Q1 (Dec)	3.18	3.36	3.89A	4.87	5.72	6.46
Q2 (Mar)	1.90	2.10	2.73A	3.01	3.34	3.83
Q3 (Jun)	1.42	1.67	2.34A	2.60	2.66	3.00
Q4 (Sep)	1.67	2.07	2.84	3.27	3.73	4.16
FY	8.18	9.19	11.79	13.75	15.45	17.45
Bloomberg EPS FY (\$)	8.27	9.00	11.75	13.62	14.85	-

Source: Company data, Bloomberg, J.P. Morgan estimates.

### Initiation Overweight

AAPL, AAPL US

Price: \$220.42

Price Target: \$272.00

#### Telecom & Networking Equipment/IT Hardware

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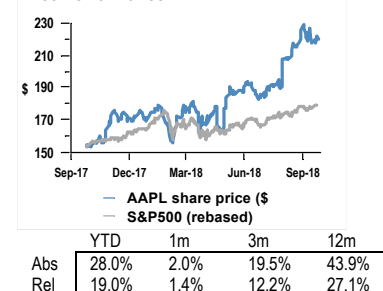
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#### Price Performance



#### Company Data

Price (\$)	220.42
Date Of Price	26-Sep-18
52-week Range (\$)	229.67-150.24
Market Cap (\$ bn)	1,064.70
Fiscal Year End	Sep
Shares O/S (mn)	4,830
Price Target (\$)	272.00
Price Target End Date	31-Dec-19

See page 123 for analyst certification and important disclosures, including non-US analyst disclosures.

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*The authors wish to thank Joseph Kaplan for his contribution to this report.*

## Investment Thesis Summary

### **Transforming from a hardware company to a services company faster than investors had expected, which is driving financial and valuation upside**

Apple has historically been regarded as an IT Hardware company tied to a short product refresh cycle of the iPhone in an extremely competitive smartphone industry. More recently, investors have been proved wrong on the pace of Apple's transformation to a services company, with revenues in the Services reporting segment increasing from 8% of total in FY12 to an estimated 20% of total in FY21E. The Services opportunity is currently derived primarily from App Store purchases and there are multiple emerging drivers, such as Apple Music and Apple Pay, which should continue to drive strong growth. We forecast +23% revenue CAGR for Services (including comfortably hitting the FY20E Services revenue target of \$48bn) with modestly better than company-wide margins to be accretive to profit growth, and accompanied by higher visibility to revenue and earnings, which we believe warrants a higher earnings multiple relative to the core hardware business.

### **Apple Music and Apple Pay levered to megatrends of streaming music and digital currency, which are emerging growth areas for Services**

Apple Music and Apple Pay are key additions to the Apple ecosystem levered to consumer behavior megatrends in the form of the shift from downloading to streaming music and the increasing adoption of mobile payments. We expect Apple's subscription-based Music service to reach >100mn MAUs by FY20E through increasing penetration of a target market estimated by *J.P. Morgan Internet analyst, Doug Anmuth*, to total 2.7bn users, thus remaining the second largest music streaming service globally after Spotify. We forecast annual revenues to grow at a +41% CAGR to \$16bn by FY21E. Separately, Apple Pay is gaining traction with the installed base and already leads competitive product offerings on Samsung or other Android platforms. We forecast ~\$2.2bn in revenues from Apple Pay by FY21E with a +48% CAGR, led by the broader industry trend of strong growth in use of mobile payments and increase in NFC-enabled merchants.

### **Apple to expand media offering to consumers with the addition of video, newspaper, and magazine content**

We expect Apple to expand its media offering beyond music by adding video and print media content, resulting in an all-encompassing Media subscription. We expect Apple to ramp up its investments in video content steadily starting with ~\$1bn in 2018. We expect a steady increase in investments in video content, given Apple's focus on differentiation through content rather than encouragement of cord-cutting. However, the level of investments is unlikely to reach Netflix's \$8bn and Amazon's \$5bn over our forecast window (FY21E). We expect Apple to combine the video and print media offering (through acquisition of Texture) to offer a packaged subscription at \$14.99/month relative to \$9.99 for Apple Music and drive Apple Music subscribers to upgrade to the packaged subscription, while at the same time growing the subscriber base at a rapid pace. We estimate Apple's incremental media offerings beyond Music to drive an incremental \$2.8bn of revenues by 2025.

### **Missing the forest for the trees: Concerns about iPhone volumes have driven investors to overlook the robust growth in the installed base**

In addition to the increase in service revenue opportunity per device, growth in the installed base of Apple devices is the other primary contributor to the growth in new

Services revenue. While investors have been concerned about the modest growth in iPhone volumes, Apple has still been able to drive double-digit increases in the installed base through a combination of 1) new subscribers; 2) incremental consumer switching to iOS; and 3) replacement units from existing iOS users making it to the secondary market (we estimate Apple has a 50% share of the secondary market relative to 15% of new smartphone market). We estimate a total installed base of 1.4bn devices in 2017 (~1bn iPhones) rising to 1.9bn by 2021 or a +7% CAGR.

**Pricing power, driven in part by differentiation on technology, will continue to surprise investors on the upside**

Investors have been pleasantly surprised by the limited price elasticity exhibited by customers, which includes the increase in iPhone volumes despite a +3% pricing CAGR over the last ten years (and a higher increase in retail price in certain countries due to roll-off of carrier subsidies). Consumers have been willing to pay higher ASPs, due to a combination of: 1) stickiness of the iOS platform (including smartphones and accessories like watches) through technology differentiation; 2) increasing use of financing to pay in installments; and 3) push-out of spend on laptops and tablets. Our analysis reveals that Apple has an exceptional track record of success with the top-of-the-line smartphone marketed each year and with larger screen size smartphones (generally priced at a premium), relative to Apple's primary competitor in the high-end smartphone category, Samsung. The latest generation of iPhones launched on September 12, with base prices ranging from \$1,099 at the high-end to \$749 at the low-end, is set to continue to drive ASPs higher.

**Apple to drive differentiation of the ecosystem through technology leadership**

Apple's portfolio strategy of focusing on design of three iPhone models each year allows it more bandwidth for resources to drive technology leadership and quality assurance, which are crucial in maintaining price premium over competitive products and driving a longer life-cycle of the product (which supports installed base growth). Apple is already comfortably ahead of competition in relation to facial recognition modules. *JPM Asia Technology analyst, Narci Chang*, expects world facing 3D Sensing to be adopted on iPhones starting in 2019 (see [report](#)), again comfortably ahead of competition. Similarly, optimism around foldable smartphones has increased in recent months; we expect Apple to be a fast follower with adoption starting in 2021 (see [report](#)) if it finds the form factor gaining traction with customers. Apple's technology leadership drives both new customers joining the iOS installed base (an estimated one-third of annual demand) and replacement demand led by upgrades from existing customers (roughly two-thirds).

**Acceleration in revenue growth to be a catalyst for investor sentiment; buybacks to boost earnings growth further**

We expect a +10% revenue CAGR between FY17 and FY21, accelerating from the +8% CAGR over the last five years, led by a combination of high-single-digit revenue growth in iPhones and double-digit revenue growth in Services and "Other Products" revenues. The acceleration in revenue growth should drive investor attention to the change in the drivers of revenue growth from being primarily led by iPhone revenues historically, to a balance between iPhone, Services, and Other Product revenues over our forecast window. We expect the +10% revenue CAGR to translate into a +17% earnings CAGR over the forecast window (FY21E), through deployment of capital in share buybacks on a continual basis.

### **Enormous capital deployment opportunity provides optionality**

The firm's target of being net cash neutral in the long-run relative to the net cash position of \$129bn at end of F3Q18 and strong free cash flow generated annually (average of \$54bn annually over last five years) provides an enormous opportunity for capital deployment. However, we believe medium-term upside to our base case estimates (based on buybacks largely in line with free cash flow) is likely from large buybacks or acquisitions. For example, we estimate annual buybacks of \$100bn can help Apple reach close to a cash neutral position by FY21E, with accretion of ~\$2.25 to our FY21E EPS. On the downside, however, our base case forecasts embed largely flat operating margins, and we estimate the proposed tariffs, if implemented, could be a modest headwind of 50bps on operating margins medium-term and moderate our earnings growth forecasts.

### **Expect M&A to focus on Services opportunities and large installed base; Video Gaming, Automotive, and Smart Speakers could be potential opportunities**

While Apple has historically acquired hardware companies, it has largely been to bring certain technologies in-house and have the ability to further develop them. We expect bolt-on acquisitions of hardware companies to continue as the firm continues to evaluate technology differentiation for future generation of products. However, recent acquisitions of Texture, and Shazam, are more typical of acquisitions we would expect Apple to focus on moving forward to further enhance the Services offering to its existing installed base. Additionally, we do not rule out Apple looking at other end-markets with a combination of a large installed base and associated opportunity to deploy services. We believe mobile video gaming and the automotive end-market could be of interest in this regard, in addition to potential interest in the smart speaker end-market given lackluster performance of the HomePod to date.

### **Stronger track record of profitability than other technology leaders; yet trading at only market multiples makes it attractive to both value and growth investors**

Interestingly, with annual revenues of \$230bn, Apple is ahead of other technology leaders, including Amazon, Alphabet, Facebook, and Netflix (all covered by *JPM Internet analyst Doug Anmuth*). In greater contrast, Apple's \$61bn in operating profit compares to \$26bn for Alphabet, \$20bn for Facebook, \$4bn for Amazon, and \$0.8bn for Netflix. Additionally, the firm has a historical track record of much stronger earnings growth than the S&P 500 index, of which it is the largest constituent at ~5% weight. However, AAPL shares still trade at 16.6x NTM P/E, modestly below the market multiple and well below trading multiples of other technology leaders. We expect the combination of double-digit earnings growth and a trading multiple in line with the market to screen very attractively for both value and growth investors (although AAPL is part of only the S&P 500 growth index).

### **We rate Apple shares Overweight with solid +23% upside potential to our December 2019 price target of \$272**

We rate AAPL shares Overweight given our favorable outlook on iPhone and Services revenues relative to investor expectations, catalysts to accelerate revenue growth, and upside risk to our base forecast for +18% earnings CAGR. We expect increasing appreciation of acceleration in growth, along with greater visibility into earnings and cash flow with increasing mix of Services, to drive a modest re-rating, from NTM trading multiple of 16.6x to a 17.5x blended P/E, which we arrive at a based on a SOTP methodology using 14.0x P/E for iPhones, 11.0x for Mac and iPad devices, 26.0x for Services, 25.0x for Apple Watch, and 16.0x for Other Products. We see +23% upside to our December 2019 price target of \$272.

## Risks to Rating and Price Target

### Industry Downside Risks

#### **Deceleration or contraction in the handset and smartphone market could be faster than expected**

Economic conditions or shifting consumer demand could cause greater-than-expected deceleration or contraction in the handset and smartphone markets. This would negatively impact Apple's prospects for growth, and the shares may fail to achieve our target price as a result.

#### **Increase in competitive pressures in international markets**

Apple is increasingly participating in international markets, such as China and India, where local players, which are better situated, could leverage their position and pull on levers such as pricing to make the market more competitive. In addition, tariffs enacted by local governments may further hurt Apple's ability to effectively compete in international markets.

### Company-Specific Downside Risks

#### **Investment in new business strategies and acquisitions could be fruitless**

Apple has historically invested in new business strategies and acquisitions. As such, success on these investments has low visibility at this time and could lead to greater-than-expected liabilities and expense. Additionally, new investments could have a negative impact on current operations by distracting management.

#### **Key man risk around departure of chief executive officer**

While risks related to departure of management executives is considerably lower relative to in the past, we believe the execution on strategic priorities under CEO Tim Cook's leadership does still present modest risk to the share price, although we see a strong group of executives to support business performance without disruptions.

#### **Litigation with Qualcomm could drive unexpected liabilities**

As part of risk mitigation from the ongoing litigation with Qualcomm, Apple has provisioned what management believes could be worst-case payments to Qualcomm in the event of an adverse judgement. However, less favorable outcomes with greater damages awarded to Qualcomm could be a liability for Apple beyond the provisions, and drive downside to our price target.



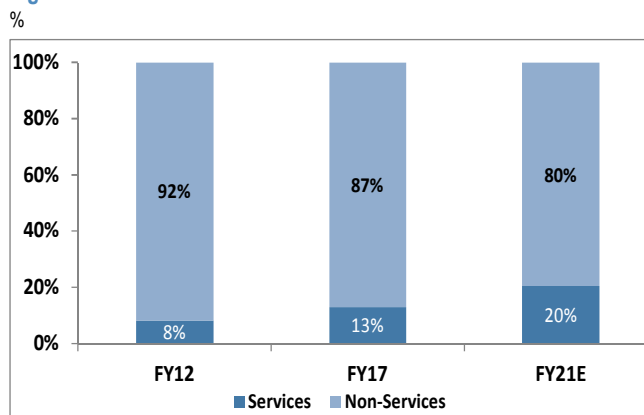
## Key Themes for AAPL Stock

### Transformation to Services Faster than Expected

#### Forecast Services to grow to one-fifth of revenues by FY21E

Investors have been pleasantly surprised on the pace of transformation to Services, particularly given the size of the hardware business with ~215mn smartphone units sold annually. However, with strong double-digit growth (+18%) CAGR over the last five years, Apple has more than doubled the FY12 revenue of \$13bn by FY17 (\$30bn). We forecast a modestly stronger +23% CAGR through FY21E, including comfortably achieving its target of doubling the FY16 revenue of \$24bn by FY20E (JPMe \$56bn). Growth will be driven both by increase in the installed base from 1.4bn devices in FY17 to 1.9bn by FY21E at a +7% CAGR, and an increase in service revenue per installed device at a 16% CAGR.

Figure 1: Services a % of Total Revenues



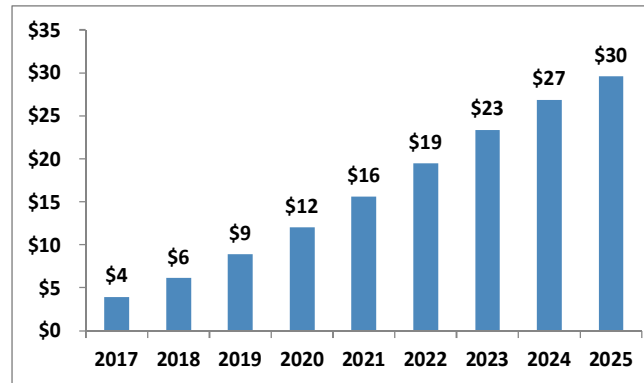
Source: Company reports and J.P. Morgan estimates.

#### Apple Music to account for \$30bn by 2025, led by strong subscriber growth

Apple's Music service, based on monthly subscriptions, is second only to Spotify globally and we see adequate room for growth for both players in a market where consumers are switching to streaming services relative to download purchases. Streaming revenues for the industry have grown at a +59% CAGR since 2012 and we expect the same to continue with Apple Music gaining further penetration of the estimated (by J.P. Morgan Internet analyst, Doug Anmuth) TAM globally of 2.7bn users relative to its current subscriber base of >50mn. We expect Apple to reach 106mn subscribers by FY20 and 262mn by FY25, accounting for an estimated \$30bn of revenues by FY25.

**Figure 2: Apple Music Revenue Forecast**

\$ in Billions



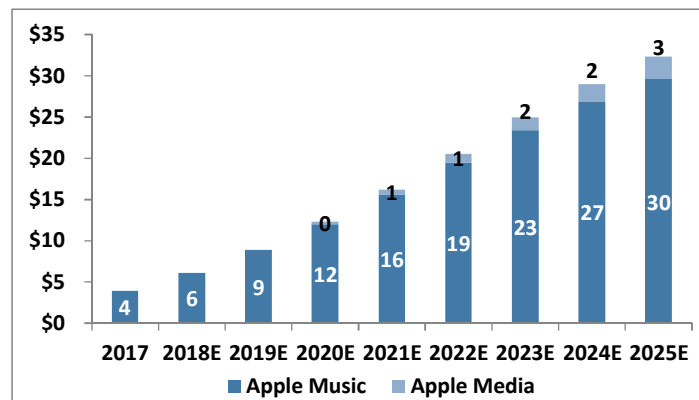
Source: Company reports and J.P. Morgan estimates.

**Media services, including original video, to be the next big driver for Apple**

News reports (see [link](#)) indicate that Apple is looking to invest around \$1bn into original video programming initially to drive exclusive content and we expect investments to steadily ramp further over time. However, investments will remain lower than Netflix's \$8bn and Amazon's \$5bn levels through our forecast window (FY21E), primarily as Apple is looking to add exclusive content to the media platform rather than position itself as an alternative to cable, Netflix or Amazon Prime. Additionally, we expect Apple to add print media subscriptions, building on the recent acquisition of Texture to further enhance the services offering. We believe Apple is likely to look to consolidate the media services by tying together existing Music services and original video and print media. We expect the Apple Media subscription to be priced at a premium to the existing Music subscription; we assume pricing of \$14.99 for individual subscriptions (vs. \$9.99 for Music) and \$19.99 for family subscriptions (vs. \$14.99 for Music). We also expect 35% of Apple Music subscribers to upgrade to the all-encompassing Media service by FY25E, and account for an incremental \$3bn of revenue in FY25E.

**Figure 3: Apple Music and Media Revenue Forecast**

\$ in Billions



Source: Company reports and J.P. Morgan estimates.

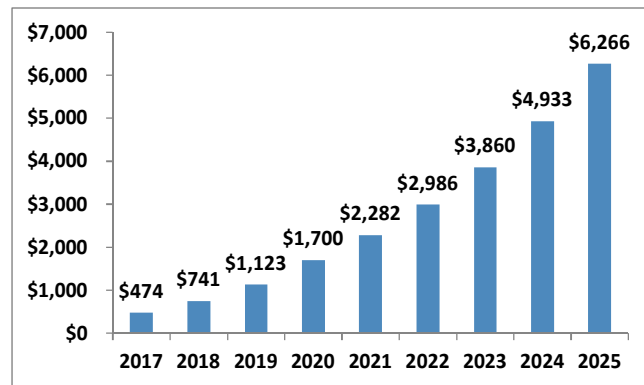


### Apple Pay leveraged to growth in mobile payments globally

We see Apple Pay as a key component in the Services portfolio which is positioned for significant growth in the coming years with the increasing adoption of mobile payments globally. eMarketer forecasts global mobile payment users amounted to 721mn in 2017 and are expected to expand at a +13% CAGR to greater than 1bn globally in 2020. In consumer surveys, Apple Pay has had stand-out feedback with materially better adoption within installed base of devices relative to other competing platforms on Android devices, including those of primary premium smartphone competitor, Samsung. We expect Apple Pay revenues to rise at a +38% CAGR through FY25 to \$6bn.

Figure 4: Apple Pay Revenue Forecast

\$ in Millions



Source: Company reports and J.P. Morgan estimates.

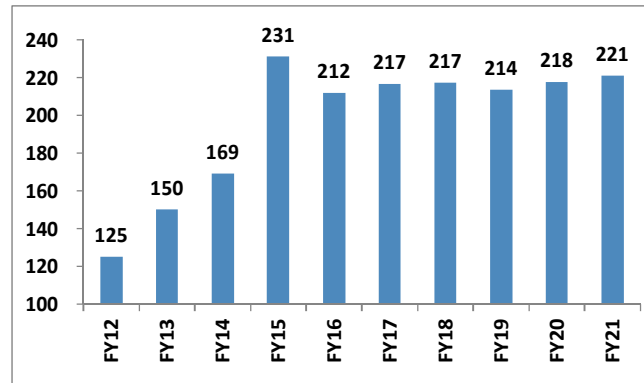
### Growth in Installed Base Underappreciated

#### Investors have been concerned relative to modest volume growth in iPhone in the backdrop of plateauing smartphone volumes

iPhone volumes rose quickly from 11mn units in the first year after the first iPhone launch (FY08) to peak at 231mn units in FY15, before moderating to FY17 volumes of 217mn. The combination of Apple's current three-fourths market share in the premium smartphone market and expectations for flat volumes for the handset and smartphone market have raised concerns relative to maturity of the smartphone market and Apple's position in it, leading to limited opportunities for volume growth. We acknowledge the modest volume opportunity for iPhones, particularly when every generation of smartphones is accompanied by price increases, and forecast +1% volume CAGR through FY21E.

**Figure 5: Apple iPhone Shipment Forecast**

Units in Millions



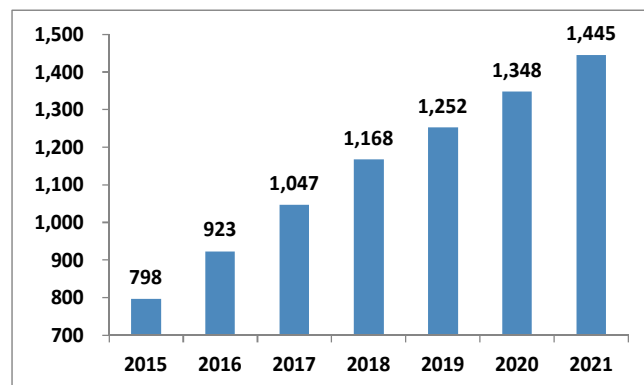
Source: Company reports and J.P. Morgan estimates.

**However, we believe investors are missing the forest for the trees: Installed base demonstrating robust growth feeding into strong Services growth**

While investors have been focused on iPhone volumes sold annually in the primary market, the driver fueling the transformation to Services has been the expansion in the installed base which has demonstrated double-digit growth to date. Going forward, growth in the installed base is likely to moderate to a high-single-digit pace, but still implying growth of roughly 100mn units in the installed base of devices every year relative to flat volumes in the primary market. The high-single-digit expansion in the installed base is led by new consumers switching to the iOS platform, new subscribers, and a high portion of replacement units making their way to the secondary market where we estimate iPhones have a 50% market share relative to ~15% market share of the new smartphone market.

**Figure 6: Apple iPhone Installed Base Forecast**

Units in Millions



Source: Company reports and J.P. Morgan estimates.

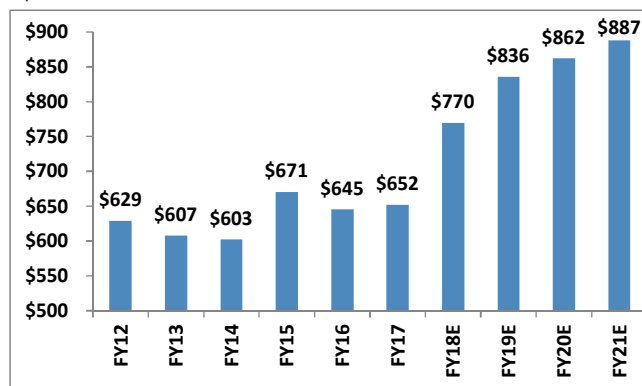
## Limited Consumer Price Elasticity Will Continue to Surprise

### Apple has continued to drive higher prices to grow revenues despite benign growth in iPhone volumes; see acceleration in pricing over the forecast window

Blended ASPs for iPhones have increased at a +3% CAGR since 2007 with an even higher increase in retail prices in certain geographies where carrier subsidies rolled off after 2010. Despite the increase in prices, iPhone volumes have not shown any significant signs of decline and investors have been pleasantly surprised by the limited price elasticity exhibited by consumers. Banking on the limited price elasticity demonstrated by consumers, Apple pivoted to a more aggressive pricing strategy with the launch of the iPhone X at a base price of \$999 in 2017, which has put the firm on track for a high-teen percentage increase in pricing for FY18E. The latest generation of iPhones released on September 12 this year now has the top-end product with a base price \$1,099 and the low-end product with a base price of \$749, setting up the firm for another year of strong price increase, by our estimates.

Figure 7: Apple iPhone Blended ASP Forecast

\$ per Unit



Source: Company reports and J.P. Morgan estimates.

### Better track record of driving the premium pricing strategy relative to peers

Our analysis shows Apple has a better track record relative to competition with driving consumer adoption of the top-end phone in its portfolio. For example, iPhone X has accounted for one-third of total iPhone shipments to date and Apple's top-end iPhones accounted for 14%-38% of total shipments over the last six quarters, which compared to a range of 3%-24% for Samsung. Similarly, Apple has a solid track record with larger screen size phones (marketed popularly as Plus Size models) with shipments of these premium models accounting for an increasing portion of total shipments, roughly in line with Samsung's track record with a much broader set of smartphone models offered in larger screen sizes.

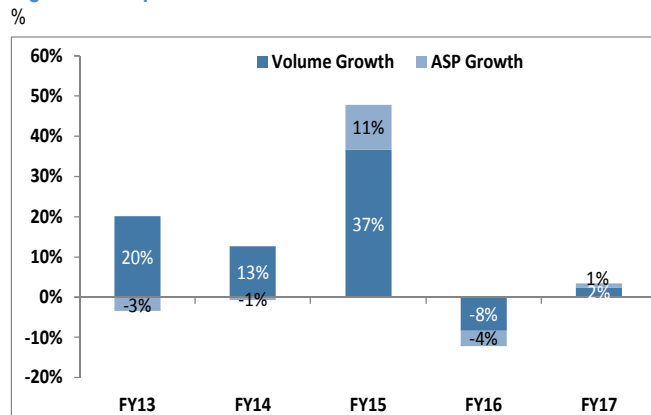
### Pricing strategy is sustainable as consumers are willing to pay more for smartphones, which are dis-intermediating other IT hardware spend

We believe the pricing strategy is sustainable and expect limited price elasticity from consumers led by: 1) stickiness of the iOS platform with the combination of the iPhone and accessories, including watches; 2) smartphone capabilities increasing and substituting demand for laptops and tablets, pushing out the replacement cycle led consumer spending on these devices; 3) consumers spending an increasing amount of time on a smartphone; and 4) consumers increasingly using financing to convert the high retail prices into affordable monthly payments.

### Pricing strategy to drive change in composition of iPhone revenue growth, with surprises led by pricing strength

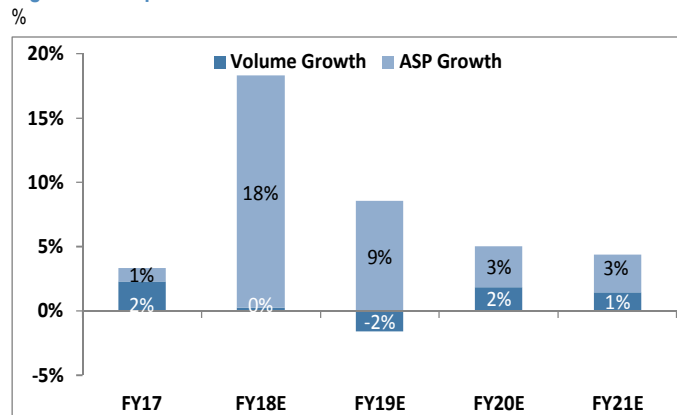
We forecast solid growth in iPhone revenue from iPhone sales, despite heightened investor concerns around both volumes and pricing. We expect growth in revenues from iPhone sales to moderate from +12% CAGR over the last five years to a +9% CAGR for FY17-FY21E, but still surprise on the upside relative to investor expectations led by a greater contribution from price increases.

Figure 8: Composition of FY12-FY17 iPhone Revenue Growth



Source: Company reports and J.P. Morgan estimates.

Figure 9: Composition of FY17-FY21E iPhone Revenue Growth



Source: Company reports and J.P. Morgan estimates.

### Capital Deployment Provides Option Value to Investors

#### Target of neutral net cash position long-term provides optionality to investors

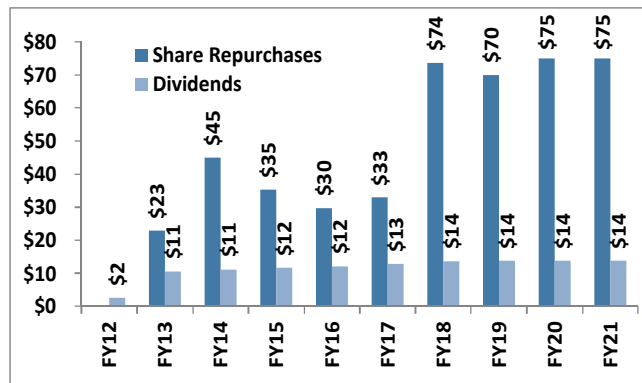
Apple ended F3Q18 with \$244bn of cash on the balance sheet and with debt of \$115bn, leading to a net cash position of \$129bn. Additionally, the firm has generated on average free cash flow of \$54bn over the last five years. Apple has not put a timeline to its net cash neutral target, but the availability of up to \$291bn or ~30% of the market cap to deploy over FY19E-21E through a combination of dividends, share repurchases, and M&A provides enormous option value to investors in terms of upside to earnings.

#### Embed increased share repurchases and dividend in our base case forecasts, partly driving our above consensus forecast for FY20 and FY21

Apple has returned roughly \$300bn of cash to shareholders since 2012 through the end of F3Q18, which is roughly 30% of its current market capital, and we expect there is another roughly \$300bn to deploy over the next three years. While we don't expect Apple to reach its net cash neutral position by end of FY21E, we expect share buybacks to accelerate to a \$75bn annual pace (similar to 2018E) rather than the slower pace of around \$30-\$35bn during FY15-17—in part driving our above consensus forecast for FY20E and FY21E. Additionally, we are modeling a steady increase in dividends from \$2.40/share in FY17 to \$3.42/share in FY21E, amounting to \$42bn of dividends over the next three years.

**Figure 10: Apple Share Repurchase and Dividend Forecast**

\$ in Billions



Source: Company reports and J.P. Morgan estimates.

**Acceleration in share repurchases to drive 6% accretion to our already above consensus FY20 and FY21 earnings estimates**

Despite our above consensus modeled pace of buybacks in FY20 and FY21, we still expect Apple to have a net cash position of \$60bn by end of FY21E (and generating over \$64bn of free cash annually). We see upside to our already above consensus forecasts if management decides to aggressively pursue their target for a neutral cash position. We estimate a pace of buybacks close to \$100bn annually would drive the company to a cash neutral position by end of FY21E, and imply upside of \$2.25 to our already above consensus FY21E EPS forecast.

**Balance between share purchase acceleration and M&A is likely as Apple invests to build the Services platform and maintain leadership in technology**

We believe it is more realistic to assume a balance between an acceleration of share repurchases beyond what is already in our base case estimates and spend on acquisitions as the drivers of earnings upside relative to our estimates.

**M&A Opportunities: Focus on Services with Large Installed Base**

**Apple has historically only engaged in bolt-on acquisitions; expect focus to be on subscription-based service opportunities in the coming years**

Apple has a history of making multiple bolt-on acquisitions every year, which has largely been focused on bringing any hardware technology that the company expects to be crucial in driving competitive differentiation in-house and better managing its development towards commercialization. As shown in Table 1, a lot of applications in use on iPhones today can be associated with technology acquisitions in the past, for example, facial recognition using 3D sensing and speech recognition for Siri. However, as we look at the transformation of the business to Services at a rapid pace, we expect a greater bias towards acquiring subscription-based software businesses that can be integrated into the Services segment, and we believe the recent acquisitions of Shazam and Texture are typical examples of what investors should expect going forward.

Table 1: List of Key Acquisitions

Company	Date	Acquisition Value (\$ mn)	Business
Akonia Holographics	30-Aug-18		Lenses for augmented reality glasses
Texture	12-Mar-18		Digital magazine subscription service
Buddybuild	2-Jan-18		Offers tools for App development
Shazam	11-Dec-17	400	Music and Image recognition
Regaind	29-Sep-17		Photo and facial analysis
Vrvana	22-Sep-17	30	AR headsets
Lattice Data	13-May-17	200	ML to convert dark data to structured data
Beddit	9-May-17		Monitor daily sleep habits
Tuplejump	22-Sep-16		Big Data solutions to capture and analyze data
Glimpse	22-Aug-16		Personal health data recording platform
Turi	5-Aug-16	200	Help developers build scalable artificial intelligence solutions
LegbaCore	3-Feb-16		Security consultancy – firmware and software security
Flyby Media	29-Jan-16		Augmented Reality – technology for mapping spaces
Emotient	7-Jan-16		Emotion recognition using facial data
Faceshift	Nov-15		Motion capture platform
Perceptio	Sep-15		Advanced artificial intelligence systems for smartphones
VocalIQ	Sep-15		Speech technology
Mapsense	Sep-15		Cloud-based mapping virtualization
Metaio	May-15		Augmented Reality tools
Linx	14-Apr-15	20	Multi-aperture camera equipment for mobile devices
Semetric	21-Jan-15		Media analytics
Beats Electronics	Aug-14	3000	Subscription music service and audio devices

Source: Bloomberg, Company data, and J.P. Morgan estimates.

**Relative to transformational M&A driving access to new end-markets, we expect criteria to include large installed base and services opportunity**

We believe with increasing focus on Services revenues, particularly in the form of subscriptions, Apple's interest in entering new end-markets is likely to be evaluated based on the opportunity for Apple to offer services (leveraging the iOS platform) on a large installed base. Certain end-markets in our view could be of interest based on this criterion:

1. **Video gaming companies:** The video gaming industry generates about \$125bn in revenues, including roughly one-third on smartphones, making it an attractive industry for smartphone manufacturers in terms of vertical integration, particularly given recent investments in augmented reality. Apple's focus on services will be highly complemented by video games, which are taking time and monetization share from other forms of entertainment. *JPM Media analyst, Alexia Quadrani*, believes the increasing global reach, improving technology, shift to higher-margin digital revenues, and increasingly social environments are fueling greater player engagement and spending. Software game sales are becoming increasingly digital (in the US 31% of total sales in 2010 to 74% in 2016) which is likely to coincide with the increasing computing capabilities and larger screen sizes on smartphones to drive consumer gaming habits increasingly to mobile devices. We see opportunity for smartphone-based gaming to increase from current levels of one-third of gaming revenues to around 40% of the industry by 2020, led by a double-digit annual growth rate.
2. **Automotive services:** Numerous press reports have in the past indicated Apple's interest in the automotive end-market, including developing an autonomous vehicle. We think Apple's interest in the automotive end-market is reasonable given the large installed base (roughly 1.4bn vehicles globally) and the ability to deliver services to drivers and passengers. We see the automotive OEM business



as a largely unattractive one both in terms of manufacturing and supply chain complexity, and profitability. Though, we would not rule out acquisitions of:

- a. **Infotainment companies** providing Apple ability to deliver content in the automotive end-market. Apple has already developed the CarPlay software to get access to the automotive end-market, but we believe owning the complete infotainment product would allow Apple to deliver the same high-quality experience that it has been able to offer consumers on other devices like the iPhone.
  - b. **Small-scale automotive OEMs** to provide Apple experience in integration of software-based services with the hardware.
3. **Smart Speakers:** We acknowledge that Apple already has a HomePod product, which was first released in early 2018. Based on our discussion with the company, we believe Apple wants to position the HomePod as a high-quality speaker with some intelligence features, relative to: 1) Google Assistant, which is geared to intelligence leveraging the company's leadership in search functions; and 2) Amazon Alexa, which is geared towards promoting Amazon's portfolio of features, including driving purchases in the Amazon marketplace. We believe this leaves room for Apple to position another product with greater intelligence features and with a different form factor, potentially leveraging an acquisition similar to its purchase of Beats to enter the headphone category.

**Table 2: Current Key Participants in Potentially Attractive Industries for Apple**

\$ in Millions

	Market Cap	EV/Sales	FY19 EV/EBITDA	P/E	Description
<b>Infotainment</b>					
Alpine Electronics	\$1,483	0.4x	5.0x	15.7x	Supplier of automotive technology, systems and components, including infotainment systems
Visteon	\$3,163	0.9x	7.9x	14.5x	Developer of instrument cluster, HUD, infotainment, audio, telematics and autonomous solutions
<b>Gaming</b>					
Activision	\$55,409	6.8x	17.2x	23.9x	Developer and publisher of video games (Mobile accounts for 30% of revenue)
Electronic Arts	\$35,092	5.4x	14.3x	21.0x	Developer and publisher of video games (Mobile accounts for 13% of revenue)
Zynga	\$3,409	2.8x	13.0x	21.1x	Developer and publisher of video games (Mobile accounts for 85% of revenue)
<b>Smart Speakers</b>					
Bose	Private				Design and develop audio equipment
Klipsch	Private				Design and develop audio equipment
Sonos	\$1,094	0.8x	14.1x	NA	Developer of wireless smart home sound system
<b>Health</b>					
Peloton	Private				Provides Indoor bike and subscription-based video streaming service
Teladoc	\$4,814	9.4x	178.2x	NA	Provides a technology platform for on-demand remote medical care via PC and mobile devices

Note: The table represents JPM's assumptions on which industries potentially could be attractive for Apple to consider investing in to enhance its capabilities or portfolio.

Source: Bloomberg. Priced as of 9/25/2018.

## Apple's Opportunity in Health & Fitness

### **Apple has already disrupted the fitness-wearables market**

Apple's launch of Apple Watch was relatively late when compared to early movers in the fitness-driven wearables market, including Garmin, Fitbit and Nike. However, despite being late to the market, Apple Watch managed to disrupt some of the existing players, particularly single-activity tracking devices, as well as expand the addressable market for the wearables market. While most early entrants into the wearables market were seen as functional products targeting the fitness enthusiast, we believe Apple managed to expand the addressable market with a utility product, which went beyond the niche segment of fitness enthusiasts.

### **Now set to address health-wearables market, further expanding the target demographic to drive higher penetration**

We believe with the launch of features like heart rate monitoring and electro cardio grams (ECGs) in the latest generation of Apple Watches (Series 4), Apple is now making a bigger push into health-based wearables, expanding the target market beyond the typical age demographic interested in fitness wearables. For example, the target age demographic in the US now includes an additional 136mn people in the age group of 50 years and above, relative to the existing target market of 182mn in the age group below 50 years for fitness-based wearables.

### **Move into preventive healthcare to provide a wider TAM than diagnostics**

We believe the preventive healthcare market is an even more attractive market than diagnostics. With its entry into health-based wearables Apple is able to target a much wider population relative to the targeted individuals in the diagnostic phase following symptom identification. For example, relative to the occurrence of AFib (Atrial Fibrillation), which the Series 4 watch can help identify, the number of people impacted in the US ranges from 2.7mn to 6.1mn and the company will be involved in the diagnostic phase with products from specialized companies like iRhythm (*covered by JPM Medical Supplies & Devices analyst Robbie Marcus*). This compares to 182mn TAM for those aged 50 or more who are likely to adopt the Apple Watch for preventive measures and symptom identification for AFib.

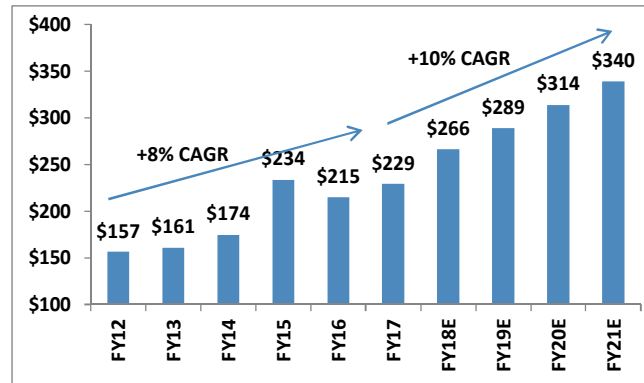
## Multiple Re-rating from Services Transformation and Visibility into Replacement Demand

### **Revenue acceleration likely to be a catalyst to increase investor focus on Services transformation**

We believe investors have largely ignored the transformation of the business towards Services. However, looking forward, we see a catalyst in the acceleration in revenue growth to a forecasted +10% CAGR from the +8% CAGR in the last five years, with further likely upside to our estimates from: 1) stronger increase in Services revenue per device; 2) stronger than expected pricing on iPhones; 3) and stronger than currently modeled growth in the Apple Watch after a major refresh with the Series 4. Boosted by an aggressive capital deployment program with repurchases totaling a forecasted \$294bn for FY18E-FY21E, we expect a +17% earnings CAGR leading to our above consensus EPS forecasts.

Figure 11: Total Revenues

\$ in Billions



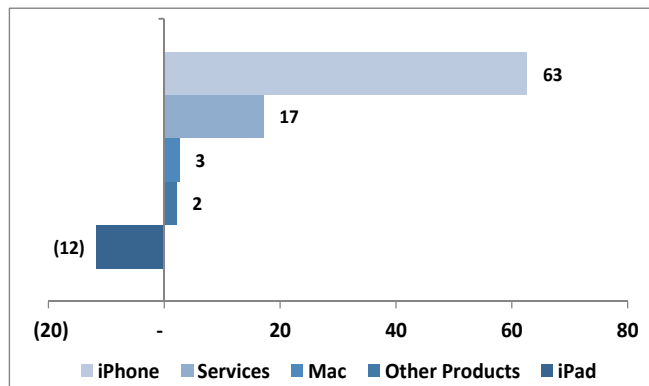
Source: Company reports and J.P. Morgan estimates.

### Shift in composition of growth to a greater balance of Services, more than offsetting moderation in iPhone revenue growth

As shown in Figure 12 and Figure 13, historically revenue growth for the company has been primarily driven by iPhone sales, but we expect more balanced growth led by iPhone sales, Services, and Other Products in the medium-term.

Figure 12: Composition of FY12-FY17 Revenue Growth

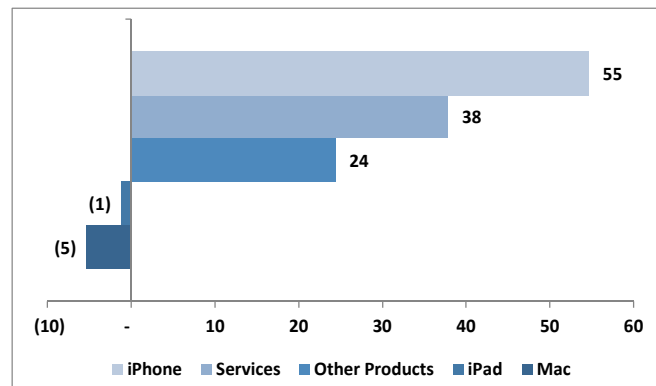
\$ in Billions



Source: Company reports and J.P. Morgan estimates.

Figure 13: Composition of FY17-FY21E Revenue Growth

\$ in Billions



Source: Company reports and J.P. Morgan estimates.

### Apple shares have traded at a discount to the S&P 500 multiple, despite stronger revenue and earnings growth

We find it largely unwarranted that AAPL shares have traded at a modest discount to the average S&P 500 multiple over the last few years despite a stronger historical track record in revenue and earnings growth, as well as stronger outlook. As shown in Figure 14, Apple shares still trade only roughly in line to at a modest discount to the S&P 500, despite a stronger revenue outlook and earnings growth outlook relative to the average company in the S&P 500.

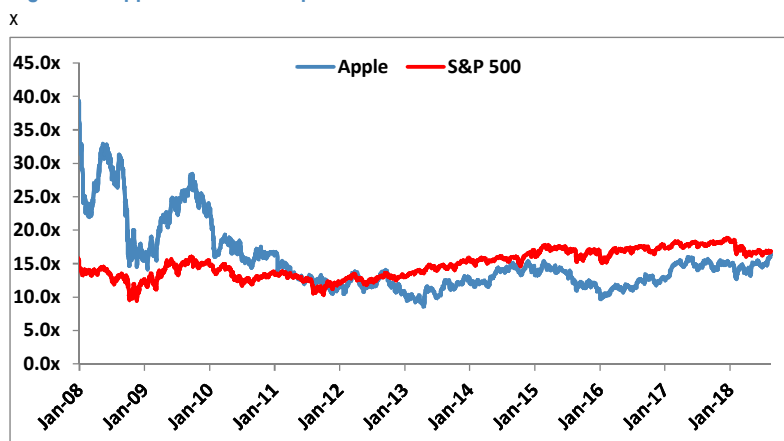
Table 3: Apple vs. S&P 500

% Change Y/Y

	2013	2014	2015	2016	2017	2018E	2019E	2020E	Average
<b>Revenue Growth</b>									
Apple	3%	18%	21%	-7%	10%	13%	11%	8%	9%
S&P 500	3%	4%	-2%	2%	7%	10%	5%	5%	4%
<b>Earnings Growth</b>									
Apple	-23%	49%	43%	-11%	16%	31%	14%	11%	16%
S&P 500	7%	6%	-3%	0%	13%	31%	10%	10%	9%

Source: J.P. Morgan estimates, Bloomberg.

Figure 14: Apple NTM P/E Multiple vs. S&P 500



Source: Company reports and J.P. Morgan estimates.

#### Premium to recent year average multiple warranted on return to innovation

We believe the recent year discount on Apple's trading multiple relative to the S&P 500 multiple has largely been driven by the perception that opportunities for innovative product launches into new markets have moderated since the large success of the iPhone. However, we believe Apple has now returned to demonstrating its innovation prowess, although now disrupting end-markets like wearables, health, and gaming, rather than disrupting existing hardware like it did with iPhones. In our view, the return to innovation warrants a re-rating relative to recent year average P/E multiple of 13.5x.

#### We believe a modest re-rating is warranted based on our SOTP analysis

We arrive at a blended multiple of 17.8x for the combination of Apple's products and services we anticipate in our forecast and expect a modest re-rating from current NTM trading multiple of 16.6x, led by a 14.0x multiple on the iPhone (in line with Nokia's multiple during its leadership in feature phones) and 26.0x on Services (in line with hardline and luxury goods retailers with similar loyalty-driven recurring purchases from customers).

Table 4: SOTP Valuation

	CY20 Revenue (\$ bns)	EPS	P/E Multiple	Revenue Growth (FY17-21E)
iPhone	193	10.6	14.0x	9%
iPad	19	0.2	11.0x	-2%
Mac	21	0.1	11.0x	-6%
Services	58	4.6	26.0x	23%
Apple Watch	18	0.6	25.0x	30%
Other	14	0.1	16.0x	30%
<b>Total</b>	<b>323</b>	<b>16.2</b>	<b>17.8x</b>	<b>10%</b>
SP500			17.3x	7%

Source: J.P. Morgan estimates.

### Should AAPL shares be valued in line with consumer staples?

It appears there has been an increasing narrative that AAPL should be evaluated in comparison to earnings multiples for consumer staples companies, such as Household and Personal Care products with high degree of repeat purchases by consumers. We acknowledge the repeat purchase cycle for consumers in relation to the iPhone and Services group, which together currently account for 77% of total company revenues; however, the iPad, Mac, and Other products have more unpredictable replacement cycles. In addition, while the average 21x P/E multiple for Household and Personal Care (HPC) companies can be thought of as the high-end of potential re-rating for AAPL shares, we think investors should consider a discount to the average HPC multiple to account for the ability of consumers to push out smartphone purchases during a downturn in addition to trading down to less expensive variants, with only the latter likely for HPC products.

Table 5: Household and Personal Care (HPC) Valuations

Company	Ticker	Stock Price	F2019	
			EPS	P/E
Church & Dwight	CHD	\$59.40	\$2.45	24.2x
Colgate-Palmolive	CL	\$67.10	\$3.22	20.9x
Clorox	CLX	\$150.37	\$6.87	21.9x
Estee Lauder	EL	\$141.73	\$5.30	26.7x
Procter & Gamble	PG	\$83.26	\$4.69	17.7x
Kimberly-Clark	KMB	\$113.07	\$6.99	16.2x
<b>Average</b>				<b>21.3x</b>

Source: Bloomberg. Note: Consensus estimates.

### Favorable Position Relative to Other Technology Leaders

#### Comparison with other technology leaders is normal and we find Apple well positioned relative to balance of valuation multiple against earnings outlook

Interestingly, with annual revenues of \$230bn, Apple is ahead of other technology leaders, including Amazon, Alphabet, Facebook, and Netflix (all covered by *JPM Internet analyst Doug Anmuth*). In greater contrast, Apple's \$61bn in operating profit compares to \$26bn for Alphabet, \$20bn for Facebook, \$4bn for Amazon, and \$0.8bn for Netflix, showcasing a much stronger track record of generating profits than other technology leaders. While revenue and earnings growth rates for AAPL are expected to be a little less than half of the group average of Alphabet, Amazon, Facebook, and Netflix, so is the earnings multiple of 16.0x relative to the group average of 42.2x. As a result, we find AAPL shares screening well for both growth and value investors relative to tech leaders when looking at earnings multiple for every point of earnings growth, with PEG ratio (ex-cash) of 0.8x relative to the group average of 1.0x.

**Table 6: Comparison with Other Technology Leaders**

\$ in Millions, except EPS

	Apple	Alphabet	Amazon	Facebook	Netflix	Average	S&P 500
<b>FY17 Income Statement</b>							
Revenue	\$229,233	\$110,855	\$177,866	\$40,653	\$11,693		
CAGR (F17-F20E)	11%	12%	25%	27%	27%	23%	7%
Operating Profit	\$61,343	\$26,146	\$4,106	\$20,203	\$839		
CAGR (F17-F20E)	8%	28%	75%	18%	71%	48%	15%
EPS	\$9.19	\$42.99	\$10.10	\$6.97	\$1.60		
CAGR (F17-F20E)	19%	17%	69%	15%	65%	41%	17%
<b>FY19E Valuation Metrics</b>							
P/E	16.0x	20.9x	53.4x	17.6x	76.8x	42.2x	16.3x
P/E (ex-Cash)	14.1x	18.5x	54.6x	16.1x	78.8x	42.0x	
PEG Ratio	0.8x	1.2x	0.8x	1.2x	1.2x	1.0x	2.5x
PEG Ratio (ex-cash)	0.7x	1.1x	0.8x	1.1x	1.2x	1.0x	
EV/Sales	3.3x	5.6x	3.5x	6.5x	8.9x	6.1x	
FCF Yield	6%	4%	3%	4%	NA	3%	

Source: J.P. Morgan estimates, Bloomberg. Note: JPM estimates for AAPL; consensus estimates for all other companies.

## Tariff Headwinds Could Moderate Earnings Growth Expectations

### Currently proposed tariffs only impact accessories

Apple recently sent a letter to the US Trade Representative, Robert Lighthizer, detailing a list of products that will be impacted from the currently proposed \$200bn of tariffs on imports from China. The list initially included products from the “Other Products” segment, which has total revenues of an estimated \$26bn in FY19E, but was later updated to exclude Apple Watch which we estimate accounts for almost half of the segment revenues. We estimate Other Products excluding Apple Watch has gross margins closer to 20%. iPhones are also currently outside the purview of the proposed tariffs.

### We see limited impact as Apple is likely to take pricing to offset the pressures

We believe it is relatively easier for Apple to raise prices on accessories relative to taking price increases on the iPhone. We expect relatively minimal price elasticity for accessory products and expect Apple to likely raise prices to cover entirely the tariffs. As shown in Table 7 below, we expect the 25% tariff to translate into a price increase of 15% if Apple decides to pass the entire impact of the tariff to consumers.



**Table 7: Scenario Analysis on Currently Proposed Tariffs**

\$ million

Other Products ex Watch	FY19E
<i>in \$ mns</i>	
Revenue	10,155
Gross Margin	20%
Gross Profit	2,031
COGS	8,124
BOM @ 75% of COGS	6,093
New BOM After Tariff @ 25%	7,617

Scenario 1: Raise Prices to Cover Tariff	
Increase in Cogs on Tariff	1,523
Price Increase Required	15.0%
Impact on Gross Profit	-
Impact on Total Company Gross Margin	0.0%

Scenario 2: Raise Prices to Cover 50% of Increase	
Increase in COGS on Tariff	1,523
Price Increase Required	7.5%
Impact on Gross Profit	762
New Gross Margin	13%
Impact on Total "Other Products" Gross Margin	3.3%
Impact on Total Company Gross Margin	0.3%

Scenario 3: Not Raise Prices	
Increase in COGS on Tariff	1,523
Impact on Gross Profit	1,523
New Gross Margin	5.0%
Impact on Total "Other Products" Gross Margin	6.6%
Impact on Total Company Gross Margin	0.5%

Source: J.P. Morgan estimates.

### Headwind of up to 50 bps in the worst case if Apple decides not to raise prices

As shown in Scenario 3 in the table above, we estimate a headwind of up to 50 bps to total company margins if Apple decides to take a conservative approach to prices and absorb the impact, which in our view is unlikely given the even lower degree of price elasticity on accessories.

### No tariff impact on iPhone currently; however, we would not expect a change in sourcing strategy even with a 25% tariff

Although the iPhone is not the purview of currently proposed tariffs, the greater risk to Apple would be from any potential developments relative to tariffs on the iPhone, which accounts for 60% of total company revenues. However, our analysis shows that even if a 25% tariff were to be imposed, it would still make economic sense for Apple to continue with the current manufacturing footprint relative to moving the assembly to the United States. Over the long-run, we would expect Apple to move assembly operations for the iPhone (done by Pegatron, Honhai, and Wistron) to other countries with relatively cheaper labor cost relative to the United States and not

under the purview of punitive import tariffs from the administration, for example, Mexico.

**See labor cost still driving enough arbitrage to keep existing manufacturing footprint rather than move to the United States**

As shown in Table 8, we estimate moving the assembly operations to the United States for the iPhone X would increase the cost to Apple from ~\$522 to ~\$643 (assuming only 50% of components are manufactured in China), relative to an estimated cost of \$653 if Apple decided to pay a 25% tariff on the assembled product. In our view, the lack of any major advantage of moving assembly operations back to the United States limits the likelihood of any investment in the US as a consequence of the tariffs.

Table 8: Impact on Cost of iPhone X from Tariff

\$

Base Case: No Tariffs		Scenario 1: Pay the 25% tariff		Scenario 2: 25% Tariff on only 50% of BOM and Assembly in US	
BOM	370	BOM	370	BOM	416
Warranty	20	Warranty	20	Warranty	20
Packaging	10	Packaging	10	Packaging	10
Depreciation	10	Depreciation	10	Depreciation	10
Overhead	5	Overhead	5	Overhead	5
Labor	25	Labor	25	Labor	100
<b>Total Cost to EMS</b>	<b>440</b>	<b>Total Cost to EMS</b>	<b>440</b>	<b>Total Cost to EMS</b>	<b>561</b>
Gross Margin for EMS	5%	Gross Margin for EMS	3%	Gross Margin for EMS	3%
GP for EMS	22	GP for EMS	22	GP for EMS	22
Other Costs	60	Other Costs	60	Other Costs	60
<b>Total Cost to Apple</b>	<b>522</b>	Transfer Price from EMS to Apple	522	<b>Total Cost to Apple</b>	<b>643</b>
		Tariff @25%	131		
		<b>Total Cost to Apple</b>	<b>653</b>		

Source: Company reports and J.P. Morgan estimates.

**Price increase of 13% required to absorb impact of tariff**

As shown in Table 9, we estimate a price increase of around 13% would be required to absorb the impact of a 25% tariff, keeping margin dollars for all players in the supply chain constant.

Table 9: Price Increase to Pass Through Tariff Impact

\$

Base Case: No Tariffs		Scenario 1: Pay the 25% tariff		Scenario 2: 25% Tariff on only 50% of BOM and Assembly in US	
BOM	370	BOM	370	BOM	416
Warranty	20	Warranty	20	Warranty	20
Packaging	10	Packaging	10	Packaging	10
Depreciation	10	Depreciation	10	Depreciation	10
Overhead	5	Overhead	5	Overhead	5
Labor	25	Labor	25	Labor	100
<b>Total Cost to EMS</b>	<b>440</b>	<b>Total Cost to EMS</b>	<b>440</b>	<b>Total Cost to EMS</b>	<b>561</b>
Gross Margin for EMS	5%	Gross Margin for EMS	3%	Gross Margin for EMS	3%
GP for EMS	22	GP for EMS	22	GP for EMS	22
Other Costs	60	Other Costs	60	Other Costs	60
<b>Total Cost to Apple</b>	<b>522</b>	Transfer Price from EMS to Apple	522	<b>Total Cost to Apple</b>	<b>643</b>
		Tariff @25%	131		
		<b>Total Cost to Apple</b>	<b>653</b>		
GM on iPhone X	42%	GM on iPhone X	37%	GM on iPhone X	37%
GP on iPhone X	378	GP on iPhone X	378	GP on iPhone X	378
Price to Retailer	900	Price to Retailer	1,031	Price to Retailer	1,021
Retailer Margin	10%	Retailer Margin	9%	Retailer Margin	9%
Prfotit/Unit for Retailer	100	Prfotit/Unit for Retailer	100	Prfotit/Unit for Retailer	100
<b>Retail Price</b>	<b>1,000</b>	<b>Retail Price</b>	<b>1,131</b>	<b>Retail Price</b>	<b>1,121</b>
		<b>Increase in price</b>	<b>13%</b>	<b>Increase in price</b>	<b>12%</b>

Source: Company reports and J.P. Morgan estimates.

**Worst case headwinds of 300 bps to gross margins if Apple does not price for the tariff**

However, if Apple were to be willing to absorb all the tariff and not raise prices, we estimate a 300 bps headwind to margins.

Table 10: Impact on Gross Margin if Tariff Is Absorbed by Apple

\$

Base Case: No Tariffs		Scenario 1: Pay the 25% tariff		Scenario 2: 25% Tariff on only 50% of BOM and Assembly in US	
BOM	370	BOM	463	BOM	416
Warranty	20	Warranty	20	Warranty	20
Packaging	10	Packaging	10	Packaging	10
Depreciation	10	Depreciation	10	Depreciation	10
Overhead	5	Overhead	5	Overhead	5
Labor	25	Labor	100	Labor	100
<b>Total Cost to EMS</b>	<b>440</b>	<b>Total Cost to EMS</b>	<b>608</b>	<b>Total Cost to EMS</b>	<b>561</b>
Gross Margin for EMS	5%	Gross Margin for EMS	3%	Gross Margin for EMS	3%
GP for EMS	22	GP for EMS	22	GP for EMS	22
Other Costs	60.0	Other Costs	60.0	Other Costs	60.0
<b>Total Cost to Apple</b>	<b>522</b>	<b>Total Cost to Apple</b>	<b>690</b>	<b>Total Cost to Apple</b>	<b>643</b>
GM on iPhone X	42%	GM on iPhone X	23%	GM on iPhone X	29%
GP on iPhone X	378	GP on iPhone X	211	GP on iPhone X	257
Price to Retailer	900	Price to Retailer	900	Price to Retailer	900
Retailer Margin	10%	Retailer Margin	10%	Retailer Margin	10%
Prfotit/Unit for Retailer	100	Prfotit/Unit for Retailer	100	Prfotit/Unit for Retailer	100
<b>Retail Price</b>	<b>1,000</b>	<b>Retail Price</b>	<b>1,000</b>	<b>Retail Price</b>	<b>1,000</b>
		Increase in price	0%	Increase in price	0%
		Impact to Total Company GP	8,320	Impact to Total Company GP	6,022
		<b>Impact on Total Company GM</b>	<b>3%</b>	<b>Impact on Total Company GM</b>	<b>2%</b>

Source: Company reports and J.P. Morgan estimates.

**Prices increases to cover part of the tariff impact more likely; 10% retail price increase would mitigate gross margin headwind to less than 100 bps**

As shown in Table 11, if Apple were to take a 10% price increase on the iPhone citing punitive tariffs, it would reduce the estimated headwind from any potential tariffs to less than 100 bps on gross margin.

**Table 11: Impact on Gross Margin on 10% Price Increase**

\$

Base Case: No Tariffs		Scenario 1: Pay the 25% tariff		Scenario 2: 25% Tariff on only 50% of BOM and Assembly in US	
BOM	370	BOM	463	BOM	416
Warranty	20	Warranty	20	Warranty	20
Packaging	10	Packaging	10	Packaging	10
Depreciation	10	Depreciation	10	Depreciation	10
Overhead	5	Overhead	5	Overhead	5
Labor	25	Labor	100	Labor	100
<b>Total Cost to EMS</b>	<b>440</b>	<b>Total Cost to EMS</b>	<b>608</b>	<b>Total Cost to EMS</b>	<b>561</b>
Gross Margin for EMS	5%	Gross Margin for EMS	3%	Gross Margin for EMS	3%
GP for EMS	22	GP for EMS	22	GP for EMS	22
Other Costs	60	Other Costs	60.0	Other Costs	60.0
<b>Total Cost to Apple</b>	<b>522</b>	<b>Total Cost to Apple</b>	<b>690</b>	<b>Total Cost to Apple</b>	<b>643</b>
GM on iPhone X	42%	GM on iPhone X	31%	GM on iPhone X	36%
GP on iPhone X	378	GP on iPhone X	311	GP on iPhone X	357
Price to Retailer	900	Price to Retailer	1,000	Price to Retailer	1,000
Retailer Margin	10%	Retailer Margin	9%	Retailer Margin	9%
Prfofit/Unit for Retailer	100	Prfofit/Unit for Retailer	100	Prfofit/Unit for Retailer	100
<b>Retail Price</b>	<b>1,000</b>	<b>Retail Price</b>	<b>1,100</b>	<b>Retail Price</b>	<b>1,100</b>
		Increase in price	10%	Increase in price	10%
		Impact to Total Company GP	3,353	Impact to Total Company Gros Prof	1,055
		<b>Impact on Total Company GM</b>	<b>1%</b>	<b>Impact on Total Company GM</b>	<b>1%</b>

Source: Company reports and J.P. Morgan estimates.

## iPhone: Our Views on Latest Launches

- **iPhone Xs Max:** 6.5" OLED display with a base price of \$1,099, and likely to see the most demand from upgrades from existing iPhone X customers looking for the top-end phone, and customers looking for a large display size.
- **iPhone Xs:** 5.8" OLED display with a base price of \$999, and likely to have the least volume, following limited hardware upgrades from the iPhone X.
- **iPhone XR:** 6.1" LCD display with a base price of \$749, and likely to account for ~50% of total volumes, with substantial upgrades from existing users of iPhone 6s and previous generation products.
- **Apple Watch Series 4:** Most substantial hardware upgrade this year, with the addition of EKG feature receiving high interest from customers.

Table 12: iPhone Specification Comparison

	iPhone XS Max	iPhone XS	iPhone XR	iPhone X	iPhone 8 Plus	iPhone 8	iPhone 7 Plus	iPhone 7
Announced	9/12/2018	9/12/2018	9/12/2018	9/12/17	9/12/17	9/12/17	9/7/16	9/7/16
Availability	9/21/2018	9/21/2018	10/26/2018	10/27/17	9/22/17	9/22/17	9/16/16	9/16/16
Display	6.5" OLED	5.8" OLED	6.1" LCD	5.8" OLED	5.5" LCD	4.7" LCD	5.5" LCD	4.7" LCD
Touch	Out-Cell	Out-Cell	Out-Cell	Out-Cell	In-Cell	In-Cell	In-Cell	In-Cell
Resolution	2688 x 1242	2436 x 1125	1792 x 828	2436 x 1125	1920 x 1080	1334 x 750	1920 x 1080	1334 x 750
OS	iOS 12	iOS 12	iOS 12	iOS 11	iOS 11	iOS 11	iOS 10	iOS 10
AP	A12	A12	A12	AP11 Bionic, 2.39 GHz	AP11 Bionic, 2.39 GHz	AP11 Bionic, 2.39 GHz	A10, 2.34 GHz	A10, 2.34 GHz
RAM (DRAM)	4 GB	4 GB	3 GB	3 GB LPDDR4X	3 GB LPDDR4X	2 GB LPDDR4X	3 GB LPDDR4	2 GB LPDDR4
Storage (NAND)	64 / 256 / 512 GB	64 / 256 / 512 GB	64 / 128 / 256 GB	64 / 256 GB	64 / 256 GB	64 / 256 GB	32 / 128 / 256 GB	32 / 128 / 256 GB
Rear Camera	Dual-12 MP	Dual-12 MP	12 MP	Dual-12 MP	Dual-12 MP	12 MP	Dual-12 MP	12 MP
OIS	Dual OIS	Dual OIS	Single OIS	Dual OIS	Single OIS	Single OIS	Single OIS	Single OIS
Face ID	Yes	Yes	Yes	Yes	No	No	No	No
3D Touch	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Battery	Last < 1.5hr longer than X	Last < 30 min longer than X	Last < 1.5hr longer than 8 Plus	2,716 mAh	2,691 mAh	1,821 mAh	2,900 mAh	1,960 mAh
Wireless Charging	Yes, Qi Standard	Yes, Qi Standard	Yes, Qi Standard	Yes, Qi Standard	Yes, Qi Standard	Yes, Qi Standard	No	No
Casing	Stainless Steel Frame, 2.5D Glass	Stainless Steel Frame, 2.5D Glass	Aluminum Frame, 2.5D Glass	Stainless Steel Frame, 2.5D Glass	Aluminum Frame, 2.5D Glass	Aluminum Frame, 2.5D Glass	Aluminum Frame, Unibody	Aluminum Frame, Unibody
Dual-sim	Yes, Nano- and E-Sim	Yes, Nano- and E-Sim	Yes, Nano- and E-Sim	No	No	No	No	No
Launch Price	\$1,099	\$999	\$749	\$999 / \$1,149	\$799 / \$949	\$699 / \$849	\$769 / \$869 / \$969	\$649 / \$749 / \$849

Source: Company reports and J.P. Morgan estimates.

## Financial Outlook

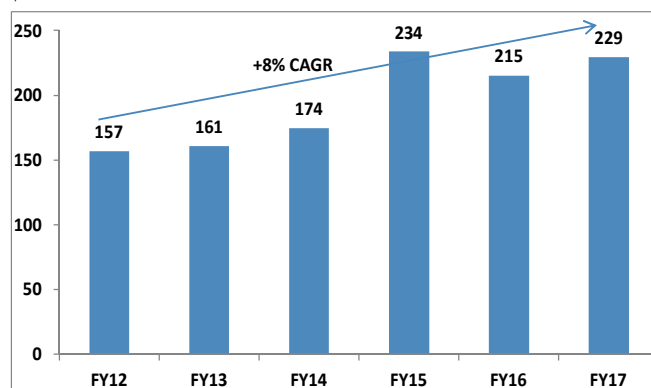
### Revenue Outlook: Low-Double-Digit Growth Led by iPhone, and Services

**Innovation has enabled the company to drive a +8% revenue CAGR over the last five years**

Apple's innovation in new and existing product categories, including smartphones, tablets, and watches has helped drive robust revenue growth for the firm over the last few years. Looking over the last five years, the firm has posted revenue CAGR of +8% between FY12 and FY17, although as shown in Figure 15, FY17 revenues are largely in line with FY15 revenues following a levelling out of the growth driver in the form of iPhone revenues. As shown in Figure 16, relative to the revenue growth of \$73bn from FY12 to FY17 for the firm, three-fourths has been driven by iPhones, and 20% by Services, with Mac and Other Products contributing a minority, while iPad has been a modest headwind.

Figure 15: Revenues (FY12-FY17)

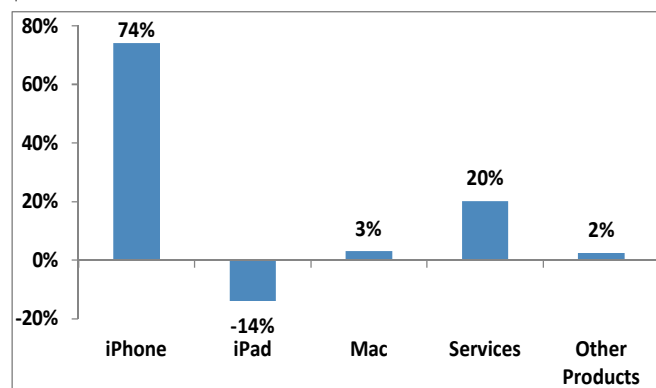
\$ in Millions



Source: Company reports and J.P. Morgan estimates.

Figure 16: FY12-FY17 Contribution to Revenue Growth

\$ million



Source: Company reports and J.P. Morgan estimates.

### We expect low-double-digit revenue growth, led by iPhone, Services, and Apple Watch

As shown in Table 13, we believe the medium-term revenue growth for the company will track in the low-double-digit range, led by a combination of: 1) high-single-digit revenue growth in iPhones, largely driven through price/ASP increases; 2) double-digit revenue growth in Services, led by growth in both the installed base as well as revenue per unit from the installed base; and 3) double-digit revenue growth in Other Products, the combination of which is likely to be partly offset by declines in iPads and Mac devices.



Table 13: Medium-Term Revenue Growth Buildup

%		
Segment	% of Total Revenue (FY17)	Medium-Term Growth (FY17-FY21E)
iPhone	62%	8%
iPad	8%	-2%
Mac	11%	-6%
Services	13%	23%
Other Products	6%	30%
Total	100%	10%

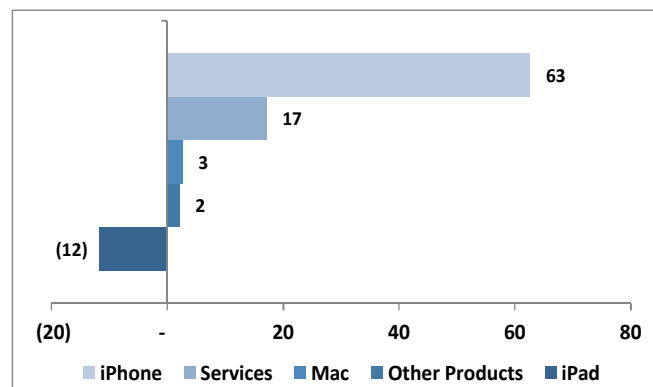
Source: Company reports and J.P. Morgan estimates.

**Despite similar growth expectations relative to history, the composition of growth is likely to be materially different**

Relative to the \$73bn of revenue growth over the five-year period starting in FY12, we expect even greater revenue growth of \$111bn over our four-year forecast window (FY17-FY21E). However, as shown in the comparison in Figure 17 and Figure 18, while iPhone sales accounted for three-fourths of the revenue growth in the last five years, we expect the growth in the next four years to be more balanced, although iPhones will continue to be the leading contributor to growth. As shown in Figure 18, we expect growth drivers to shift to Services and Other Products (accessories) in addition to the growth in iPhone revenues.

Figure 17: Composition of FY12-FY17 Revenue Growth

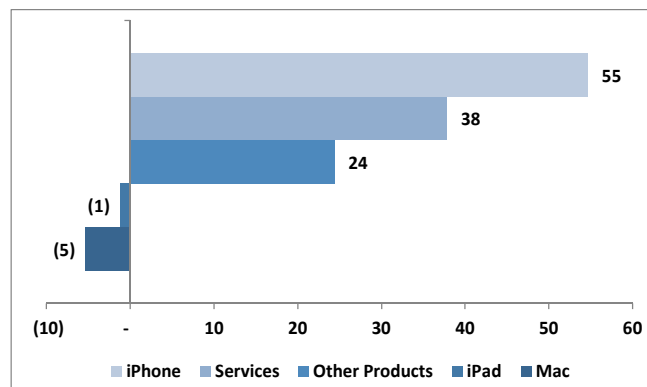
\$ in Billions



Source: Company reports and J.P. Morgan estimates.

Figure 18: Composition of FY17-FY21E Revenue Growth

\$ in Billions



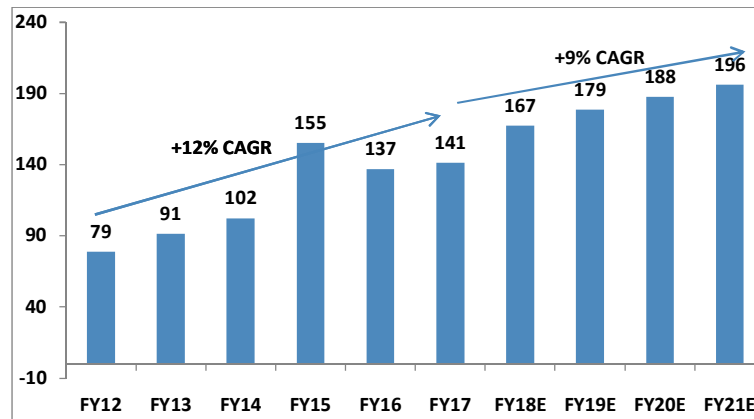
Source: Company reports and J.P. Morgan estimates.

**Despite continued volume concerns from investors, we expect revenue growth, although now led by pricing**

As shown in Figure 19, we forecast growth in revenue from iPhone sales, despite heightened investor concerns around both volumes and pricing. However, we do expect growth in revenues from iPhone sales to moderate from +12% CAGR over the last five years to +9% CAGR for FY17-FY21E.

Figure 19: Revenue Growth for iPhone Sales

\$ in Billions

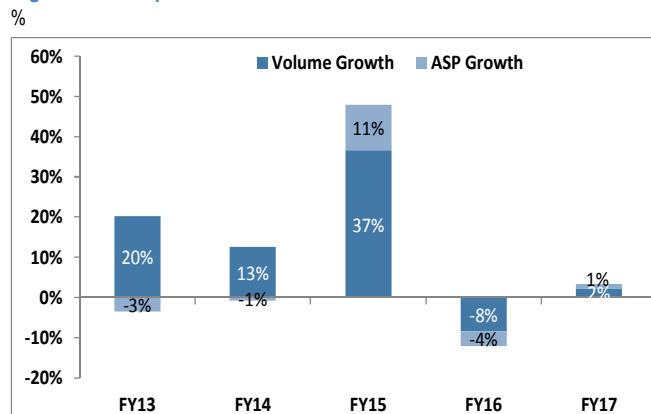


Source: Company reports and J.P. Morgan estimates.

**However, mix of volume and ASP drivers for revenue growth to change relative to historical trends**

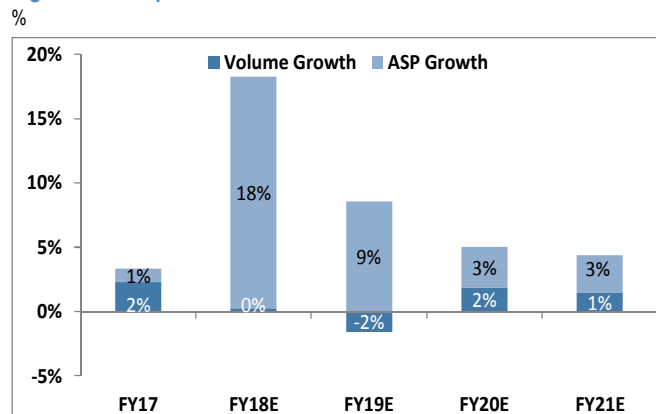
While we do expect continued revenue growth from iPhone sales, we expect the composition of growth drivers to be more heavily weighted to pricing relative to volumes. As shown in the comparison in Figure 20 and Figure 21, we expect the drivers of revenue growth to shift from being weighted to volume growth in the last five years to being weighted to ASP growth over the next four years.

Figure 20: Composition of FY12-FY17 iPhone Revenue Growth



Source: Company reports and J.P. Morgan estimates.

Figure 21: Composition of FY17-FY21E iPhone Revenue Growth



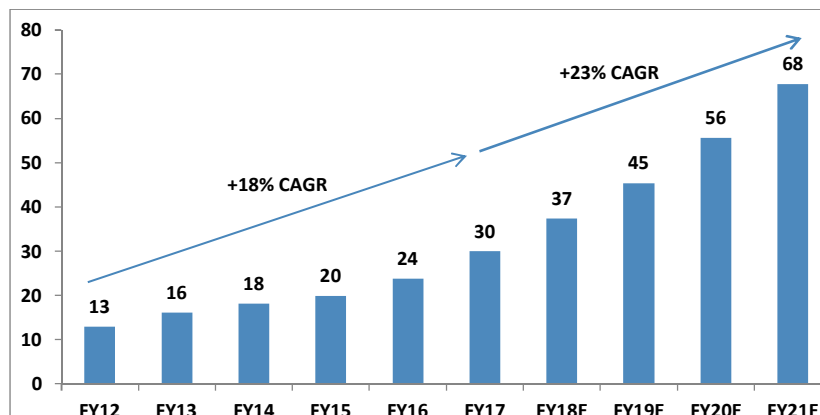
Source: Company reports and J.P. Morgan estimates.

**Services to be second largest revenue growth driver and to more than double FY16 revenues by FY20E**

We expect Services to turn out to be the second largest revenue growth driver for the company over the medium-term and expect it to comfortably meet the firm's target of \$48bn in revenues by FY20. As shown in Figure 22, we expect Services revenue growth to accelerate and rise at a +23% CAGR over our forecast window. Helped by the strong pace of growth, by our estimates, Services revenue should reach \$56bn by FY20E, relative to Apple's target of \$48bn. The forecast growth in Services revenue is led by both growth in the installed base and rise in Services revenue per device in the installed base.

Figure 22: Services Revenue Growth

\$ in Billions



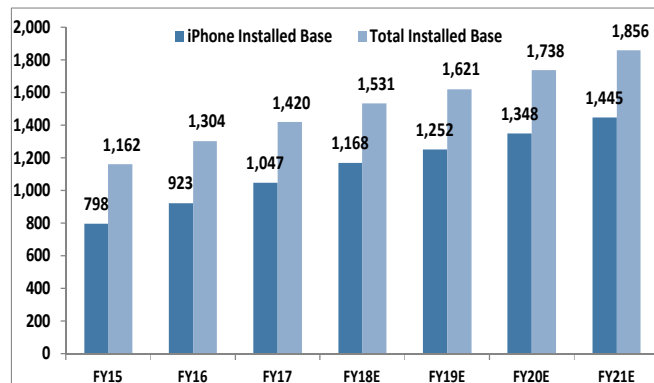
Source: Company reports and J.P. Morgan estimates.

### Installed base growth to outpace growth in new devices

Services revenue allows Apple to leverage its installed base of devices with consumers relative to annual revenues from device sales being levered to new units sales and being more cyclical around success of certain product launches in certain years. As shown in Figure 23, we expect the installed base of all devices, estimated to be around 1.4bn devices at FY18E end, will continue to increase at a high-single-digit pace to 1.9bn devices by FY21E. However, we believe primary portion of Services revenues will be levered to the installed base of iPhone devices with customers being able to use the same subscription across all their devices. As shown in Figure 23, we estimate the installed base of iPhones (including those with second owners) will be roughly 1bn devices at the end of FY18E, progressing to 1.45bn at FY21E end, implying high-single-digit increases. Net, we expect the high-single-digit pace of increase in the installed base to outpace the modest decline for legacy devices, including iPhones, iPads, and Mac devices, positioning the Services group for stronger growth relative to new devices.

Figure 23: Growth in Installed Base

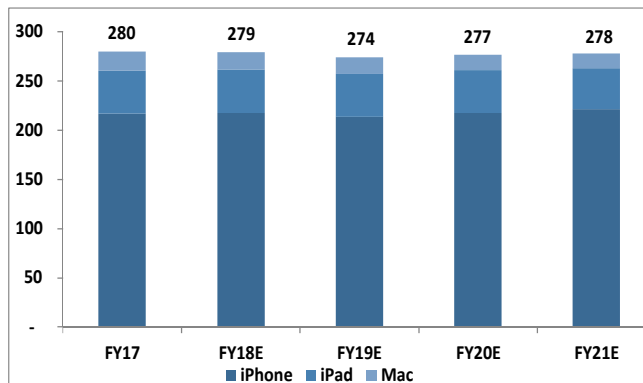
Units in Millions



Source: Company reports and J.P. Morgan estimates.

Figure 24: New (Legacy) Device Sales

Units in Millions



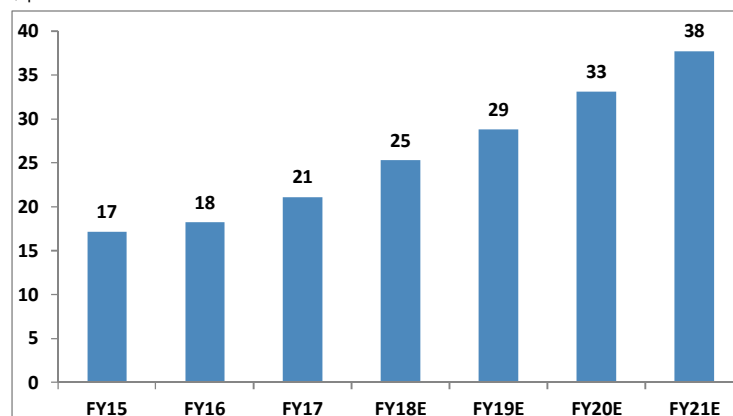
Source: Company reports and J.P. Morgan estimates. Note: Excludes Watch and Ancillaries.

### Also expect growth in revenue per installed base device, led by growth in Music, App Store, Apple Care, and Apple Pay penetration

As shown in Figure 25, we expect a continued strong pace of increase in Services revenue per device in the installed base, from a variety of growth drivers including increasing penetration of Apple Music within the installed base, increase in adoption as well as revenue per transaction for Apple Pay, continued growth in App Store revenues from increasing pace of application activity by third-party developers, and penetration of Apple Care as the preferred support and repair coverage for new device sales relative to third-party coverage.

**Figure 25: Services Revenue per Apple Device in Installed Base**

\$ per Unit



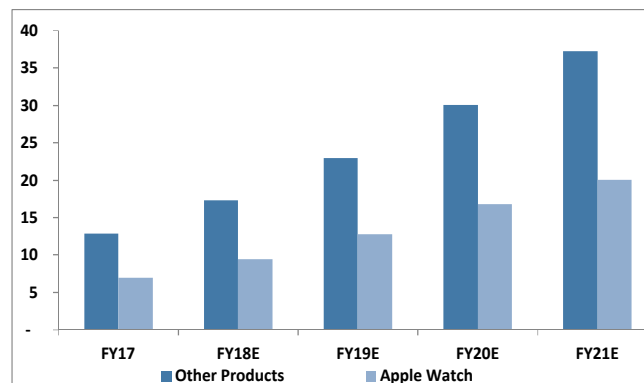
Source: Company reports and J.P. Morgan estimates.

### Other Products, including Apple Watch, to be third primary driver of medium-term revenue growth

The Other Products segment comprises various products, primary among which is the Apple Watch. Additionally, Apple has seen good success with launch of accessory products like AirPods and with the acquisition of Beats. While we expect growth in revenues of the Other Products segment to be driven by multiple products, we believe the primary driver will be sales of Apple Watch, which is already the leading smart watch globally.

**Figure 26: Other Products and Apple Watch Revenues**

\$ in Billions



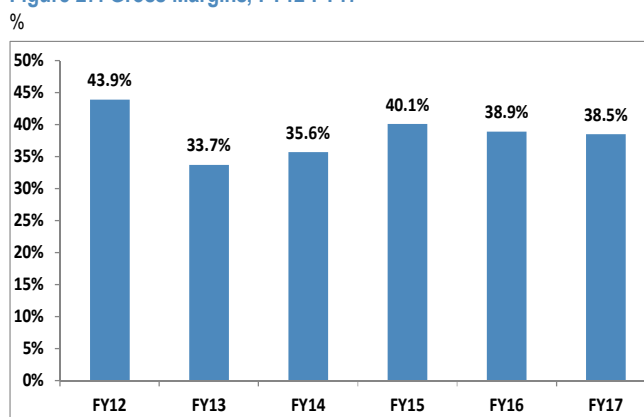
Source: Company reports and J.P. Morgan estimates.

## Margin Outlook: Investment in Services to Be Modest Headwind

### Gross margins have moderated on a combination of headwinds including memory costs and currency

While Apple's gross margins have improved substantially from the 29.0% in FY06, prior to the launch of the iPhone, they have been range bound around the 38%-40% level for the last three years. Additionally, as shown in Figure 27, gross margins in recent years are lower than the peak gross margin of 43.9% in FY12, led we believe by a combination of the following: 1) increase in memory costs; 2) currency headwinds; 3) increasing exposure to accessory sales at lower margins, partly offset by growth in Services revenue.

Figure 27: Gross Margins, FY12-FY17



Source: Company reports and J.P. Morgan estimates.

### Expect gross margins to be range bound on increasing mix of Services revenue offset by increasing mix of lower margin accessory sales

Table 14 below shows our forecast for gross margin by product. We estimate iPhone sales, and Services to be accretive to corporate gross margins, while sales of iPad, Mac devices, and Other Products excluding the Apple Watch are dilutive to gross margins. Apple does not disclose margin by product.

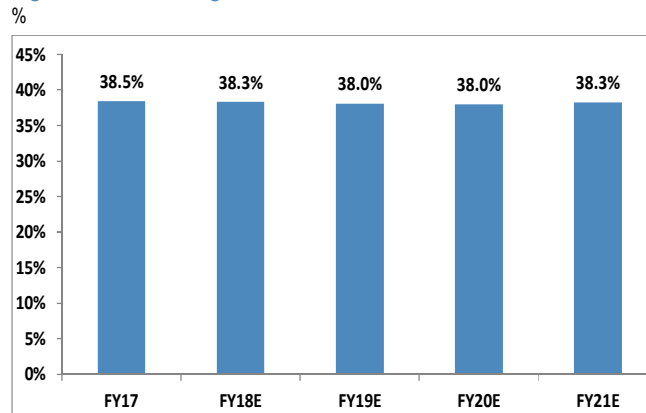
Table 14: Gross Margin Assumption by Product

Product/Segment	Gross Margin
iPhone	40.1%
iPad	22.0%
Mac	18.0%
Services	50.0%
Apple Watch	32.0%
Other Products	20.0%

Source: J.P. Morgan estimates.

Figure 28 shows our gross margin forecasts, which we expect to remain largely range bound between 38% and 39%, on the confluence of tailwinds from increasing mix of Services revenues, which we estimate to be at higher-than-corporate margins and increasing mix for revenues from sales of accessory products (excluding Apple Watch), which we estimate to be at lower margins relative to corporate margins.

Figure 28: Gross Margin Forecasts

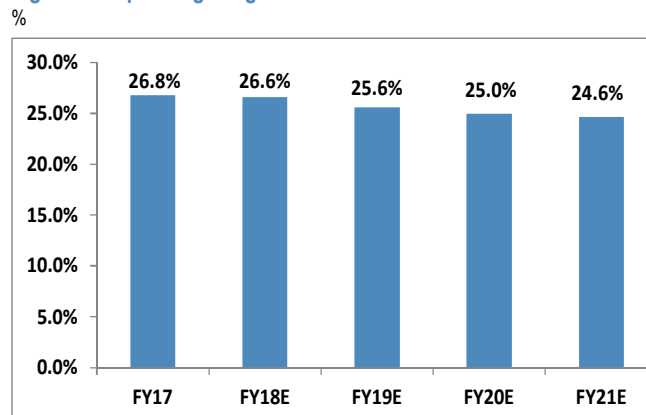


Source: Company reports and J.P. Morgan estimates.

**Despite stable gross margins, we forecast moderation in operating margins with the company likely to prioritize growth in Services opportunities**

We expect to see a higher pace of investments from Apple towards driving the existing services revenue opportunities and create new opportunities. While there is ample headroom for growth in current Services opportunities, including growth in penetration of Apple Music and Apple Pay, we believe more investments are likely to drive original content in both Apple Music and video content.

Figure 29: Operating Margin Forecasts



Source: Company reports and J.P. Morgan estimates.

**Earnings Outlook: Strong Double-Digit CAGR Driven by Combination of Revenue Growth and Share Repurchases**

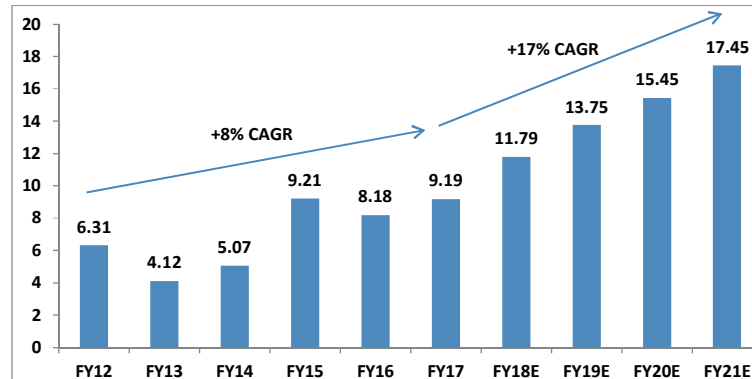
**Earnings growth to accelerate led by capital deployment**

While we expect modest acceleration in revenue growth relative to the pace over the last five years, we expect a stronger earnings acceleration led by an accelerated pace of share repurchases. As shown in Figure 30, we expect the pace of earnings growth to accelerate to a +17% CAGR for FY17-FY21E, relative to +8% earnings CAGR between FY12 and FY17.



Figure 30: Earnings Growth Forecasts

\$/Share



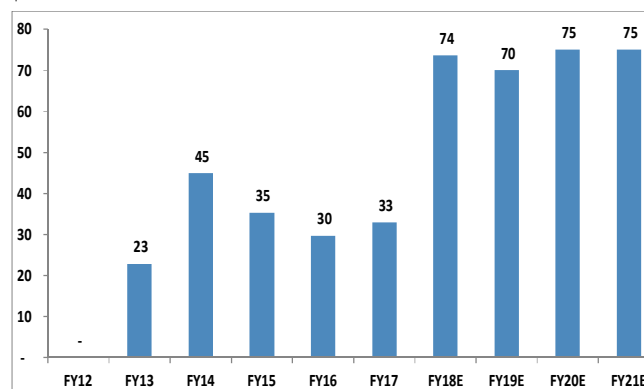
Source: Company reports and J.P. Morgan estimates.

### Largest capital return program for any US company, pace of repurchases accelerated since tax reform

After already returning \$275bn of capital to shareholders through repurchases and dividends since 2012, Apple announced a \$100bn buyback program in May of 2018. In addition to the \$100bn buyback program, Apple has an existing dividend through which Apple has already promised to return around \$14bn annually, the combination of which makes it the largest capital return program for any US company. The pace of repurchases accelerated earlier this year on the back favorable tax reform. We expect Apple to buy back \$74bn of stock in FY18E and \$70bn of FY19E, to exhaust the \$100bn program announced in mid-FY18, before accelerating to a pace of around \$75bn annually. This compares to repurchases of \$165bn between FY13 and FY17 (five years), at an average pace of \$33bn/year.

Figure 31: Share Repurchases – Historicals and Forecasts

\$ in Billions



Source: Company reports and J.P. Morgan estimates.

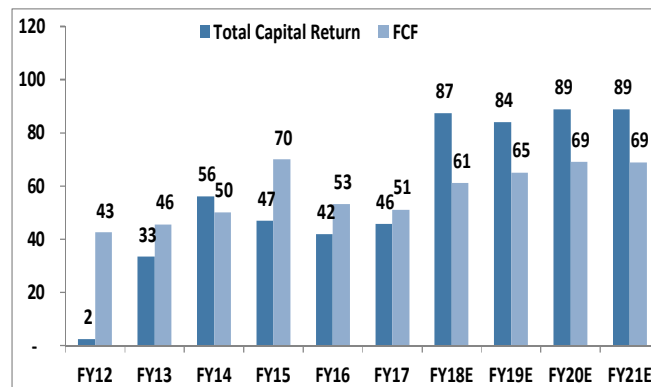
### Large repurchases are enabled by attractive free cash flow

Apple's large repurchase activity is facilitated by attractive free cash flow generation, which we currently forecast to be in the range of \$65bn-\$69bn annually in the coming years. As shown in Figure 32, despite a very large repurchase and dividend program, Apple has continued to add cash to the balance sheet helped by free cash flow exceeding the capital returns in most years. Additionally, Apple has largely

refrained from any large acquisitions, with the only notable large acquisition in the last five years being that of Beats for \$3bn.

**Figure 32: Capital Return and FCF**

\$bn

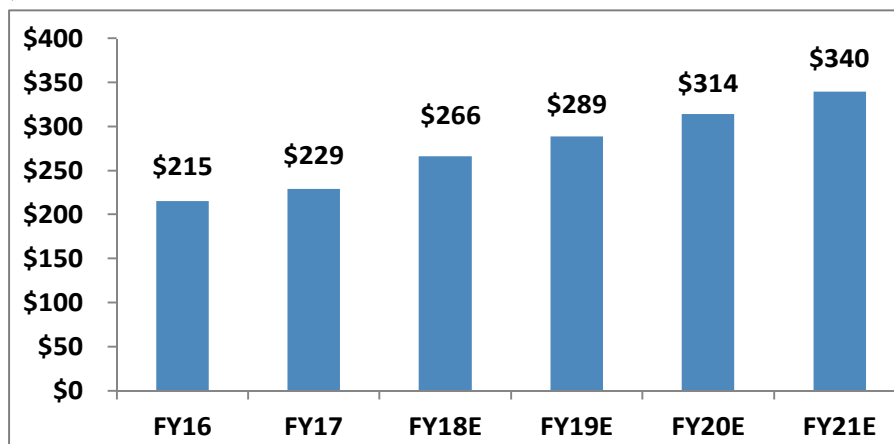


Source: Company reports and J.P. Morgan estimates.

## JPM Forecasts in a Snapshot

Figure 33: Revenue (FY16-FY21E)

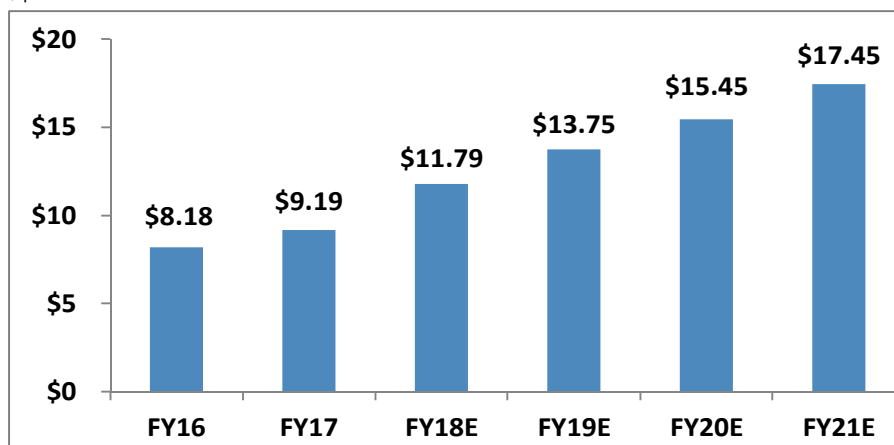
\$ in Billions



Source: Company reports and J.P. Morgan estimates.

Figure 35: EPS (FY16-FY21E)

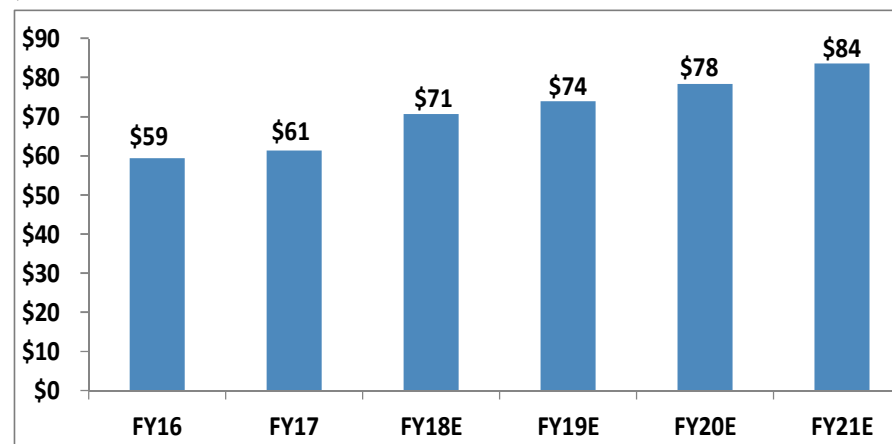
\$ per Share



Source: Company reports and J.P. Morgan estimates.

Figure 34: EBIT (FY16-FY21E)

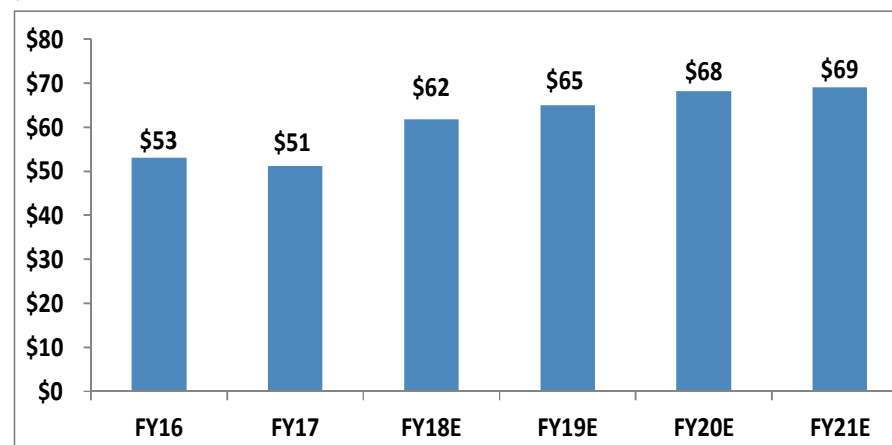
\$ in Billions



Source: Company reports and J.P. Morgan estimates.

Figure 36: FCF (FY16-FY21E)

\$ in Billions



Source: Company reports and J.P. Morgan estimates.

## Valuation

### Our SOTP-Based Analysis Suggests +23% Upside to Our December 2019 Price Target

We rate Apple shares Overweight with a December 2019 price target of \$272, implying +23% upside from current levels.

#### **We rate Apple shares Overweight**

We rate shares of Apple Overweight given our favorable outlook for continued growth in iPhone revenues led by price, combined with significant growth opportunities for its Services segment which is levered to growth in the installed base as well opportunity to increase Services revenue per device in the installed base.

#### **We value Apple shares using a blended multiple, which values Apple's various product segments at different multiples**

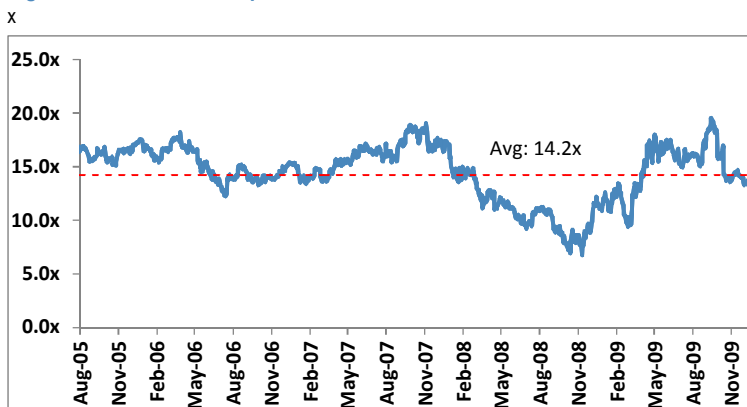
We believe a blended multiple is most appropriate for Apple, which as discussed is expected to see a shift in the composition of growth drivers from hardware sales to services sales. While growth in Services revenues is expected to be one of the primary drivers of the revenue growth for the company through FY21, it still only accounts for 20% of total company revenues by the end of our forecast window (FY21). We expect the growth in Services revenue to drive acceleration in revenue growth for the total company beyond our forecast window, as it becomes a greater portion of total company revenues.

#### **Our SOTP approach implies a blended 17.5x P/E multiple is appropriate**

We estimate earnings per share contributions from the various product segments and arrive at our price target by assigning P/E multiple appropriate for the earnings growth outlook for each segment. Key assumptions used in formulating the price target as shown in Table 16 are:

- **iPhone:** We use a 14.0x P/E multiple for our iPhone earnings estimate in calendar 2020, in line with the multiple that industry leader in the early 2000s, Nokia, traded at from 2005 to 2010 when the firm had a leadership position in feature phones.

Figure 37: Nokia P/E Multiple



Source: Bloomberg.

- **Mac devices:** P/E multiple of 11.0x, modest discount to the 12.2x NTM P/E multiple for competitor HPQ, largely subject to similar industry dynamics, but lower unit growth on account of premium pricing.
- **iPad devices:** P/E multiple of 11.0x, in line with the multiple we assign for Mac devices as growth opportunities are limited for both notebooks as well as tablets. Additionally, we believe increasing consumption of content on smartphones is likely to substitute purchases of laptops/notebooks as well as tablets in the future.
- **Services:** P/E multiple of 26.0x on the Services segment, in line with the average trading multiple for a peer group of luxury/retail companies (Costco, Estée Lauder and Home Depot), which are leaders in their respective markets and derive a stickiness for product sales through customer loyalty either in the form of membership programs or brand value. We believe the subscription nature of Apple's Services segment, with high visibility of revenue and earnings, warrants it being valued in line with the leading luxury/retail companies. As shown in Table 15, the average NTM for the peer group is 26.6x.

Table 15: P/E Multiple of Luxury/Retail Companies

Luxury/Retail	NTM	FY18	FY19	FY20
Costco	31.1x	33.4x	30.2x	27.9x
Estée Lauder	29.9x	29.6x	26.7x	24.1x
Home Depot	21.0x	21.6x	20.2x	18.5x
<b>Average</b>	<b>27.3x</b>	<b>28.2x</b>	<b>25.7x</b>	<b>23.5x</b>

Source: Bloomberg. Note: Consensus estimates.

- **Apple Watch:** P/E multiple of 25.0x, roughly in line with the 26.0x target multiple we use for the Services group, on account of the materially higher room for growth relative to Apple's legacy hardware products like iPhone, iPad, and Mac.
- **Other Products:** P/E multiple of 16.0x, at a modest premium to the legacy hardware devices like iPhone, iPad, and Mac on account of higher growth opportunities. However, the 16.0x multiple is at a discount to the 25.0x multiple we use to value Apple Watch on account of lower margins for accessory sales in a more competitive market.

Table 16: SOTP Valuation

	CY20 Revenue (\$ bns)	EPS	P/E Multiple	Revenue Growth (FY17-21E)
iPhone	193	10.6	14.0x	9%
iPad	19	0.2	11.0x	-2%
Mac	21	0.1	11.0x	-6%
Services	58	4.6	26.0x	23%
Apple Watch	18	0.6	25.0x	30%
Other	14	0.1	16.0x	30%
<b>Total</b>	<b>323</b>	<b>16.2</b>	<b>17.8x</b>	<b>10%</b>
SP500			17.3x	7%

Source: J.P. Morgan estimates.

### Our 17.5x blended P/E multiple leads us to December 2019 price target of \$272

We arrive at our December 2019 price target of \$272 using a blended 17.5x P/E multiple and our 2020E calendar EPS of \$16.19.

Figure 38: Apple P/E-Based Price Target Analysis

\$ in Millions, except per share amounts

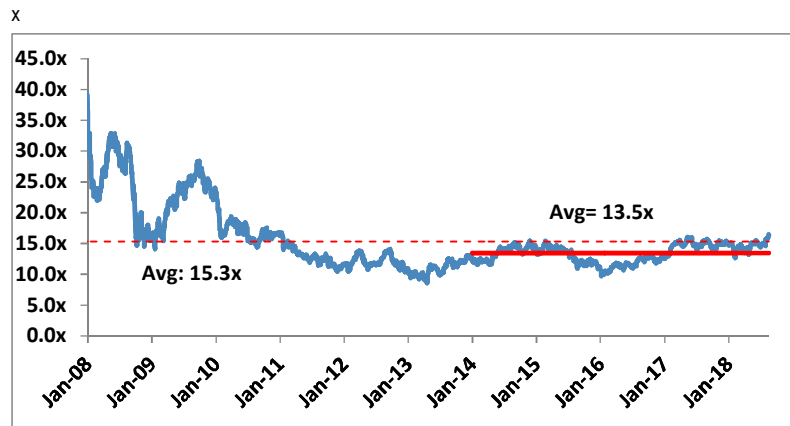
	NTM Qtrs 1-4	CY19E	CY20E
JPM Net Income	62,749	66,322	69,093
JPM EPS	\$13.32	\$14.61	\$16.19
P/E Multiple	16.6x		
JPM P/E Multiple		17.5x	17.5x
<b>Total Equity Value</b>	<b>1,064,698</b>	<b>1,157,327</b>	<b>1,212,233</b>
Average Diluted Share Count	4,830.3	4,743.5	4,460.5
<b>Implied Share Price</b>	<b>\$220.4</b>	<b>\$244.0</b>	<b>\$272.0</b>
Current Value per Share	\$220.4	\$220.4	\$220.4
Upside vs. Current		11%	23%
<u>Memo:</u>			
(-) Net Cash/(Debt)	106,995	108,920	92,602
Enterprise Value	957,703	1,048,407	1,119,630
JPM EBITDA	84,566	89,447	93,883
<i>Implied EV/EBITDA</i>	<i>11.3x</i>	<i>11.7x</i>	<i>11.9x</i>

Source: Company reports and J.P. Morgan estimates.

### Apple shares have traded at a discount to an appropriate earnings multiple

As shown in Figure 39, shares of Apple have traded at an average of 15.3x P/E since beginning of 2008 and an average multiple of 13.5x since 2014, both of which are at a discount to what we believe is an appropriate multiple for Apple shares.

Figure 39: Apple 12-Month Forward P/E Chart (2008-2018)



Source: Bloomberg.

**Apple shares have traded at a discount to the S&P 500 multiple, despite stronger revenue and earnings growth**

As shown in Figure 40, Apple shares still trade at a modest discount to the S&P 500, despite a stronger revenue outlook and earnings growth outlook relative to the average company in the S&P 500.

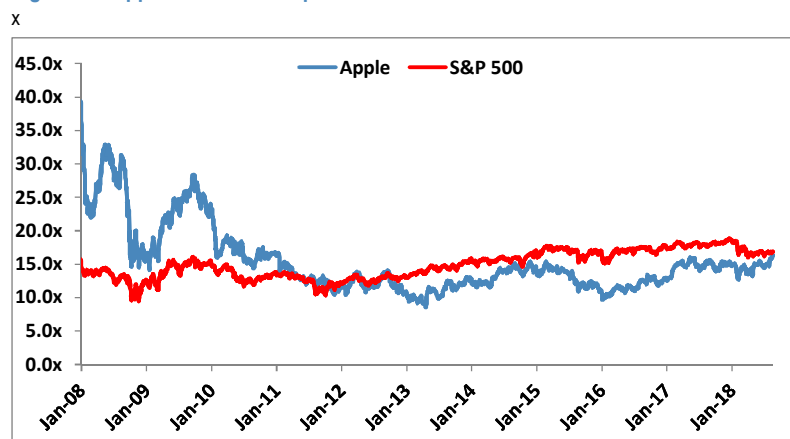
Table 17: Revenue and Earnings Growth

Y/Y % Change

	2013	2014	2015	2016	2017	2018E	2019E	2020E	Average
<b>Revenue Growth</b>									
Apple	3%	18%	21%	-7%	10%	13%	11%	8%	9%
S&P 500	3%	4%	-2%	2%	7%	10%	5%	5%	4%
<b>Earnings Growth</b>									
Apple	-23%	49%	43%	-11%	16%	31%	14%	11%	16%
S&P 500	7%	6%	-3%	0%	13%	32%	10%	10%	9%

Source: J.P. Morgan estimates, Bloomberg.

Figure 40: Apple NTM P/E Multiple vs. S&P 500



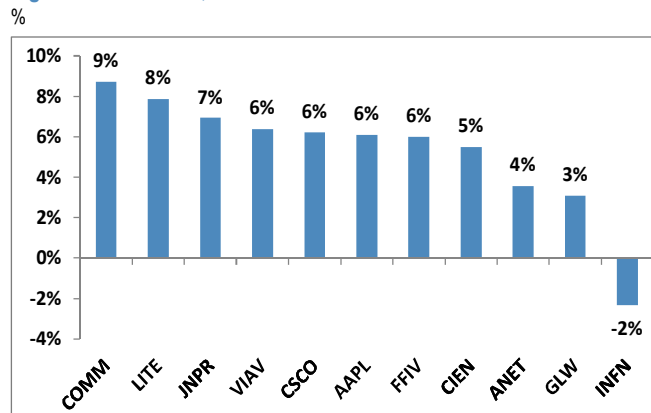
Source: Company reports and J.P. Morgan estimates.



### P/E and FCF yield continue to be attractive despite a trillion dollar valuation

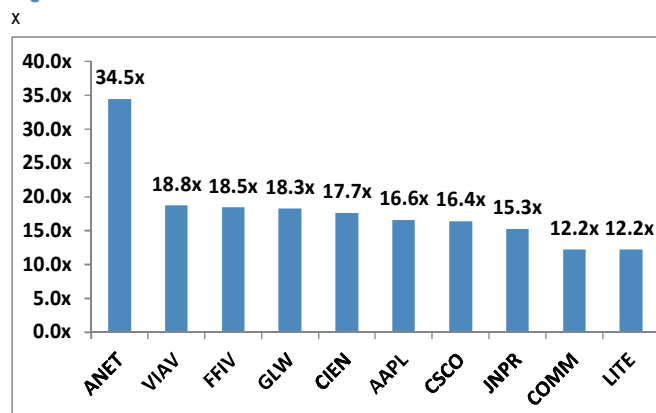
Despite a trillion dollars or more in market value, AAPL shares trade at inexpensive levels in term of both P/E multiple and FCF yield. As shown Figure 41, AAPL's FCF yield is an attractive 6%, while as shown in Figure 42 the NTM P/E multiple of 16.6x is roughly in line with the average of communication peers and the S&P 500 despite a demonstrated track record in innovation and leadership with a strategy to maximize profits rather than chase volume share.

Figure 41: FCF Yield, FY19E



Source: J.P. Morgan estimates.

Figure 42: NTM P/E



Source: J.P. Morgan estimates.

## Company Description

Apple designs and sells mobile communication devices, media devices, personal computers, smart watches, and home audio systems—mediums through which content is delivered to consumers. While the content is not necessarily owned by Apple, the devices that Apple sells are the mediums through which consumers are increasingly consuming content. Apple's hardware devices include the iPhone, iPad, Mac, AppleTV, and Apple Watch.

In addition to hardware devices, Apple controls the portal through which digital content is delivered to the devices, including through iTunes Store and Apple Music (music), App Store (applications), iBooks Store (books), and TV App Store (TV content). The above portals are collectively referred to as "Services".

In the fiscal year ended 2017 (September year-end), Apple had revenues of ~\$229bn, with a majority accounted for by iPhones (62%). Revenue contributions from iPhones were followed by Services (13% of total), Mac (11%), iPad (8%), and Other products (6%), which comprises devices such as the Apple Watch as well as accessories.

Apple shares are listed on the NASDAQ (ticker: AAPL) and are marked as the first public company to reach a trillion dollars in market value on August 2, 2018.

### The Executive Team: Experienced Team in Hardware, Software, and Retail Capabilities

**Chief Executive Officer: Tim Cook** has been serving as the CEO since August 2011, prior to which he was the Chief Operating Officer and was responsible for worldwide sales and operations. Prior to joining Apple, he was Vice President of Corporate Materials for Compaq and responsible for procurement, and also spent 12 years with IBM in various roles prior to Compaq.

**Senior Vice President of Retail: Angela Ahrendts** is responsible for strategy, real estate and development and operations of Apple's physical stores, which remain key to Apple's differentiated customer experience. Prior to joining Apple in 2014, Angela Ahrendts was CEO of luxury goods retailer Burberry.

**Senior Vice President Internet Software and Services: Eddy Cue** is responsible for Apple's content services, including iTunes Store, Apple Music, Apple Pay, Maps, Search Ads, iCloud services, and productivity and creativity apps. Eddy is also responsible for Apple's worldwide video programming. Eddy joined Apple in 1989 and has since been instrumental in creating much of the current Services portfolio.

**Senior Vice President Software Engineering: Craig Federighi** is responsible for the development of iOS and macOS. His prior experiences include NeXT (acquired by Apple in 1996) and Ariba (software company acquired by SAP).

**Chief Design Officer: Jonathan Ive** is responsible for all design at Apple including look and feel of hardware, user interface, packaging, etc., and has been leading the team since 1996.

**Senior Vice President and Chief Financial Officer: Luca Maestri** joined Apple in 2013. Prior to joining Apple, Luca Maestri was CFO at Xerox and prior to that at Nokia Siemens Networks. He began his career with General Motors.

**Senior Vice President Hardware Engineering: Dan Riccio** leads the Mac, iPhone, iPad, and iPod engineering teams.

**Senior Vice President Worldwide Marketing: Philip W. Schiller** is a frequent presenter at Apple's annual product event and is a member of the Executive Team. Chiller joined Apple in 1997 and helped in creation of Mac, digital music, and iPhone and App Store.

**Senior Vice President: Johny Srouji** has been responsible in driving innovation in silicon and custom hardware technologies, including the application processors, display silicon and batteries. Johny joined Apple in 2008 to lead development of A4, the first Apple-designed system on chip.

**Chief Operating Officer: Jeff Williams** oversees supply chain, service and support, and development of Apple Watch. Jeff Williams has been COO since 2010.

**Senior Vice President and General Counsel: Katherine Adams** joined in 2017 to oversee all legal matters.

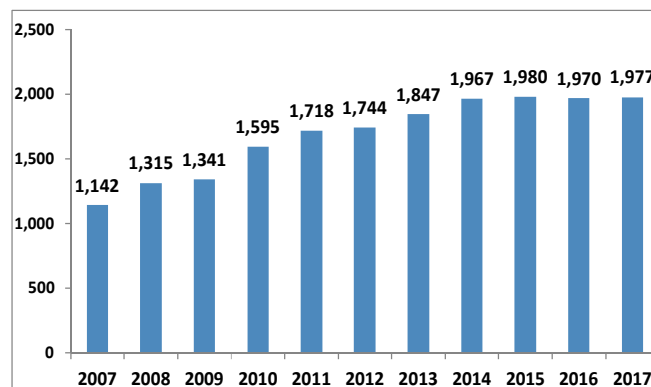
## iPhone: Premium Strategy May Limit Volume Opportunity, But Not Revenues

### **Mature penetration of mobile handsets globally makes it one of the most attractive markets**

The increasing adoption of mobile handsets globally, including both smartphones and feature phones, has driven the market to 2.0bn units in 2017 from 1.1bn in 2007, representing a +6% CAGR over the last ten-year period. The significant increase means that roughly every fourth individual globally buys a mobile handset each year. Additionally, the installed base globally for mobile handsets is estimated to be roughly 7.4bn, which means that almost every individual globally owns one. The high penetration and volume opportunity makes it a very attractive market for new entrants.

**Figure 43: Global Mobile Handset Shipments**

Units in Millions



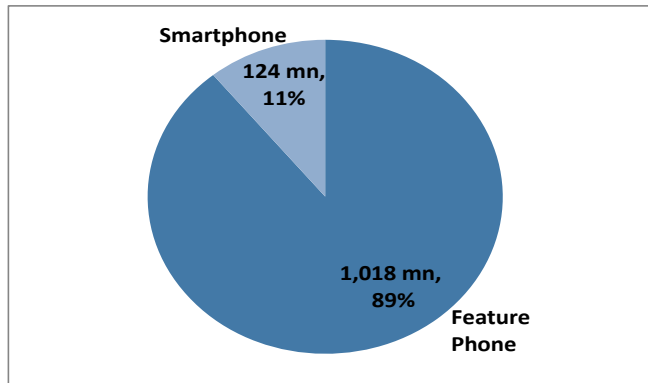
Source: IDC.

### **The disruption of the feature phone market by smartphones**

While the global handset industry demonstrated a strong CAGR of +6% over the last ten years, within the industry we saw significant disruption led by smartphones marginalizing feature phones to the low-end of the market. As shown in Figure 45, roughly 512mn feature phones are sold annually relative to 1.5bn smartphones currently, making smartphones the primary segment within the mobile handset industry. This is relative to ~90% of the total mobile handset industry comprising feature phones in 2007.

**Figure 44: Breakdown of Mobile Handset Industry (2007)**

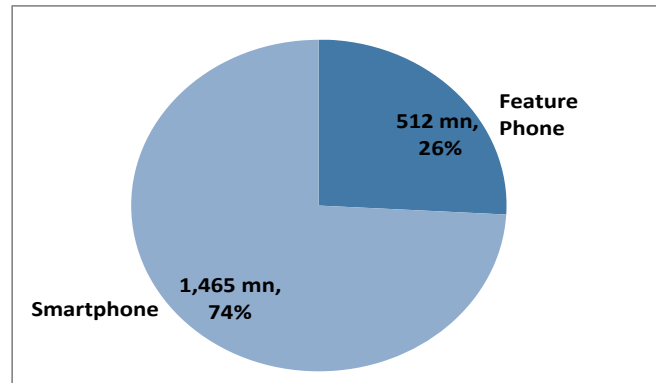
Units in Millions



Source: IDC.

**Figure 45: Breakdown of Mobile Handset Industry (2017)**

Units in Millions



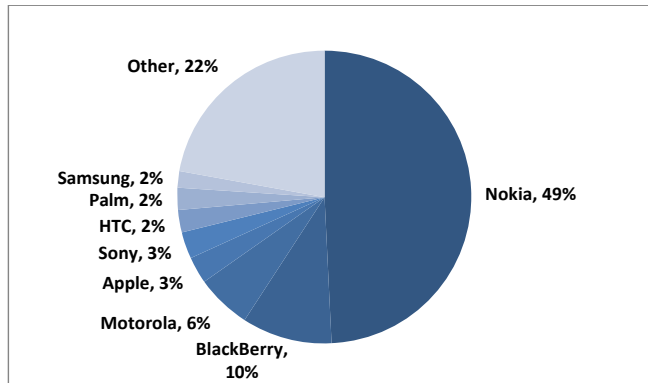
Source: IDC.

### **Samsung and Apple disrupted the mobile handset industry as new entrants**

Apple was one of the disrupters in the mobile handset industry with the launch of its smartphone, the iPhone, in 2007. Despite being a premium offering priced at \$499, relative to the majority of feature phones available in the market at that time, the iPhone managed to gain share quickly. Other manufacturers, including Samsung, had already been dabbling with the idea of smartphones by then, starting with the Samsung SPH-I300 launched in 2001. However, the market for smartphones received a boost from the launch of the iPhone by Apple and subsequent launches by Samsung, including the Samsung Galaxy in 2009. Nokia, the large incumbent player globally in feature phones, did not focus on keeping up with the changing consumer preference towards smartphones and quickly lost out on its strong position in the market. As shown in Figure 46, Nokia had 49% global market share in 2007 with Apple and Samsung accounting for only 3% and 2% market share, respectively. Since then, the market has changed dramatically with only two of the top eight companies from 2007 still remaining today. As shown in Figure 47, Samsung and Apple were ranked #1 and #2 in 2017, respectively. At the same time, it is worth noting that the Smartphone market has become more fragmented, with the top three companies now accounting for only 48% of total shipments, which compares to 65% in 2007.

**Figure 46: Smartphone Market Share by Brand (2007)**

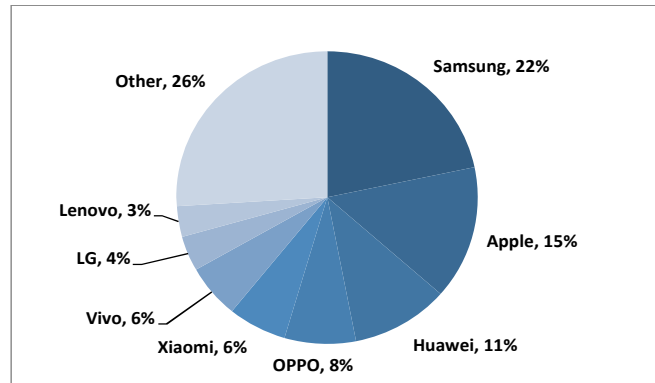
% of Total Shipments



Source: IDC.

**Figure 47: Smartphone Market Share by Brand (2017)**

% of Total Shipments



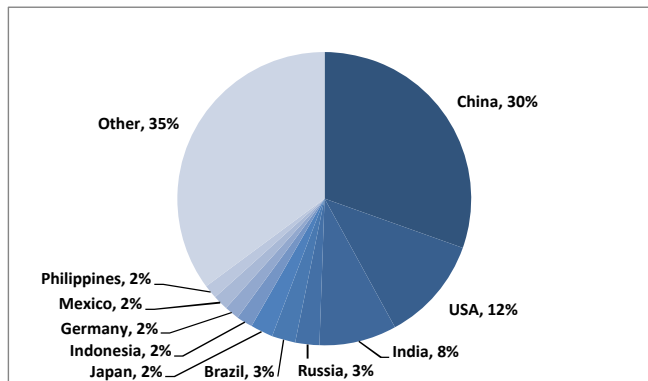
Source: IDC.

### Emerging countries account for the majority of smartphone shipments

With smartphones largely accessible to most demographics today, given the wide range of price points at which they are offered to consumers, population has a strong correlation to the size of the smartphone market in any particular country. As shown in Figure 48, China accounted for 30% of the smartphone shipments in 2017, followed by the US (12%) and India (8%). Additionally, as shown in Figure 49, Emerging countries accounted for 76% of smartphone shipments in 2017, while Developed countries accounted for 24%.

**Figure 48: Smartphone Market Share for Top 10 Countries (2017)**

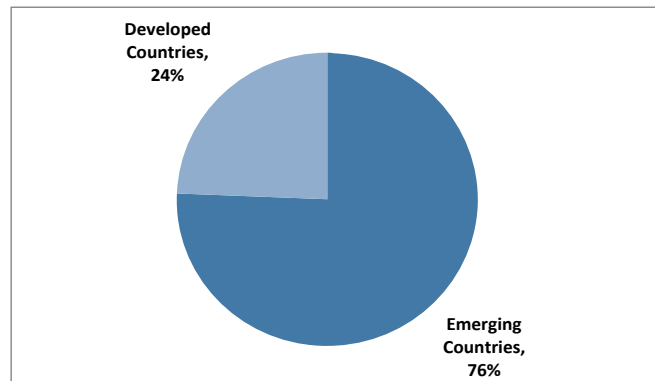
% of Total Shipments



Source: IHS.

**Figure 49: Smartphone Market Share by Type of Country (2017)**

% of Total Shipments



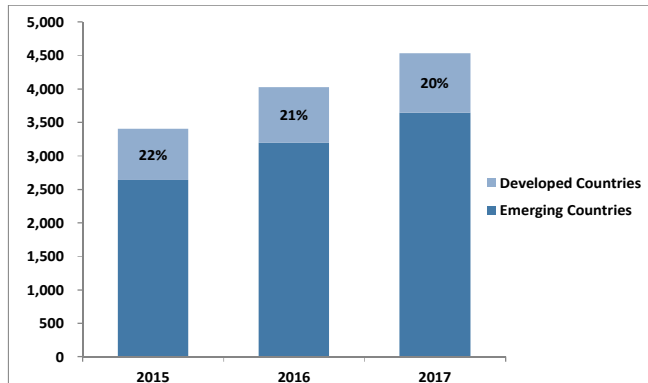
Note: Developed Countries include N. American, W. European, and certain APAC countries.  
Source: IHS.

### Emerging countries account for an even greater portion of the installed base

As illustrated in Figure 50, despite consumers in Developed countries being early adopters of smartphones, Developed countries only accounted for 20% of the smartphone installed base in 2017, which compares to 24% of smartphone revenues. We believe the higher churn rate and the shorter life-cycle of smartphones for consumers in Developed countries compared to consumers in Emerging countries drives the higher revenue contribution relative to the size of the installed base. See Figure 51 for a more granular breakdown of the global installed base by region.

**Figure 50: Smartphone Installed Base by Type of Country**

Units in Millions

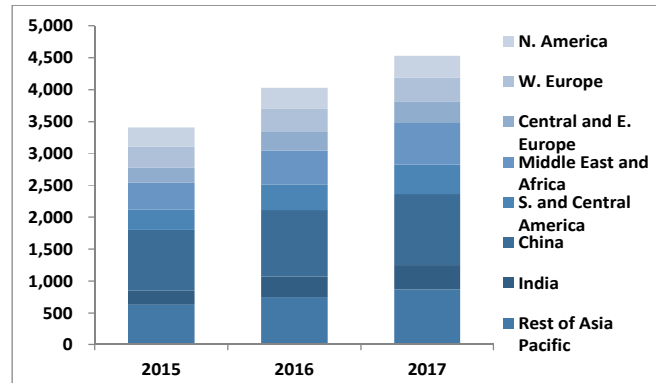


Developed Countries include N. American, W. European, and certain APAC countries.

Source: IHS.

**Figure 51: Smartphone Installed Base by Region**

Units in Millions



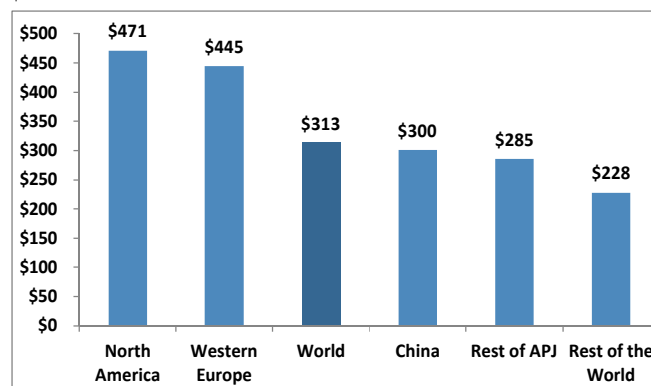
Source: IHS. Note: Does not include feature phones.

### Revenue opportunity by country is more balanced given average selling prices

Despite Emerging countries representing the larger volume opportunity, the revenue opportunity is more balanced given the variance in average selling price for smartphones in different countries. As shown in Figure 52, North America and Western Europe boast the highest average selling prices for smartphones, roughly 50% higher than the average selling price in China and roughly 60% higher than the average selling price in the rest of Asia, including India.

**Figure 52: Average Selling Price for Smartphones by Region**

\$



Source: IDC.

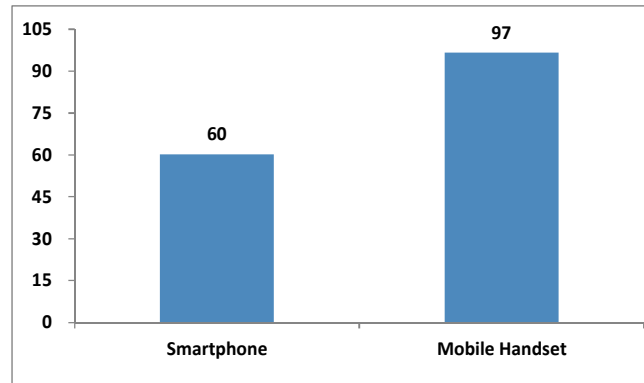
### Smartphones to continue displacing feature phones and increase penetration

While the penetration of mobile handsets is high on a global level, we continue to see further growth opportunities for smartphones driven by the displacement of feature phones, particularly in underserved Emerging countries dominated by feature phones. As shown in Figure 53, smartphone penetration stands at 60 per 100 people, which compares to almost complete mobile handset penetration globally.



**Figure 53: Smartphone vs. Mobile Handset Penetration per Capita**

Number of Phones per 100 People



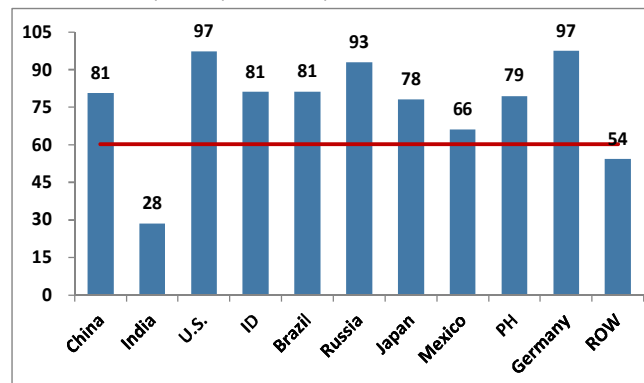
Source: IHS, The World Bank.

### Smartphone penetration lagging in key countries

As shown in Figure 54, out of the top ten countries by smartphone installed base, the United States and Germany rank the highest in smartphone penetration with a per capita installed base of 97 per 100 people. Meanwhile, smartphone penetration remains low in certain key countries, including China with 81 per 100 people and India with 28 per 100 people. However, mobile handset penetration in both China and India are likely higher with a substantial portion of the population still using feature phones, representing a significant growth opportunity for smartphones.

**Figure 54: Smartphone Penetration per Capita for Top 10 Countries by Installed Base**

Number of Smartphones per 100 People



Note: Countries are in order of size of smartphone installed base. PH – Philippines; ID – Indonesia.

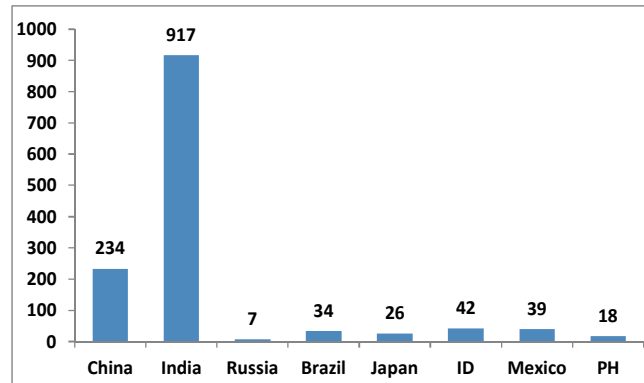
Source: IHS, The World Bank.

### Significant growth opportunity from increasing smartphone penetration

We expect smartphone penetration to increase relative to feature phones over time. As illustrated in Figure 55, an increase in smartphone penetration to the levels displayed by the United States and Germany would imply a significant volume opportunity of more than 1bn units for the remaining countries.

**Figure 55: Smartphone Growth Opportunity with Increasing Penetration to US Levels**

Units in Millions



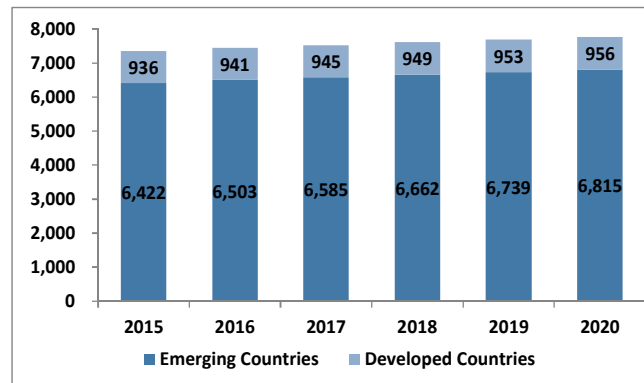
Source: J.P. Morgan estimates. PH – Philippines; ID – Indonesia.

### Developed countries remain attractive on higher smartphone churn rates

With a high penetration of smartphones in Developed countries, the growth in the installed base is likely to be closely tied to population growth, in contrast to Emerging countries where the smartphone installed base is likely outstrip population growth. However, as shown in Figure 56, population growth in Developed countries is expected to be modestly positive, driving our expectations for modest growth for the smartphone market in Developed countries.

**Figure 56: Population Forecast**

Population in Millions



Developed Countries include N. American, W. European, and certain APAC countries.

Source: The World Bank.

### Growth opportunity in Emerging countries is greater than in Developed countries, but more likely in the low-tier price segments

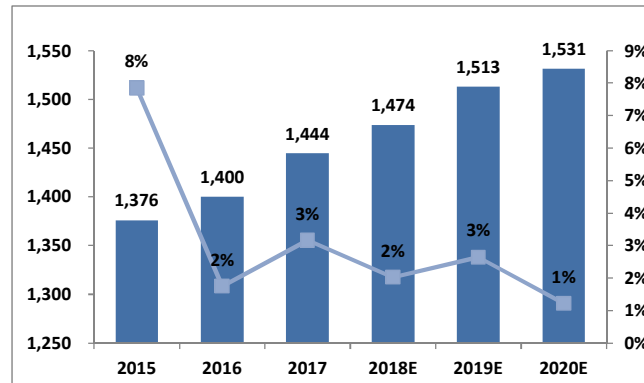
The growth drivers for the smartphone industry are greater in Emerging countries relative to the Developed countries, and thus we expect stronger growth over the medium-term in the Emerging countries. However, with an increasing portion of the growth coming from Emerging countries, the OEMs with products positioned at the low-tier and at the low end of the mid-tier smartphone market are more likely to benefit relative to the OEMs with products focused on the premium smartphone market, which includes Apple.

### Smartphones expected to grow low-single digits over the medium-term

As illustrated in Figure 57, we expect Smartphone unit shipments to grow +1.9% per year from 1,444mn in 2017 to 1,531mn in 2020, led by growth in Emerging countries.

**Figure 57: Smartphone Growth Forecast**

Unit Shipments in Millions, Y/Y Change (%)



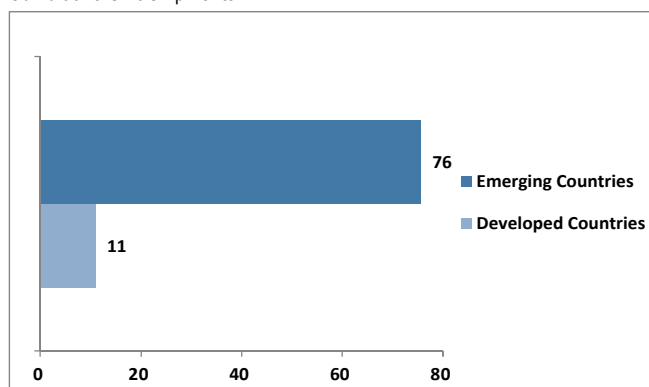
Source: IHS, J.P. Morgan estimates. Note: Does not include feature phones.

### Emerging countries driving growth over the medium-term

As shown in Figure 58, we forecast roughly 90% of the unit growth for the smartphone industry over the next three years to be attributable to Emerging countries, with Developed countries accounting for the remaining 10%. As illustrated in Figure 59, we forecast the Middle East and Africa to account for 31% of the growth, followed by India accounting for 26%, rest of Asia Pacific (largely Emerging Asia) accounting for 18%, and Central & Eastern Europe accounting for 13%. North America and Western Europe are expected to account for only 7% and 4% of the three-year growth, respectively.

**Figure 58: Smartphone Growth Forecast by Country (FY17-FY20)**

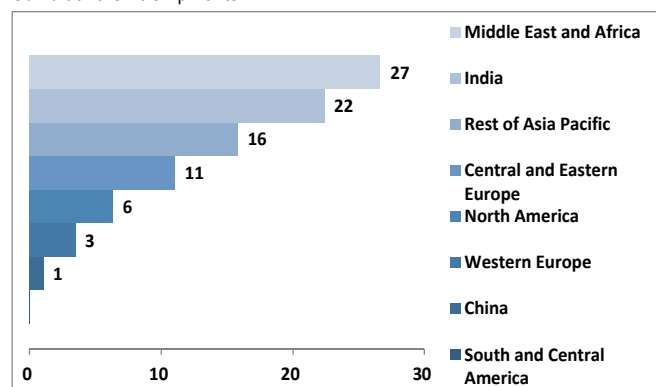
Cumulative Unit Shipments



Source: IHS, J.P. Morgan estimates.

**Figure 59: Smartphone Growth Forecast by Region (FY17-FY20)**

Cumulative Unit Shipments



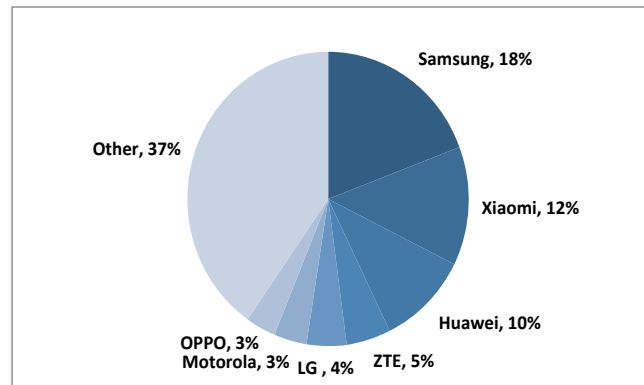
Source: IHS, J.P. Morgan estimates.

### Apple does not participate in the low-tier smartphone market

As illustrated in Figure 60, the low-tier smartphone market (\$150/unit or less), which represented ~560mn units shipments in 2017 (40% of total), is highly fragmented as the top five companies only account for 48% of shipments. Samsung with its broad range of smartphone models maintains a leading position in the low-tier market, followed by newer entrants, such as Xiaomi, Huawei, ZTE and LG.

**Figure 60: Low-Tier Smartphone Market Share by Brand, 2017**

% of Low-Tier Shipments



Note: Low-tier (<=\$150), Mid-tier (\$151-\$600), Premium (>=\$601).

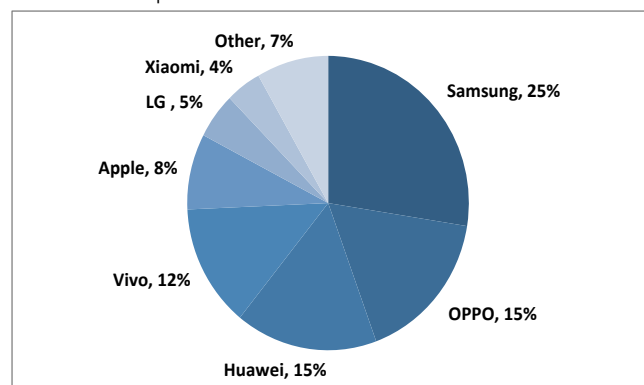
Source: IHS.

### Apple has a small share in the mid-tier smartphone market

The mid-tier smartphone market, defined to be in the price range of \$151-\$600, accounts for roughly 45% of the global market. As illustrated in Figure 61, the mid-tier market is largely dominated by Samsung, and new entrants, such as OPPO and Huawei. Apple accounts for 8% of the market with its product offering, including iPhone SE, iPhone 6S, iPhone 6S Plus, iPhone 6, and iPhone 5S.

**Figure 61: Mid-Tier Smartphone Market Share by Brand, 2017**

% of Mid-Tier Shipments



Note: Low-tier (<=\$150), Mid-tier (\$151-\$600), Premium (>=\$601).

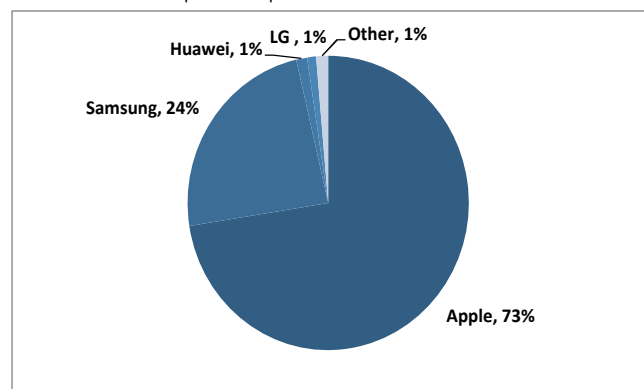
Source: IHS.

### Apple has a large share of the premium smartphone market

The premium smartphone market, defined as more than \$600, accounts for roughly 15% of the global market. Apple is by far the largest player as it accounts for almost three-fourths of the market, followed by Samsung. Together, Apple and Samsung account for 97% of the premium smartphone market. Apple's product offering in this premium price range includes the iPhone XS Max, iPhone XS, iPhone XR, iPhone X, iPhone 8, iPhone 8 Plus, iPhone 7, and iPhone 7 Plus, which compete with Samsung's Galaxy Note 9, Galaxy S9, Galaxy S9 Plus, Galaxy Note 8, Galaxy S8, and Galaxy S8 Plus.

**Figure 62: Premium Smartphone Market Share by Brand, 2017**

% of Premium Smartphone Shipments



Note: Low-tier (<=\$150), Mid-tier (\$151-\$600), Premium (>=\$601).

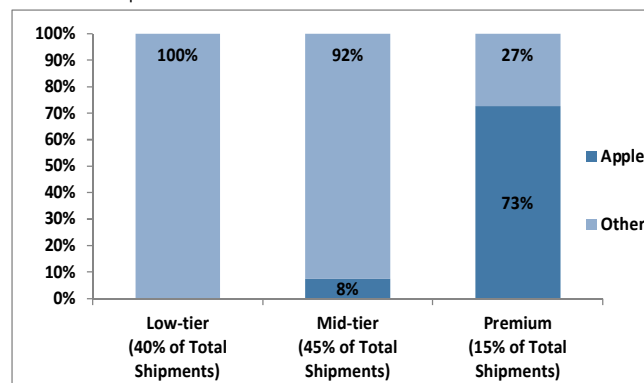
Source: IHS.

### Apple has a 15% global market share, led by its premium product offering

Apple is estimated to have a global market share of ~15% through a combination of modest share in the mid-tier market and solid share in the premium market. As shown in Figure 63, Apple has no presence in the low-tier market, which accounts for 40% of total shipments. However, Apple has a modest share in the mid-tier market, which accounts for 45% of total shipments, and has three-fourths of the share in the premium market, which accounts for 15% of total shipments.

**Figure 63: Apple Smartphone Market Share by Price Tier, 2017**

% of Total Shipments



Note: Low-tier (<=\$150), Mid-tier (\$151-\$600), Premium (>=\$601).

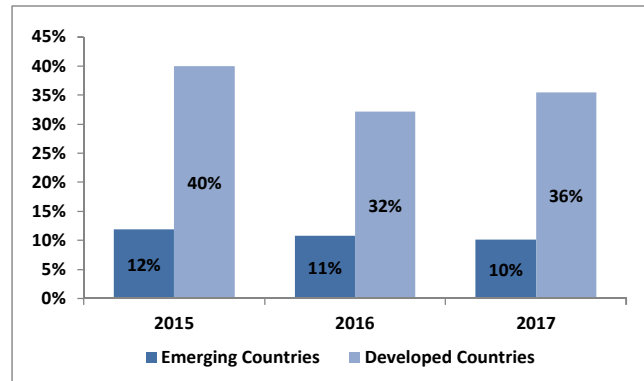
Source: IHS.

### Apple has a strong market share position in Developed countries

As shown in Figure 64, Apple's market share of smartphone shipments stood at 36% in Developed countries in 2017, compared to only 10% in Emerging countries. Additionally, Apple's market share of smartphone shipments has moderated slightly over the last three years in both Developed and Emerging countries.

**Figure 64: Apple iPhone Share by Region**

% of Total Shipments



Source: IHS.

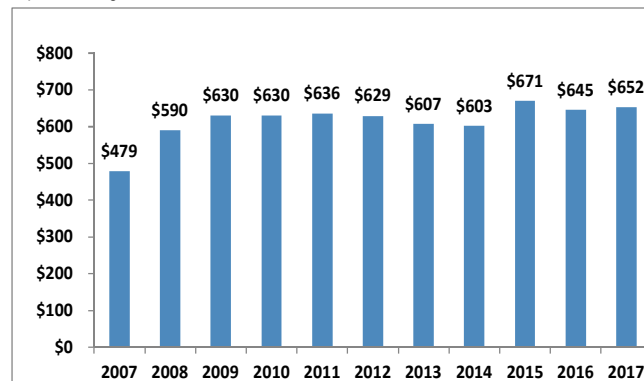
### iPhone: Premium Pricing and Mix Strategy Key to Growth

#### Driving revenue growth through average selling price increases

While Apple's limited market share in Emerging countries is an opportunity, we have not seen any appreciable change in strategy, which would allow it to better leverage the forecasted growth for smartphone shipments in Emerging countries. However, Apple has successfully explored a premium pricing strategy to drive revenue growth through consistent increases in prices. As shown in Figure 65, the average selling price of an iPhone has increased +36% since 2007, or +3% per annum, which has recently supported revenue growth as unit shipments have started to plateau.

**Figure 65: Apple iPhone Blended ASP**

\$ per Average iPhone



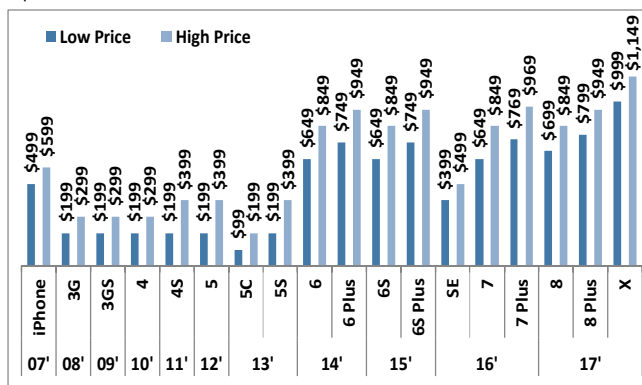
Source: Company reports.

### Consumers experience even greater price increases on roll-off of subsidies

As illustrated in Figure 66, the price to consumers for iPhones in certain countries has increased at an even greater pace relative to the +3% CAGR reported by Apple. Specifically, following the initial launch of the iPhone, telecom service carriers sold iPhones with a heavy subsidy to make it more palatable for consumers in an effort to grow their respective subscriber bases. Carrier subsidies, which were quite prevalent historically in the US, limited the price paid by iPhone consumers from 2008 to 2013. Following that period, carriers moved away from subsidies and instead began offering consumers monthly installment programs to drive device ownership and replacement.

Figure 66: iPhone Retail Price to Consumer

\$ per iPhone



Note: Retail launch prices may not reflect Apple's reported ASPs given carrier subsidies applied in the period of 2008-13.

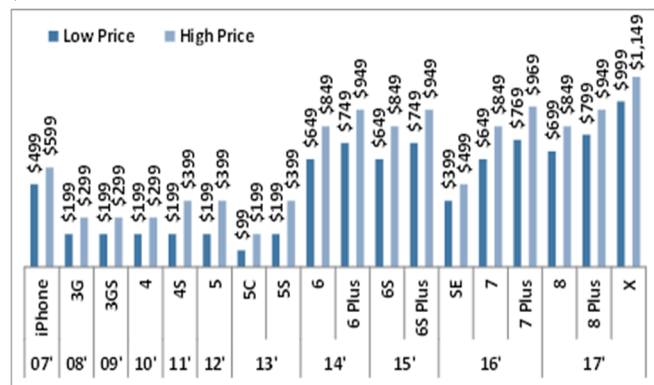
Source: Company data and J.P. Morgan estimates.

### Apple's premium smartphone customers demonstrate low price elasticity

As shown in Figure 67 and Figure 68, iPhone shipments continued to increase despite the roll-off of carrier subsidies starting in 2013. While investors are concerned about the price elasticity of consumers given Apple's pricing strategy, the increase in iPhone shipments long-term indicates to us that investor concerns appear unfounded and the customer demographic targeted by Apple demonstrates very low price elasticity.

Figure 67: Retail Price to Consumer

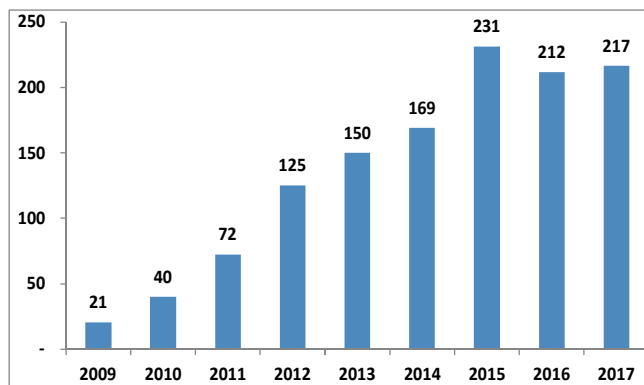
\$



Source: Company data and J.P. Morgan estimates.

Figure 68: iPhone Volume Shipments

mn



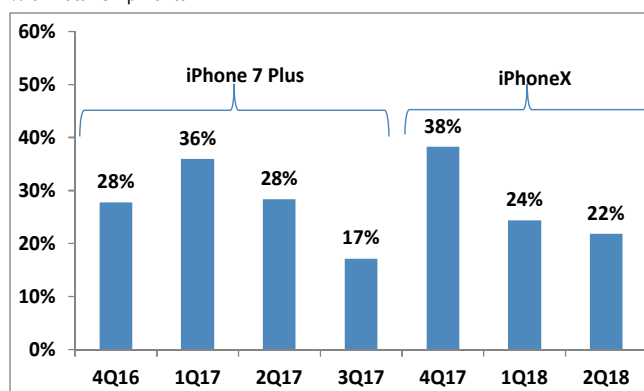
Source: Company reports and J.P. Morgan estimates.

### Success of pricing strategy demonstrated with adoption of premium smartphone

The steady increase in pricing for iPhones has been led by the success of Apple's launch of premium smartphones despite concerns around price elasticity. While there is seasonality relative to demand, Figure 69 demonstrates that Apple's top-end smartphone in any particular period has been successful in capturing a significant portion of consumers in each quarter following its initial release, which has resulted in the increase in Apple's blended average selling price. Despite investor concerns relative to demand for premium smartphones, consumers have not shied away from purchasing Apple's top-end smartphone.

**Figure 69: Success of Premium Pricing Strategy**

% of Total Shipments



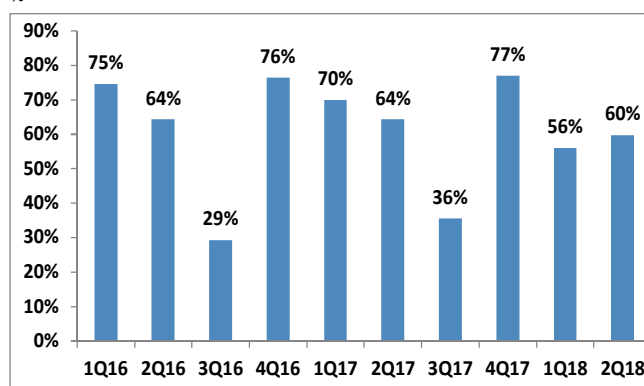
Source: IHS.

### Demand for the latest generation smartphone remains very high

Despite Apple increasing the price for every generation of iPhone, consumers have shown a strong preference for the latest generation of phones, which largely reflects preference for incremental features that Apple introduces with each new model. As illustrated in Figure 70, the latest generation of iPhone, which is usually introduced in September of each year, has become the primary contributor to unit shipments for the next four quarters, despite the availability of the previous generation for a reduced price. In our view, this demonstrates the premium pricing Apple is able to drive through consumer preference for features introduced on the latest generation of the iPhone.

**Figure 70: Success of Driving Mix to Latest Generation of Phones**

%



Source: IHS.

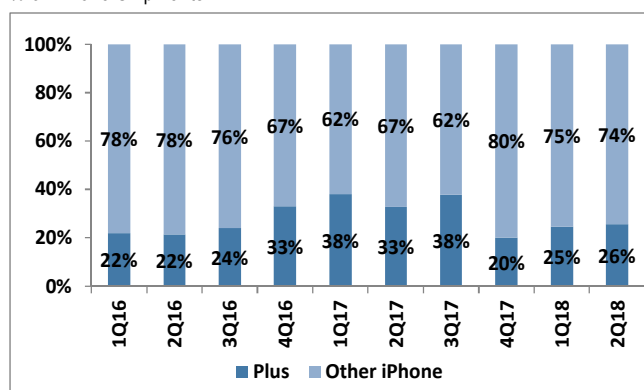


### Success of “Plus” models also contributing to success in pricing strategy

Until 2017, the “Plus” models were the top-end smartphone in Apple’s portfolio. As shown in Figure 71, “Plus” models increased as a mix of iPhone shipments as Apple successfully drove a significant proportion of customers to upgrade to the larger screen size for a premium price. Despite the launch of the iPhone X as Apple’s top-end smartphone in 4Q17, it only modestly cannibalized the mix of the “Plus” models, which are still sold at a premium to the corresponding base model with a 4.7 inch screen. For example, the “Plus” and the X model, both at a premium to the base iPhone model with a 4.7 inch display, accounted for 48% of the mix in 2Q18 (26% iPhone Plus + 22% iPhone X), which compares to the “Plus” model accounting for 38% of mix in 1Q17.

Figure 71: iPhone Plus Share of iPhone Shipments

% of iPhone Shipments



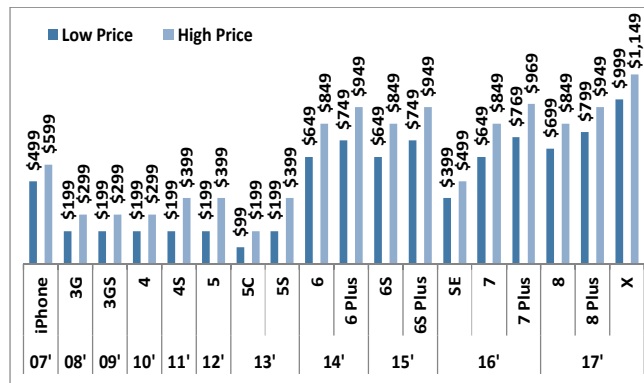
Source: IDC, IHS, J.P. Morgan estimates.

### Expanding the portfolio with more product offerings in recent generations

Starting with the launch of the iPhone in 2007, Apple focused its energy on delivering one quality product every year, following up on the first iPhone launch in 2007 with the launch of iPhone 3G in 2008, iPhone 3GS in 2009, iPhone 4 in 2010, iPhone 4S in 2011, and iPhone 5 in 2012. Starting in 2013, Apple moved to a two-product strategy with the launch of the 5C and 5S, followed by the launch of the 6 and 6 Plus in 2014, and 6S and 6S Plus in 2015. Apple has now moved to a three-product strategy with the launch of the iPhone 7, iPhone 7 Plus, and the iPhone SE in 2016, followed by the launch of the iPhone 8, iPhone 8 Plus, and iPhone X in 2017, and the launch of iPhone XS, iPhone XS Max, and iPhone XR in 2018.

Figure 72: iPhone Launch Schedule

\$ per iPhone



Note: Retail launch prices may not reflect Apple's reported ASPs given carrier subsidies applied in the period of 2008-13.

Source: Company reports.

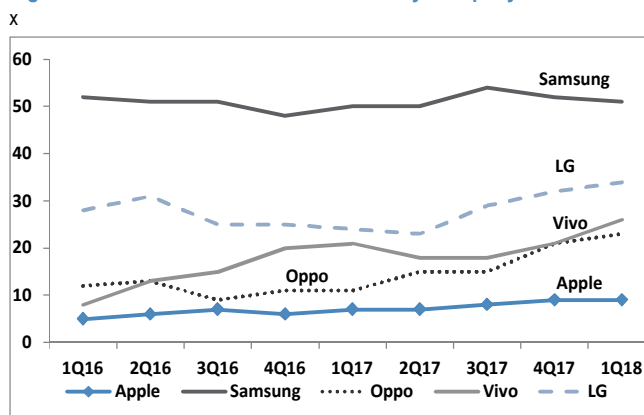
### Expanding the portfolio, widening the price points

By expanding the iPhone model lineup with every generation from one in 2007-12 to three in 2016, Apple is able to offer consumers a wider range of choices in terms of device capabilities, screen dimensions, as well as price points. For example, in the latest generation of iPhones launched in 2018, the price range between the low-end iPhone XR and the high-end iPhone XS Max is \$350 (starting prices), relative to \$100 in 2014 and 2015 when Apple launched two products in each generation.

### Apple to deliver the best consumer experience on a small number of models

Despite Apple modestly broadening its portfolio over time, we believe it will continue to focus on delivering a solid consumer experience through a small number of models, rather than pursue a broad portfolio similar to competition. As shown in Figure 73, Apple sells the fewest different phone models relative to its primary competitors in any given quarter. We believe the focus on a smaller number of models allows Apple to drive higher volume leverage across its portfolio as well as focus marketing spend on fewer products, driving the optimum outcome in relation to both gross margin and operating margins.

Figure 73: Number of Phone Models Sold by Company

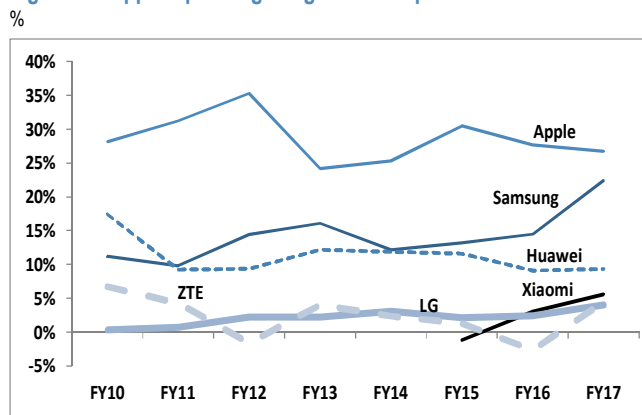


Source: IHS.

### Fewer models and premium pricing drive best-in-class product margins

We believe the combination of the premium pricing strategy as well as the focus of both R&D and marketing spend across fewer models contributes to Apple's stronger margins on iPhones relative to competitors. As shown in Figure 74, Apple delivers stronger margins than any of its competitors in the smartphone industry. Admittedly, some of the companies mentioned below have business interests outside of smartphones, but we estimate Apple has a leadership in margins for smartphones on a stand-alone basis relative to any competitive products. The higher operating margins are a function of: 1) higher gross margin led by a focus on premium smartphones; 2) pricing power with the customer demographic purchasing premium smartphones; and 3) lower operating costs, which is a function of focusing on developing 2-3 stand-out smartphone models during a year, allowing for better leverage of costs over greater volumes per phone model.

Figure 74: Apple Operating Margin vs. Competitors



Source: Company reports.

Note: Samsung margins in the chart are for the phone segment, but for total company for others.

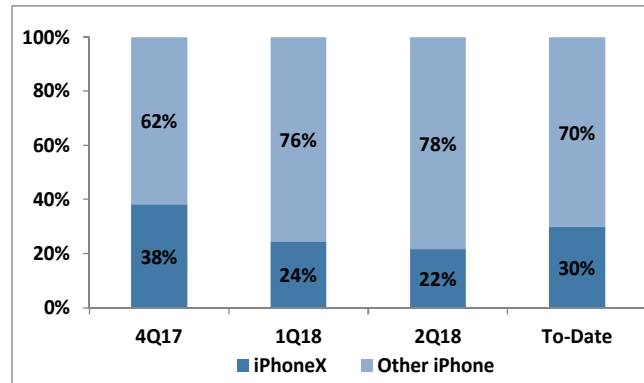
### iPhone vs. Samsung Case Study: Different Portfolio Strategies at Work

#### iPhone X: Top-end phone contributing one-third of total shipments to date

As shown in Figure 75, despite increasing the price of the top-end iPhone offered from 2016 to 2017 by around \$200 (+25% y/y), demand was much stronger than most investors would have expected. Specifically, iPhone X accounted for 30% of the mix of total iPhone shipments to date, which demonstrates that Apple's strategy of launching top-end smartphones with a competitively superior feature set has been successful.

**Figure 75: iPhone X Share of iPhone Shipments**

% of iPhone Shipments



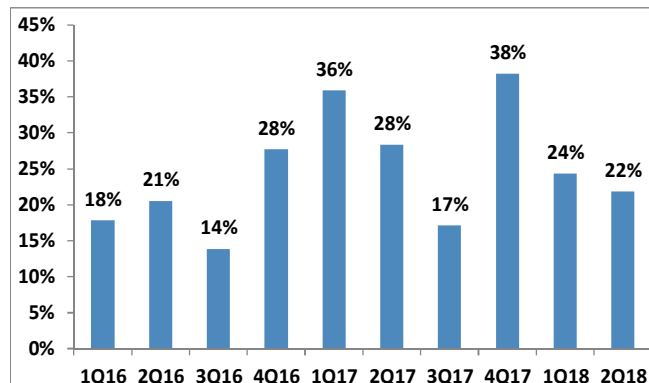
Source: IDC, IHS, J.P. Morgan estimates.

**Success of top-end strategy stands out relative to primary competitor Samsung**

Apple's strategy to focus on the top-end smartphone stands out relative to its primary competitor, Samsung. Samsung has a broader portfolio of devices with a wider range of price points, including some smartphones that are comparable in price to Apple's top-end phones in certain generations. While we acknowledge the difference in strategies between Apple and Samsung may make a comparison difficult, we think it is important to highlight that as shown in Figure 77, Samsung's top-end smartphone has only reached ~20% of total shipments.

**Figure 76: Apple – Top-End Phone as % of Apple Shipments**

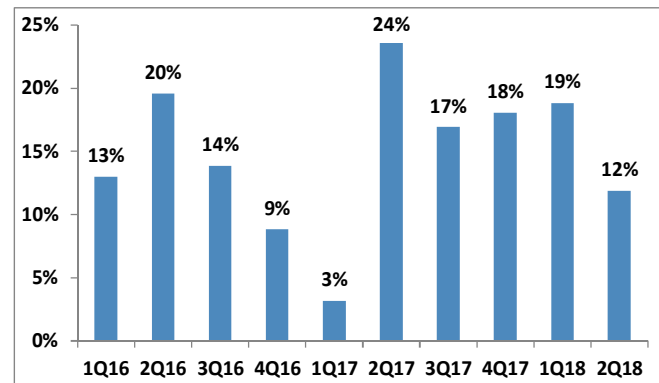
% of Total Shipments



Source: IHS.

**Figure 77: Samsung – Top-End Phone as % of Samsung Shipments**

% of Total Shipments



Note: We use the flagship phone in the Galaxy Series as the top-end phone.

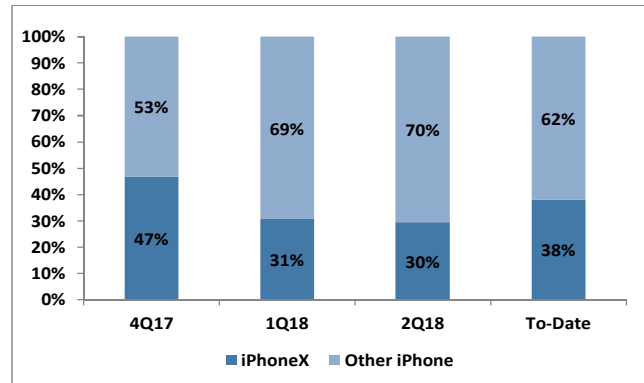
Source: IHS.

**Apple's top-end smartphone contributing an even greater percentage of revenue**

As shown in Figure 78, not only is the iPhone X already contributing one-third of Apple's unit shipments, it is also contributing an even greater percentage of the company revenues—roughly 40% to date.

**Figure 78: iPhone X Share of iPhone Revenue**

% of iPhone Revenue



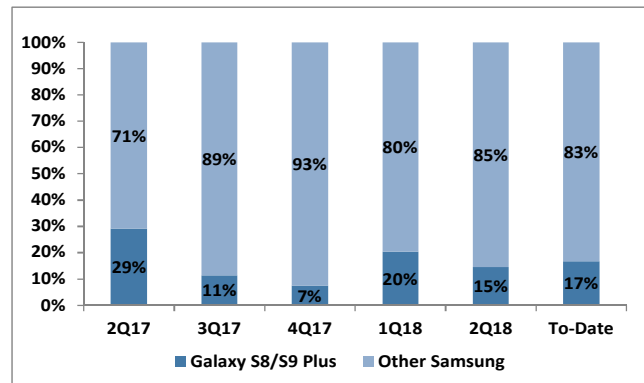
Source: IDC, IHS, J.P. Morgan estimates.

**Samsung's top-end smartphones have contributed a lower portion of revenues**

While it might not be the most appropriate to compare Samsung's Galaxy S8 Plus and Galaxy S9 Plus to Apple's iPhone X, given different portfolio strategies, we believe the comparison can provide insights into the ability to drive towards a very rich mix and maximize margins. As shown in Figure 79, Samsung's top-end smartphone has historically contributed around 17% of revenue relative to the iPhone X's ~40%.

**Figure 79: Galaxy Share of Samsung Phone Revenue**

% of Samsung Phone Revenue



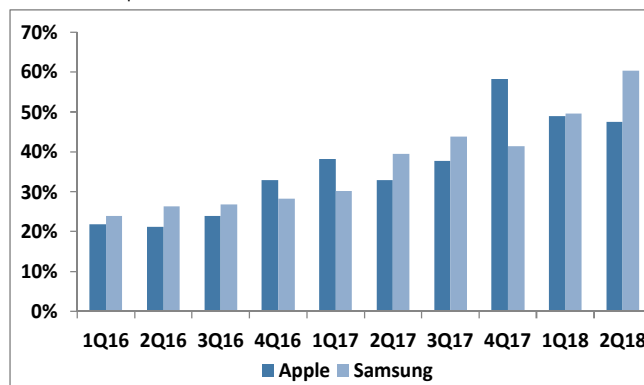
Source: IDC, IHS, J.P. Morgan estimates.

**Success for Apple and Samsung has been fairly similar with "Plus" sized models**

Larger screen sizes have been a driver of higher ASPs as well for smartphone manufacturers, with both Apple and Samsung choosing to label the larger screen size models as "Plus" and charging roughly \$0-\$100 premium relative to the base model. When we focus on shipments of smartphones with screen sizes larger than 5.5 inches for both Apple and Samsung, we find that both have had similar success in driving an increasing mix of shipments from larger screen sizes at a premium ASP. However, the roughly similar contribution of mix from Samsung is driven by a higher number of smartphone models relative to Apple.

**Figure 80: Mix of Large Screen Size Models**

% of Total Shipments



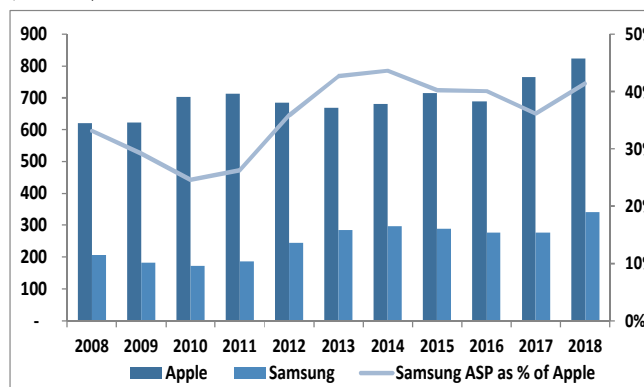
Source: IHS.

### **Samsung is slowly increasing ASPs, but remains well behind Apple**

While Samsung might have some top-end smartphones at comparable prices to Apple's, the average ASP for the Samsung portfolio remains well short of Apple's. On a year-to-date basis, the average selling price for Apple's iPhones are \$823 (per IDC), which compares to Samsung's \$340. Over the last ten years, Apple has increased average ASP by roughly \$202 per IDC relative to Samsung's \$135. While this might indicate more opportunity for Samsung with high-end smartphones, we think it also indicates that Apple has been more willing to push the pricing barrier in conjunction with delivering technology feature sets that are at least in line with, if not better than, the best phones in the market.

**Figure 81: Apple vs. Samsung ASP Comparison**

\$ for ASP, %



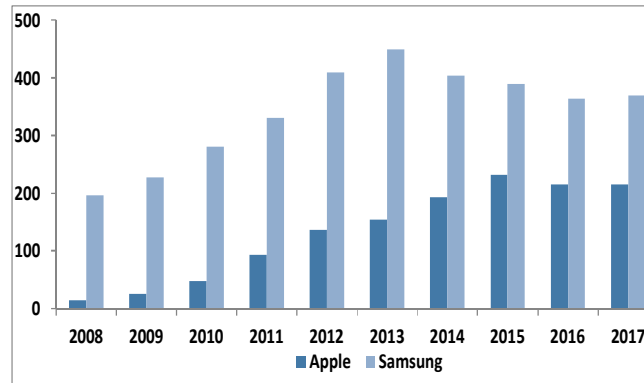
Source: IDC.

### **Volumes for both OEMs have started to plateau**

Apple and Samsung have captured most of the market share in premium smartphone market. Volumes for both OEMs have started to plateau in recent years, which is likely driven by the maturing penetration of smartphones in Developed countries.

Figure 82: Apple vs. Samsung Unit Volumes

Units in Millions



Source: IDC.

### Samsung is following Apple's premium pricing strategy

Samsung had historically preferred to price its top-end smartphone at a modest discount to Apple in a bid to cannibalize revenue from Apple. More recently, particularly with the recent launch of the Galaxy Note 9, Samsung is now looking to price smartphones in line with or at a premium to Apple. The pricing likely reflects a change in strategy and expectation around price elasticity from Samsung. As reviewed by our Asia Pacific Technology analyst, JJ Park, Samsung likely needs to increase focus on the incremental feature set delivered in the high-end smartphone to be able to successfully upsell consumers. See detailed note here: ["Samsung Electronics: Note 9 unpacked: Nothing special with higher price points"](#).

### iPhone: Is the Pricing Strategy Sustainable?

#### Smartphones substituting tablets and laptops; consumers willing to attribute higher share of wallet to smartphone purchase from savings on other devices

One of the primary reasons we believe consumers have been willing to pay an increasing amount for smartphones is the increasing convergence of capabilities of a smartphone with those of a tablet and other personal computing devices, including laptops. The increase in hardware capabilities has not been the sole driver; the increasing delivery of web-based content through applications customized for smartphones to keep up with changing consumer preference towards mobility has driven a convergence of the use cases for smartphones relative to other personal computing devices. As shown in Table 18, while the mobile handset industry is still registering modest growth, the markets for personal laptops/desktops and tablets are both declining. With smartphones substituting usage of laptops/desktops and tablets, we believe consumers are willing to attribute incremental share of wallet to the smartphone, driving limited price elasticity relative to expectations.

Table 18: Growth in Personal Computing Devices

%	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mobile Handsets	12.3%	15.1%	2.0%	18.9%	7.7%	1.5%	5.9%	6.5%	0.7%	-0.5%	0.3%
PCD	16.6%	10.8%	5.3%	13.6%	1.6%	-4.0%	-9.9%	-2.3%	-10.7%	-5.9%	-0.4%
Tablet					293.6%	89.3%	52.5%	4.6%	-9.9%	-15.6%	-6.4%

Source: IDC. PCD refers to Personal Computing Device.

### **Consumers are increasingly spending more time on a smartphone**

We believe consumers are spending an increasing amount of time on a smartphone instead of other devices, including tablets, which saw a rapid increase in usage in the early part of this decade. The willingness from consumers to pay an increasing amount for the smartphone has stemmed from their desire to have a richer experience on the device on which they are spending an increasing amount of time. For example, one of the primary drivers for large screen sizes, or “Plus” sized models, was that consumers were increasingly consuming content on their smartphones and wanted larger screen sizes to make it more convenient to read/view, which in turn increased the opportunity for OEMs to raise pricing.

### **Financing has a lot of headroom to allow pricing to increase**

Developed countries, including the US, are seeing a modest headwind on the replacement cycle for smartphones led by the discontinuation of subsidies by the carriers to facilitate consumer purchases. However, the headwind is largely being offset by the increasing penetration of financing plans to make the purchases more affordable. According to research published by Kantar, 47% of smartphones sold in the US are linked to installment plans, including 51% of iPhones and 46% of Android devices.

## **iPhone: Emerging Countries’ Product and Pricing Strategy Allows for Best Profits, not Volumes**

### **Limited product positioning for leverage to growth in Emerging countries**

Since its launch in 2007, Apple has primarily focused on the premium smartphone market. However, Apple began designing product focused on Emerging countries in 2013, including with the 5C and the SE. However, product introductions targeting the Emerging countries have been infrequent, as we believe Apple continues to prioritize Developed countries to drive growth as well as through increasing revenue over the lifetime of a smartphone rather than through volumes.

### **Apple has limited products targeting Emerging countries**

Apple has not focused on consistently launching specific products targeting Emerging countries. Apple’s product strategy has involved positioning the prior year’s smartphone models as the primary product in most of the Emerging countries, at a significantly lower price than the current generation of smartphones. The strategy of pushing the prior year’s smartphones in certain Emerging countries allows the pricing to be more affordable by the target demographic. Additionally, with a year of cost reduction opportunities explored on the prior year’s smartphones, Apple can deliver solid margins despite participating in a more price competitive market.

### **Apple’s strategy in Emerging countries offers numerous benefits to financials long-term**

We believe Apple’s strategy in Emerging countries, in contrast to competitive priority of developing specific products, has several benefits for financials, including:

- **Pricing of the primary model in Emerging countries is more affordable for consumers.** With the launch of iPhones every year, the price of the prior year’s model is trimmed and offers a better price point.



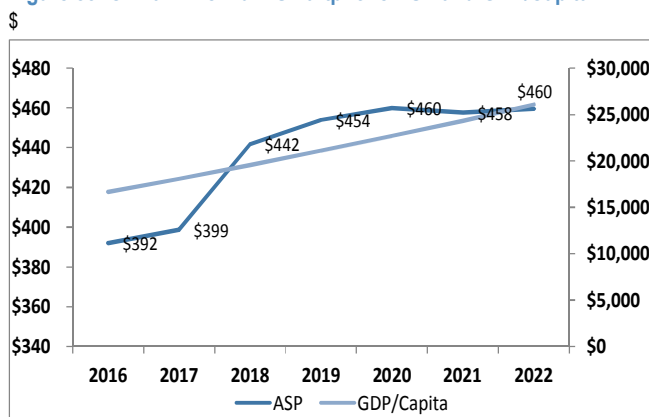
- **Less R&D in developing specific products for Emerging countries.** With leverage of existing products, Apple avoids new R&D investments to develop specific products for Emerging countries.
- **Better margins through leverage of costs savings on older generation product.** The firm has a year of learnings from product manufacturing to drive savings, leading to better gross margins on the smartphone model.
- **Ability to leverage the investment on one smartphone model for longer period than the life cycle of the product in Developed countries.** With average life cycle of a smartphone in North America close to 2.3 years, the positioning of an older smartphone product in Emerging markets allows the company to fully leverage the R&D in developing a product for a longer duration, allowing for better operating margins than competition.
- **Lower incremental marketing spend on new products.** Positioning products in Emerging countries, which already have been launched in Developed countries the prior year, creates an aspirational value attached to the product by the consumer requiring, in our view, limited incremental marketing spend relative to stand-alone products positioned for the Emerging countries.

While the combination of the above does not allow for strong volume opportunity, as Apple's smartphone usually remains at the high-end compared to competitive offerings, it does optimize the profitability, in our view.

#### Increasing "wealth" in Emerging countries to drive iPhone adoption

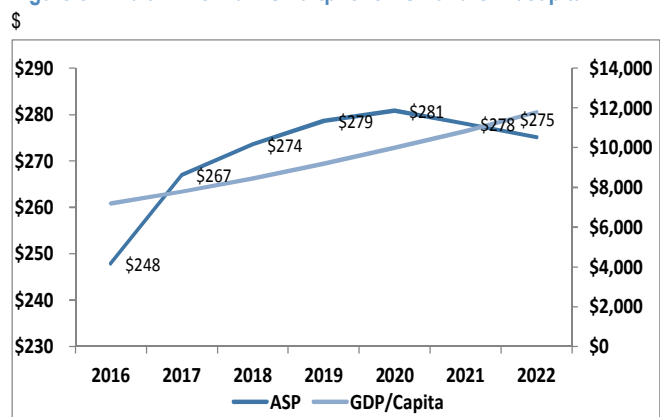
Apple's pricing strategy allows for the price of the primary iPhone positioned in an Emerging market to remain more stable than in the Developed markets. While the price of the prior year's model is still at the high-end of consumer spending on smartphones in Emerging markets, we expect more and more consumers to enter the target demographic for Apple with increasing wealth of consumer in Emerging countries. As shown in Figure 83 and Figure 84, the average selling prices of a "premium" smartphone in China and India are expected to increase at a robust pace, but lower than the rise in GDP per capita (which we treat as a proxy for changes in disposable income in the region).

Figure 83: China – Premium Smartphone ASP and GDP/Capita



Source: Gartner and IMF.

Figure 84: India – Premium Smartphone ASP and GDP/Capita

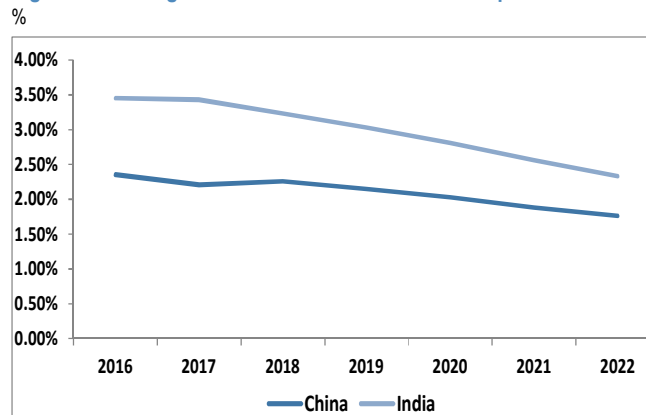


Source: Gartner and IMF.

**Ratio of Smartphone ASP to GDP/Capita to decline, leading to an increase in target demographic over time**

As shown in Figure 85, average premium smartphone ASP as % of GDP per capita in 2016 was 2.35% and 3.45% in China and India, respectively, and is expected to decline through 2022 to 1.76% and 2.33%, respectively. The decline expected over the next few years demonstrates that the increasing wealth in Emerging countries will likely push incremental consumers into Apple's target demographic.

**Figure 85: Average "Premium" ASP as % of GDP/Capita**



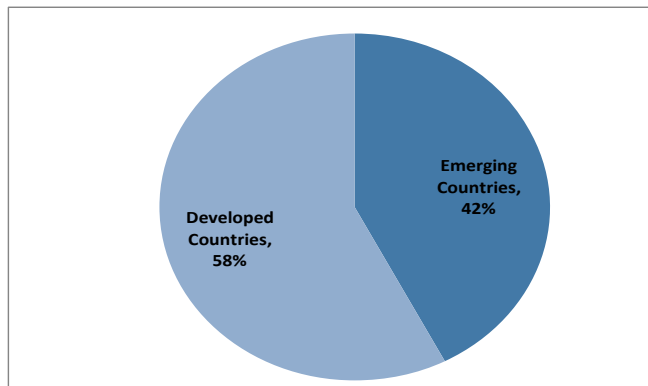
Source: Gartner and IMF.

## iPhone: Growth Opportunities in China and India

### Apple is more levered to growth in Developed countries

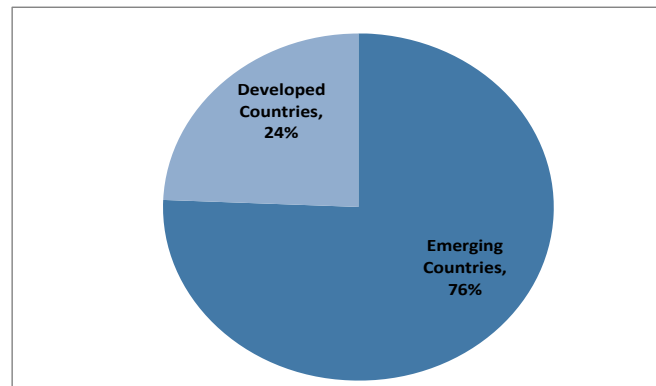
As shown in Figure 86 and Figure 87 below, iPhone shipments to Developed countries account for roughly 48% of total iPhone shipments relative to 24% for the industry.

**Figure 86: iPhone Shipments by Type of Country, 2017**  
% of Total Shipments



Source: IDC.

**Figure 87: Industry Shipments by Type of Country, 2017**  
% of Total Shipments

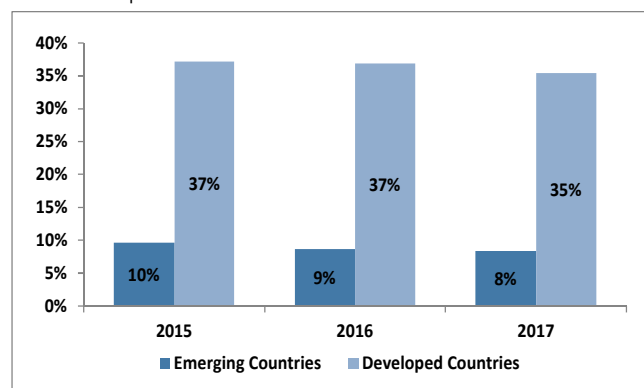


Source: IDC.

### Emerging countries a key opportunity for Apple, but we don't see realization of this opportunity in the near-term

Relative to Apple's position globally with iPhones and the 15% market share it has, the opportunity is greater in Emerging countries where Apple only has a modest 8% share relative to the 30% market share it has in Developed countries.

**Figure 88: Apple's Market Share by Type of Country**  
% of Total Shipments

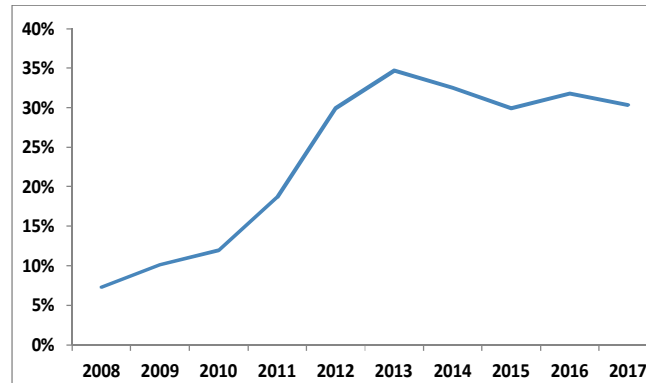


Source: IDC.

### China is the single largest country in terms of smartphone shipments

Accounting for roughly 30% of total smartphone shipments globally, China is currently the single largest country in terms of smartphones sold and installed base. As shown in Figure 89, China accounted for roughly 7% of global shipments back in 2008 before a period of exceptional growth between 2010 and 2012 driving China's leadership position in the global smartphone market by units.

**Figure 89: China Smartphone Shipments as % of Global**  
% of Total Shipments

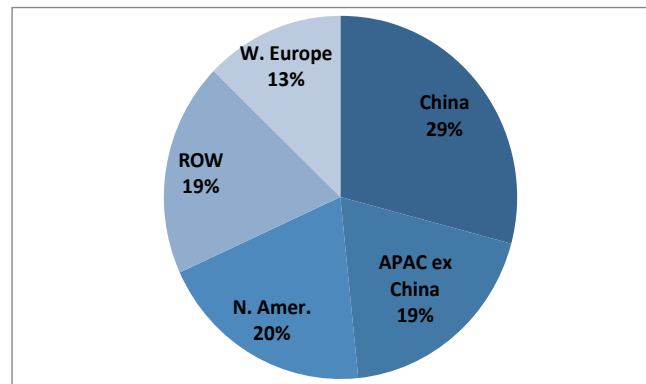


Source: IDC.

**China also leads relative to smartphone revenue, despite a lower ASP**

As shown in Figure 90, despite an ASP in China lower than in Developed countries, including North America and Western Europe, the total revenue opportunity is greater in China.

**Figure 90: Smartphone Industry Revenues as % of Global, 2017**  
% of Total Revenue



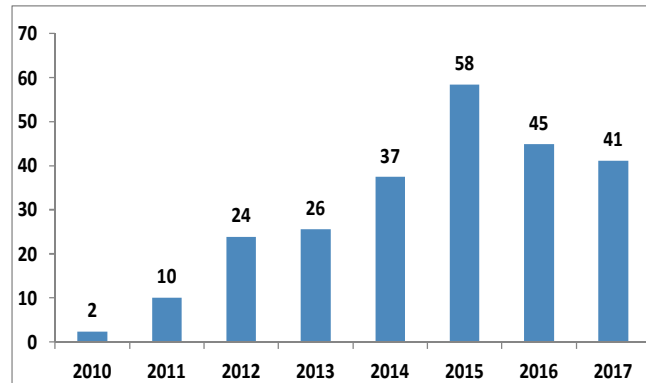
Source: IDC.

**Apple's iPhone sales in China appear to have peaked**

As shown in Figure 91, iPhone shipments to the Greater China region peaked in 2015 with the delivery of 58mn devices. Since 2015, Apple's shipments to the region have declined y/y.

**Figure 91: iPhone Shipments in China**

Units in Millions



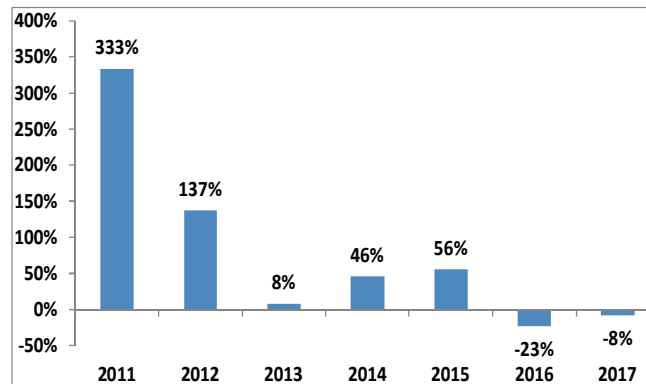
Source: IDC.

**iPhone sales to China have been declining in recent years**

As shown in Figure 92, iPhone sales in China increased at a phenomenal rate in 2011 and 2012 as well as 2014 and 2015. However, more recently in 2016 and 2017, iPhone sales in China have declined significantly.

**Figure 92: Growth in iPhone Shipments in China**

Y/Y % Change



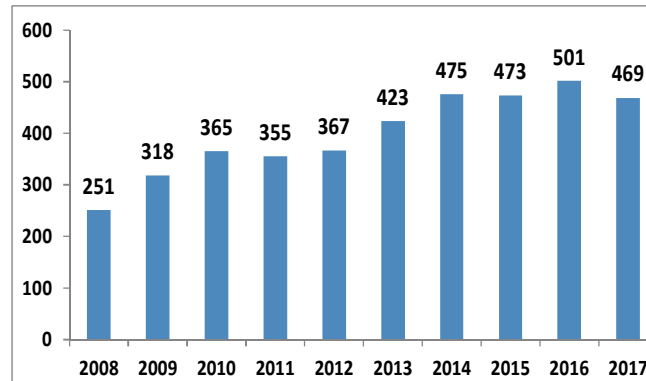
Source: IDC.

**Mobile handset sales in China have also been declining in recent years**

The decline in iPhone sales in China, although much greater in magnitude, is not entirely inconsistent with industry trends. Mobile handset shipments in China have increased strongly over the last decade. As shown in Figure 93, mobile handset shipments doubled from 251mn units in 2008 to 501mn units in 2016, growing at a +9% CAGR. However, the industry has shown signs of weakness intermittently, including y/y declines in the latest full year.

**Figure 93: China Mobile Handset Shipments**

Units in Millions



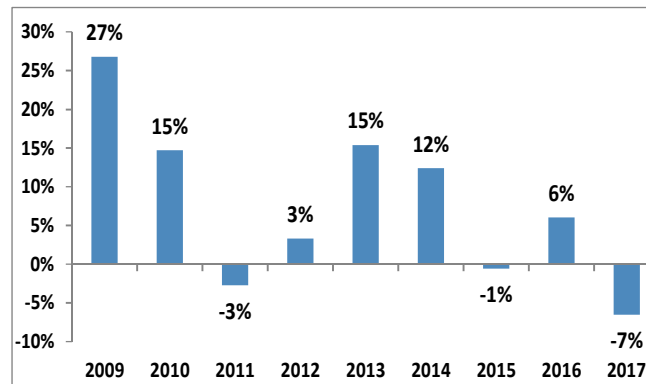
Source: IDC.

**Strong growth years in China have also been accompanied by years of declines**

As shown in Figure 94, the Chinese market has seen strong growth in mobile handset shipments, although years of strong growth like in 2009, 2010, 2013, and 2014, have also been accompanied by years of declines in 2011, 2015, and 2017.

**Figure 94: China Mobile Handset Shipment Growth**

Y/Y % Change



Source: IDC.

**iPhone revenue trends in China have improved despite unit trends**

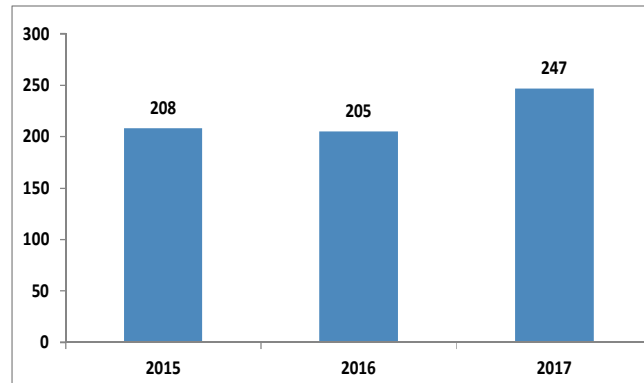
Despite the y/y declines in iPhone shipments in 2017, iPhone shipments returned to growth in calendar 3Q17 (F4Q17) and were up double digits in mainland China. While iPhone unit sales in 1H2018 are estimated to be still down -4% y/y in China, the launch of the iPhone X has improved momentum relative to revenue growth with four consecutive quarters of double-digit growth in revenue leading up to 3Q18. Despite being a premium smartphone, the iPhone X has been successful in featuring in the top few mobile handsets sold in the country on a consistent basis since its launch.

### India represents another underserved market with solid growth potential

Despite accounting for around one-fifth of the global population, India only accounts for 12% of the global mobile handset shipments and only about 8% of global smartphone shipments, led by lower than average penetration.

Figure 95: India Mobile Handset Shipments

Units in Millions



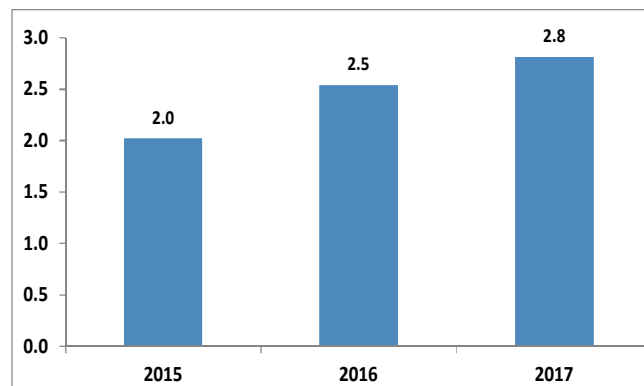
Source: IHS.

### iPhone shipments have increased steadily, although remain small in India

As shown in Figure 96, iPhone shipments in India have increased steadily over the last few years. However, despite the increase, Apple has only a 2% market share of the roughly 122mn smartphones shipped into the market.

Figure 96: iPhone Shipments in India

Units in Millions



Source: IHS.

### Apple is expanding its presence in India to build momentum in the country

Apple believes it is still in the early stages of building its presence in India, including setting up a channel and working on plans relative to owning retail stores in the country. Additionally, the company has invested in building a local supply chain for its smartphones, which is important to meet local regulations and reduce the average selling price to consumers by avoiding tariffs. Further, with the mobile infrastructure in the country improving, led by recent investments from Reliance Jio and Bharti Airtel, Apple feels more confident relative to the replacement cycle driving towards higher-capability smartphones.

## iPhone: Installed Base Analysis

### Estimate installed base of roughly 1bn iPhones globally in 2018

As shown in Table 19, we estimate that the installed base of iPhones globally with their first owners is roughly 915mn units in 2018. However, a portion of the iPhones sold annually to existing iPhone owners adds to the installed base with secondary owners, which also contributes to the installed base. Including devices sold to secondary owners, we estimate the total installed base is close to 1.1bn devices. We estimate the growth in the installed base has been in the double-digit percentages over the last few years. While we estimate the growth in the installed base will moderate to high-single-digit percentages in the coming years, the growth in the absolute number of devices should remain close to 0.1bn annually.

Table 19: iPhone Installed Base Analysis

Units in Millions

iPhone Installed Base	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018E	2019E	2020E	2021E
iPhone Units Shipped (mns)	4	14	25	47	93	136	153	193	232	215	216	216	219	222	225
New Subscriber Handsets									122	158	132	113	99	79	75
Apple's Market Share of New Subscribers									18	24	20	17	15	12	11
Industry Installed Base								6,907	7,127	7,276	7,388	7,502	7,617	7,734	7,853
Switchers to iOS @1%								69	71	73	74	75	76	77	79
Replacement Driven Demand as % of Last Two Years Sales									142	119	122	124	128	133	135
									41%	28%	27%	29%	30%	31%	31%
New iPhone Installed Base		17	42	89	175	293	413	543	633	729	823	915	1,006	1,095	1,185
New Phones Going into Secondary Market									71	59	61	62	64	67	68
Secondary Installed Base								136	165	194	224	253	246	253	260
iPhone Installed Base								679	798	923	1,047	1,168	1,252	1,348	1,445
Growth in Installed Base									18%	16%	13%	12%	7%	8%	7%

Source: Company reports and J.P. Morgan estimates.



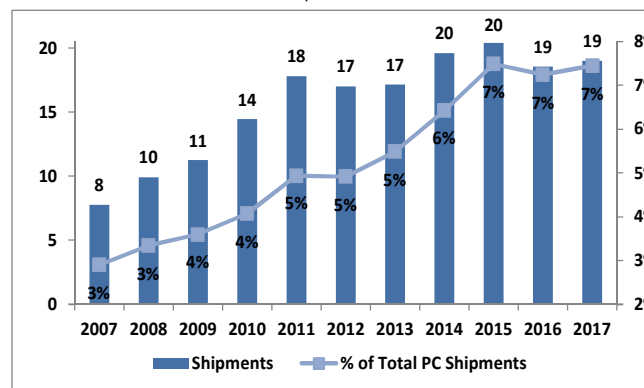
## Mac: Plateau in Market Volumes and Apple's Market Share

### Mac shipments have plateaued and volumes are likely to remain range bound

As shown in Figure 97, Mac shipments rose strongly in the last decade to reach 18mn units globally in 2011. However, since then we believe a variety of headwinds have limited growth for Mac shipments including: 1) limited growth in laptop shipments in Developed countries; 2) premium pricing for Mac limiting addressable markets; 3) shift of content consumption from traditional devices like laptops to smartphones, which has elongated the replacement cycle for laptops.

Figure 97: Apple Mac Shipments

Units in Millions, % of Total PC Shipments

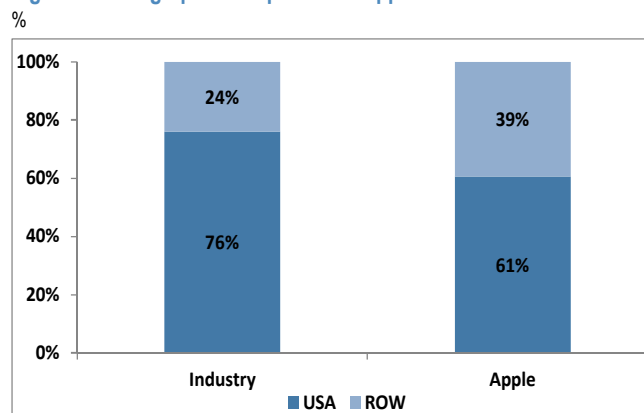


Source: IDC.

### Apple's shipments are more aligned to international markets

As shown in Figure 98, Apple's Mac devices, which have less than 10% share of the laptop market, have a greater exposure to international markets when compared to industry levels. The US accounts for ~60% of global volumes for Apple, while for the industry the US accounts for ~80% of global volumes.

Figure 98: Geographical Exposure of Apple's Mac vs. Overall Industry



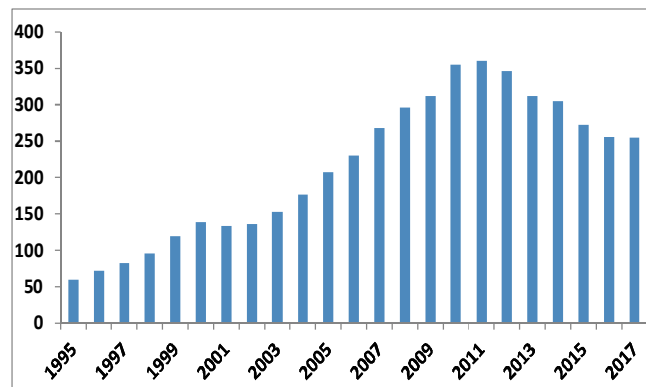
Source: IDC.

### Laptop industry volumes peaked in 2011

Despite the different geographical exposure relative to the industry, the peak in Mac shipments was relatively similar to that for the industry. As shown in Figure 99, laptop industry volumes rose from 59mn in 1995 to 360mn in 2011. However, since then industry volumes have been on a consistent decline and reached 255mn units in the latest full year.

Figure 99: Laptop Shipments Globally

Units in Millions



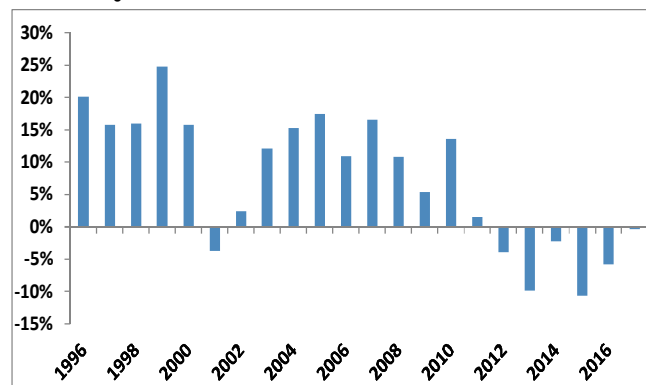
Source: IDC.

### Laptop industry volumes have declined at a single- to double-digit pace

As shown in Figure 100, the industry demonstrated strong growth for most of the late 90s and 2000s, except for a couple of years during the dotcom bust.

Figure 100: Industry Volume Growth for Laptops

Y/Y % Change



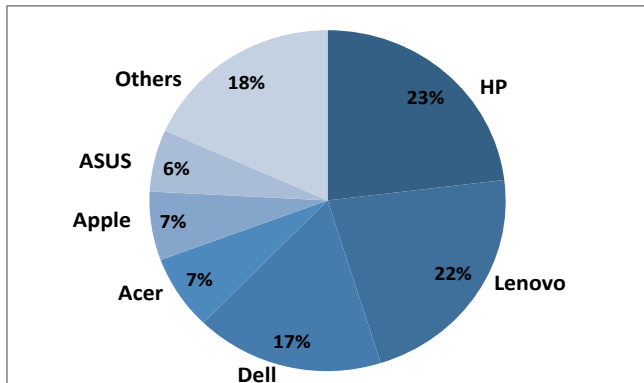
Source: IDC.

### Apple has gained modest share, although market leaders have not changed

As shown in Figure 101 and Figure 102, Apple's laptop market share has increased from 3% in 2000 to 7% in 2017. While market share for the competitive set of companies has changed a bit over the last 17 years, the leaders in the laptop market are unchanged (HP, Lenovo, and Dell).

**Figure 101: Laptop Market Share in 2017**

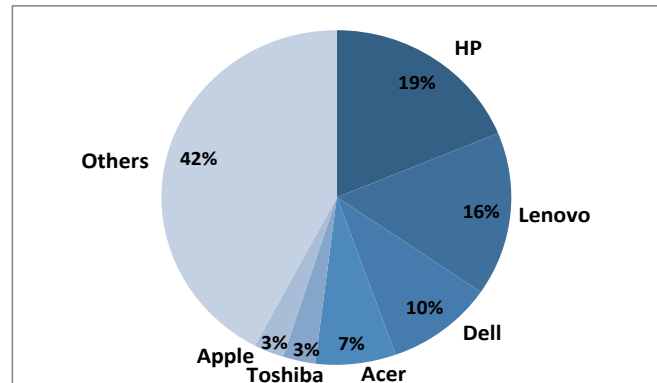
% of Total Shipments



Source: IDC.

**Figure 102: Laptop Market Share in 2000**

% of Total Shipments



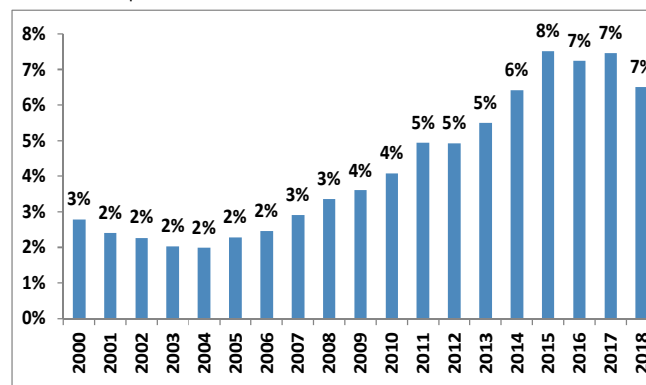
Source: IDC.

### Apple market share gains have stalled over the last few years

Apple gained a modest amount of market share in the industry since the early 2000s. However, Apple's market share peaked at 8% in 2015 and has since moderated to 7%.

**Figure 103: Apple's Market Share in Laptops**

% of Total Shipments



Source: IDC.

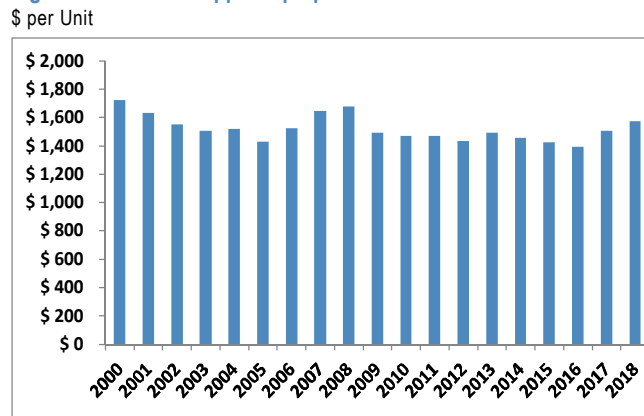
### Apple's recent product launches have reinvigorated revenue growth

While unit growth for Apple's laptops has plateaued over the last few years, Apple continues to report record revenue quarters for Mac laptops, including in FY17 with \$25.9bn of revenue in the September quarter (F4Q17) when revenues increased +25% y/y. Apple has looked to differentiate its product offering on the basis of capabilities, driving an increasing number of consumers to switch. Apple estimates that in the most recent quarters, 60% of Mac purchases were driven by new buyers as well as switching customers, including 90% of Mac purchases in China. Most importantly, the growth in Mac purchases has contributed to double-digit growth in the installed base of Mac laptops.

### Product launches have provided a boost to ASPs

As shown in Figure 104, the recent product refresh, which included increased capabilities with the MacBook Pro and the iMac, has led to an increase in ASPs for Apple's Mac laptops in 2017 and 2018 on a year-to-date basis. As a point of reference, the year-to-date ASP of \$1,572 for Apple's Mac laptops is almost 2x the industry's ASP of \$713.

Figure 104: ASP for Apple Laptops



Source: IDC.

### Expect PC shipments to stabilize in coming years

We believe volumes of personal computing devices will stabilize in coming years. *J.P. Morgan Technology analyst Gokul Hariharan* forecasts volume decline of -0.2% y/y in both 2019E, and 2020E, following greater magnitude of declines in the last few years ([“Global PC and Server Forecasts PCs staying flattish in 2018, Servers growing at 9% led by hyperscale”](#)). See Table 20 and Table 21 for details.

### Forecast Mac shipments to decline modestly, implying market share losses

We expect Apple to launch more entry-level Macs in the coming years to broaden the portfolio and target a large demographic. At the same time, we expect Apple to expand capabilities at the high-end of the portfolio to target gaming demand where price elasticity is limited. However, despite these changes in the portfolio, we expect Apple to give up modest amount of market share, which in turn should drive unit decline on a y/y basis in the backdrop of a largely flat market. Led by the rebound in revenue growth in 2017, following MacBook Pro refreshes, we expect Apple's focus to remain largely on high-end devices to drive revenue growth even in the absence of unit growth.

Table 20: J.P. Morgan Desktop and Laptop Forecast

Units in Millions

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018E	2019E	2020E
<b>PCs by Regions</b>																				
<b>APAC</b>	<b>30,212</b>	<b>32,716</b>	<b>35,682</b>	<b>40,417</b>	<b>49,712</b>	<b>58,377</b>	<b>69,973</b>	<b>79,397</b>	<b>95,843</b>	<b>113,664</b>	<b>124,505</b>	<b>124,165</b>	<b>108,937</b>	<b>102,653</b>	<b>101,230</b>	<b>95,042</b>	<b>93,689</b>	<b>92,182</b>	<b>91,838</b>	<b>91,838</b>
Desktop	26,918	28,645	31,024	34,300	40,724	45,531	50,177	51,634	56,516	61,715	65,056	63,650	59,361	57,393	55,105	50,818	48,250	47,106	46,871	46,871
Notebook	2,798	3,507	4,658	6,117	8,987	12,847	19,795	27,763	39,327	51,949	59,448	60,515	49,575	45,260	46,125	44,224	45,440	45,075	44,967	44,967
<b>Japan</b>	<b>14,391</b>	<b>12,729</b>	<b>12,698</b>	<b>13,176</b>	<b>14,147</b>	<b>13,628</b>	<b>13,472</b>	<b>14,471</b>	<b>13,863</b>	<b>16,100</b>	<b>15,653</b>	<b>15,928</b>	<b>15,930</b>	<b>15,974</b>	<b>11,189</b>	<b>11,430</b>	<b>11,864</b>	<b>11,977</b>	<b>12,074</b>	<b>12,090</b>
Desktop	7,471	6,333	6,392	6,564	6,928	6,367	6,108	5,775	5,104	6,091	5,631	5,489	6,029	5,875	3,609	3,546	3,611	3,563	3,492	3,422
Notebook	6,546	6,043	6,306	6,612	7,219	7,261	7,364	8,696	8,759	10,009	10,022	10,439	9,901	10,099	7,580	7,883	8,253	8,414	8,582	8,668
<b>W Europe</b>	<b>33,678</b>	<b>33,780</b>	<b>36,749</b>	<b>41,635</b>	<b>47,356</b>	<b>50,321</b>	<b>56,256</b>	<b>64,788</b>	<b>68,929</b>	<b>73,828</b>	<b>63,410</b>	<b>58,808</b>	<b>49,789</b>	<b>57,466</b>	<b>52,126</b>	<b>50,626</b>	<b>49,098</b>	<b>47,969</b>	<b>47,563</b>	<b>47,011</b>
Desktop	25,854	24,539	25,125	26,606	27,819	26,509	25,639	23,412	23,929	24,586	22,898	20,764	18,884	20,321	17,217	15,722	14,753	14,362	13,788	13,236
Notebook	6,897	8,285	11,623	15,029	19,537	23,812	30,617	41,376	45,000	49,241	40,512	38,044	30,905	37,146	34,909	34,905	34,345	33,607	33,775	33,775
<b>EEMEA</b>	<b>13,063</b>	<b>14,098</b>	<b>15,934</b>	<b>18,526</b>	<b>22,953</b>	<b>27,639</b>	<b>33,394</b>	<b>38,150</b>	<b>33,465</b>	<b>42,694</b>	<b>46,958</b>	<b>49,432</b>	<b>41,544</b>	<b>38,335</b>	<b>30,736</b>	<b>27,514</b>	<b>26,883</b>	<b>27,524</b>	<b>27,763</b>	<b>27,928</b>
Desktop	11,936	12,612	14,231	15,905	18,104	19,969	21,617	20,892	16,062	17,090	18,237	17,223	15,786	14,670	12,170	10,833	10,257	10,196	10,042	9,893
Notebook	923	1,240	1,703	2,621	4,849	7,670	11,777	17,258	17,403	25,604	28,720	32,209	25,758	23,665	18,566	16,681	16,625	17,328	17,721	18,036
<b>N. America</b>	<b>49,755</b>	<b>50,432</b>	<b>53,919</b>	<b>58,137</b>	<b>62,735</b>	<b>63,344</b>	<b>67,304</b>	<b>68,549</b>	<b>74,406</b>	<b>79,032</b>	<b>75,731</b>	<b>71,108</b>	<b>66,197</b>	<b>69,968</b>	<b>67,067</b>	<b>65,765</b>	<b>61,428</b>	<b>61,067</b>	<b>60,904</b>	<b>60,743</b>
Desktop	38,808	37,980	40,472	42,215	41,298	36,544	34,224	30,705	27,113	28,896	26,622	25,323	24,512	25,189	21,722	20,140	18,457	18,351	18,267	18,184
Notebook	9,393	10,567	13,447	15,922	21,437	26,801	33,081	37,844	47,294	50,137	49,110	45,784	41,686	44,779	45,344	45,625	42,971	42,716	42,637	42,559
<b>Latin America</b>	<b>9,002</b>	<b>8,545</b>	<b>9,054</b>	<b>11,486</b>	<b>14,682</b>	<b>18,204</b>	<b>23,664</b>	<b>25,442</b>	<b>27,331</b>	<b>32,790</b>	<b>39,090</b>	<b>36,425</b>	<b>33,889</b>	<b>29,285</b>	<b>25,327</b>	<b>19,730</b>	<b>19,778</b>	<b>19,990</b>	<b>19,916</b>	<b>19,849</b>
Desktop	8,339	7,883	8,418	10,608	13,241	15,421	18,827	17,959	15,202	15,350	17,218	14,055	11,282	10,127	8,391	6,900	6,965	6,854	6,649	6,449
Notebook	509	523	636	879	1,441	2,783	4,837	7,484	12,129	17,441	21,872	22,370	22,607	19,158	16,936	12,831	12,813	13,135	13,267	13,399
<b>Worldwide PCs</b>	<b>150,100</b>	<b>152,300</b>	<b>164,035</b>	<b>183,377</b>	<b>211,586</b>	<b>231,514</b>	<b>264,063</b>	<b>290,798</b>	<b>313,838</b>	<b>358,109</b>	<b>365,346</b>	<b>355,866</b>	<b>316,285</b>	<b>313,681</b>	<b>287,675</b>	<b>270,106</b>	<b>262,740</b>	<b>260,709</b>	<b>260,058</b>	<b>259,459</b>
Desktop	119,326	117,991	125,663	136,198	148,116	150,340	156,592	150,377	143,927	153,728	155,663	146,505	135,854	133,575	118,214	107,958	102,294	100,434	99,109	98,056
Notebook	27,065	30,165	38,372	47,180	63,470	81,174	107,471	140,421	169,911	204,380	209,683	209,360	180,431	180,106	169,461	162,148	160,446	160,275	160,949	161,404

Source: IDC, J.P. Morgan estimates.

Table 21: J.P. Morgan Desktop and Laptop Forecast

Y/Y Change (%)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018E	2019E	2020E
<b>PCs by Regions</b>																				
<b>APAC</b>	14.3%	8.3%	9.1%	13.3%	23.0%	17.4%	19.9%	13.5%	20.7%	18.6%	9.5%	-0.3%	-12.3%	-5.8%	-1.4%	-6.1%	-1.4%	-1.6%	-0.4%	0.0%
Desktop	13.8%	6.4%	8.3%	10.6%	18.7%	11.8%	10.2%	2.9%	9.5%	9.2%	5.4%	-2.2%	-6.7%	-3.3%	-4.0%	-7.8%	-5.1%	-2.4%	-0.5%	0.0%
Notebook	22.6%	25.3%	32.8%	31.3%	46.9%	42.9%	54.1%	40.2%	41.7%	32.1%	14.4%	1.8%	-18.1%	-8.7%	1.9%	-4.1%	2.7%	-0.8%	-0.2%	0.0%
<b>Japan</b>	-6.6%	-11.5%	-0.2%	3.8%	7.4%	-3.7%	-1.1%	7.4%	-4.2%	16.1%	-2.8%	1.8%	0.0%	0.3%	-30.0%	2.1%	3.8%	1.0%	0.8%	0.1%
Desktop	-15.0%	-15.2%	0.9%	2.7%	5.5%	-8.1%	-4.1%	-5.4%	-11.6%	19.3%	-7.5%	-2.5%	9.8%	-2.5%	-38.6%	-1.7%	1.8%	-1.3%	-2.0%	-2.0%
Notebook	3.9%	-7.7%	4.4%	4.8%	9.2%	0.6%	1.4%	18.1%	0.7%	14.3%	0.1%	4.2%	-5.2%	2.0%	-24.9%	4.0%	4.7%	2.0%	2.0%	1.0%
<b>W Europe</b>	-3.2%	0.3%	8.8%	13.3%	13.7%	6.3%	11.8%	15.2%	6.4%	7.1%	-14.1%	-7.3%	-15.3%	15.4%	-9.3%	-2.9%	-3.0%	-2.3%	-0.8%	-1.2%
Desktop	-7.2%	-5.1%	2.4%	5.9%	4.6%	-4.7%	-3.3%	-8.7%	2.2%	2.7%	-6.9%	-9.3%	-9.1%	7.6%	-15.3%	-8.7%	-6.2%	-2.6%	-4.0%	-4.0%
Notebook	14.0%	20.1%	40.3%	29.3%	30.0%	21.9%	28.6%	35.1%	8.8%	9.4%	-17.7%	-6.1%	-18.8%	20.2%	-6.0%	0.0%	-1.6%	-2.1%	0.5%	0.0%
<b>EEMEA</b>	14.2%	7.9%	13.0%	16.3%	23.9%	20.4%	20.8%	14.2%	-12.3%	27.6%	10.0%	5.3%	-16.0%	-7.7%	-19.8%	-10.5%	-2.3%	2.4%	0.9%	0.6%
Desktop	11.4%	5.7%	12.8%	11.8%	13.8%	10.3%	8.3%	-3.4%	-23.1%	6.4%	6.7%	-5.6%	-8.3%	-7.1%	-17.0%	-11.0%	-5.3%	-0.6%	-1.5%	-1.5%
Notebook	28.3%	34.3%	37.4%	53.9%	85.0%	58.2%	53.5%	46.5%	0.8%	47.1%	12.2%	12.1%	-20.0%	-8.1%	-21.5%	-10.2%	-0.3%	4.2%	2.3%	1.8%
<b>N. America</b>	-12.0%	1.4%	6.9%	7.8%	7.9%	1.0%	6.3%	1.8%	8.5%	6.2%	-4.2%	-6.1%	-6.9%	5.7%	-4.1%	-1.9%	-6.6%	-0.6%	-0.3%	-0.3%
Desktop	-14.5%	-2.1%	6.6%	4.3%	-2.2%	-11.5%	-6.3%	-10.3%	-11.7%	6.6%	-7.9%	-4.9%	-3.2%	2.8%	-13.8%	-7.3%	-8.4%	-0.6%	-0.5%	-0.5%
Notebook	-0.5%	12.5%	27.3%	18.4%	34.6%	25.0%	23.4%	14.4%	25.0%	6.0%	-2.0%	-6.8%	-9.0%	7.4%	1.3%	0.6%	-5.8%	-0.6%	-0.2%	-0.2%
<b>Latin America</b>	7.8%	-5.1%	6.0%	26.9%	27.8%	24.0%	30.0%	7.5%	7.4%	20.0%	19.2%	-6.8%	-7.0%	-13.6%	-13.5%	-22.1%	0.2%	1.1%	-0.4%	-0.3%
Desktop	8.7%	-5.5%	6.8%	26.0%	24.8%	16.5%	22.1%	-4.6%	-15.4%	1.0%	12.2%	-18.4%	-19.7%	-10.2%	-17.1%	-17.8%	0.9%	-1.6%	-3.0%	-3.0%
Notebook	-0.6%	2.9%	21.4%	38.2%	64.1%	93.1%	73.8%	54.7%	62.1%	43.8%	25.4%	2.3%	1.1%	-15.3%	-11.6%	-24.2%	-0.1%	2.5%	1.0%	1.0%
<b>Worldwide PCs</b>	-1.8%	1.5%	7.7%	11.8%	15.4%	9.4%	14.1%	10.1%	7.9%	14.1%	2.0%	-2.6%	-11.1%	-0.8%	-8.3%	-6.1%	-2.7%	-0.8%	-0.2%	-0.2%
Desktop	-5.5%	-1.1%	6.5%	8.4%	8.8%	1.5%	4.2%	-4.0%	-4.3%	6.8%	1.3%	-5.9%	-7.3%	-1.7%	-11.5%	-8.7%	-5.2%	-1.8%	-1.3%	-1.1%
Notebook	6.1%	11.5%	27.2%	23.0%	34.5%	27.9%	32.4%	30.7%	21.0%	20.3%	2.6%	-0.2%	-13.8%	-0.2%	-5.9%	-4.3%	-1.0%	-0.1%	0.4%	0.3%

Source: IDC, J.P. Morgan estimates.

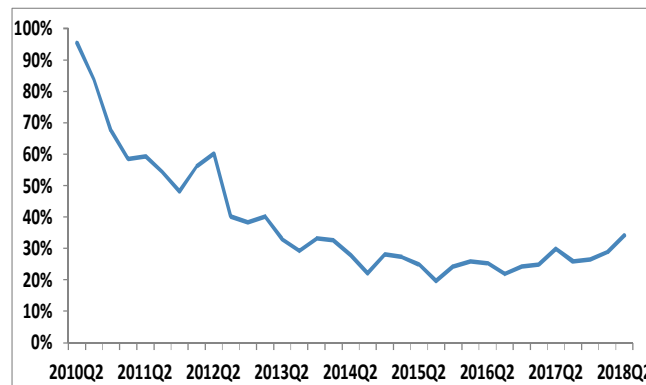
## iPad: Product Growth Despite a Challenging Market

### iPad successfully created the tablet market

Apple launched the first iPad in April 2010, creating the tablet market, which immediately gained significant popularity with consumers. The popularity of the iPad led competitors to quickly follow Apple into the tablet market, which resulted in moderation of Apple's market share; however, Apple still remains the largest player in the category it created. As shown in Figure 105, Apple started with almost 100% share of the tablet market with the launch of the iPad in 2Q 2010. Apple's market share moderated over time to as low as 20% by 3Q 2015, prior to the launch of the iPad Pro, which has driven a recovery in market share.

**Figure 105: Apple Market Share in Tablets**

% of Total Shipments



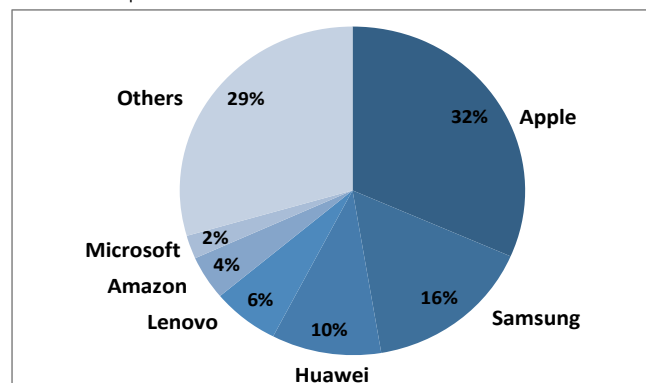
Source: IDC.

### Despite the moderation in share, Apple is still the leader in the tablet market

As shown in Figure 106, despite the moderation of Apple's share in the tablet market, as a result of a fast-follower strategy by competition, the firm still has the leading share in the tablet market and almost 2x the share of its nearest competitor, Samsung.

**Figure 106: Tablet Global Market Share, 2017**

% of Total Shipments



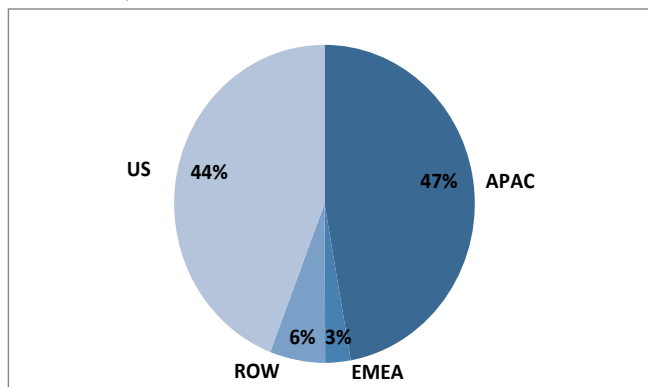
Source: IDC.

### iPad geographic sales largely in line with the industry

As shown in Figure 107 and Figure 108, iPad sales by geography are weighted towards the US and APAC region, largely in line with the industry.

**Figure 107: iPad Sales by Region, 2017**

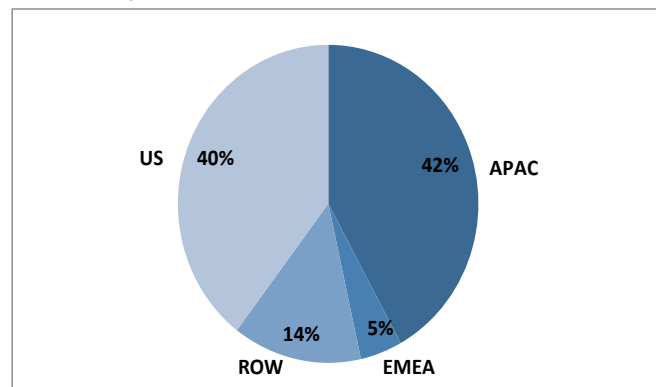
% of Total Shipments



Source: IDC.

**Figure 108: Tablet Industry Sales by Region, 2017**

% of Total Shipments



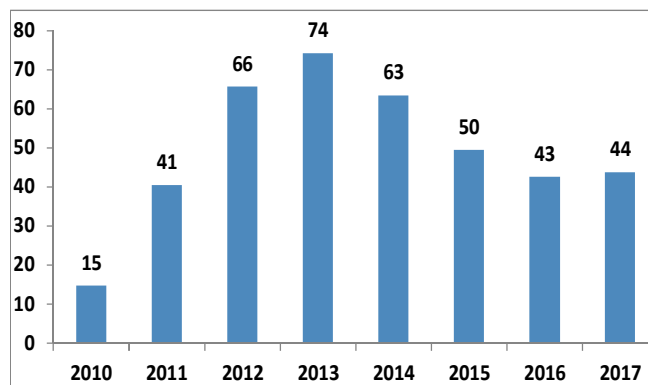
Source: IDC.

### iPad as well as tablet industry volumes have slowed down

As shown in Figure 109 and Figure 110, iPad volumes peaked in 2013 and have declined since, before finally stabilizing in 2017. The trend in iPad volumes is similar to that for the industry, despite the industry decline starting in 2014.

**Figure 109: iPad Volumes**

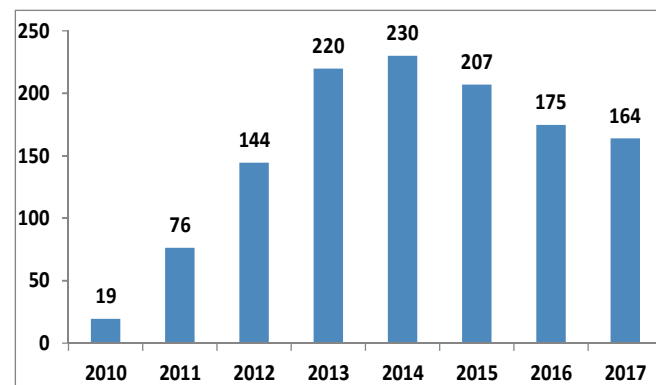
Units in Millions



Source: IDC.

**Figure 110: Industry Tablet Volumes**

Units in Millions



Source: IDC.

### Starting in late 2017, iPad units and revenues have rebounded

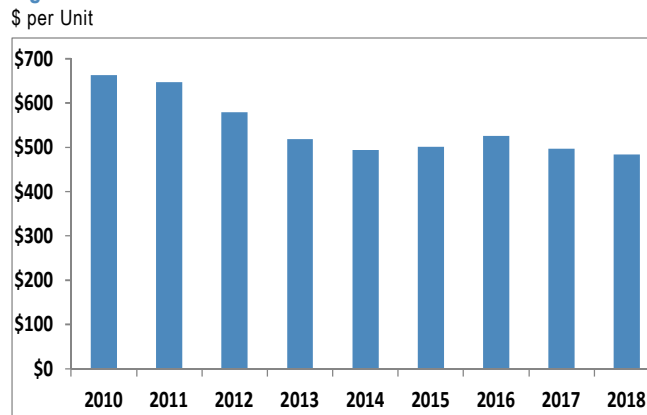
We believe Apple's latest refresh of the iPad line-up in 2017, including positioning the iPad for the education sector as well as pushing for greater enterprise adoption, has helped drive a recovery in both units and revenue. In calendar 2Q18, Apple reported the fifth consecutive quarter of iPad revenue growth, including share gains in China, rest of APAC, and the US, where it has roughly 60% share of the tablet market. Additionally, Apple believes half of the iPad purchases in the quarter were for new tablet customers as well as those switching from competitors, which has further added to the installed base of devices.



### iPad ASPs have declined on the launch of lower-price versions

As shown in Figure 111, iPad ASPs have declined since introduction in 2010. The launch of additional lower-price versions, including iPad mini, likely drove the ASP moderation.

Figure 111: iPad ASP

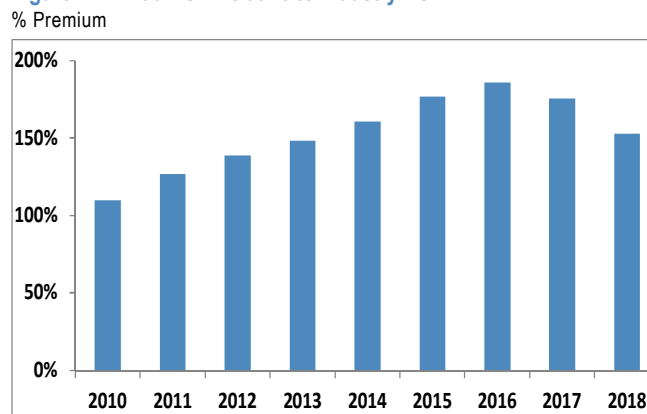


Source: IDC.

### Despite ASP moderation, Apple has increased its premium to the industry

While ASPs for tablets in the industry have been declining in conjunction with the decline in ASP for iPads, Apple has been able to expand its premium relative to the industry by holding off in competing with the less feature-rich and lower-ASP products introduced by competition. As shown in Figure 112, iPad has been able to expand the premium relative to the industry from 110% in 2010 and 127% in 2011 to 186% in 2016, 176% in 2017, and 153% in 2018.

Figure 112: iPad ASP Relative to Industry ASP



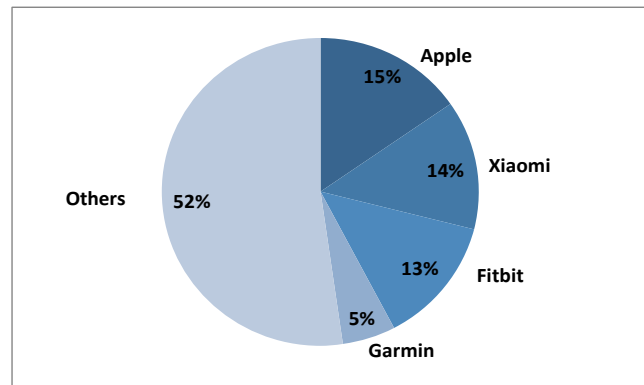
Source: IDC.

## Apple Watch: Growth Driver with Enormous Potential

### Apple has quickly established itself as a leader in the smart watch market

The first Apple Watch was released on April 24, 2015 and has since gained in popularity to become the leading smart watch sold globally. As shown in Figure 59, Apple now has 15% share of the global wearables market, followed by Xiaomi (14%), Fitbit (13%) and Garmin (5%).

Figure 113: Wearable Market Share by Brand, 2017  
% of Total Shipments



Source: IDC.

### The smart watch market accounts for roughly half of the wearables market

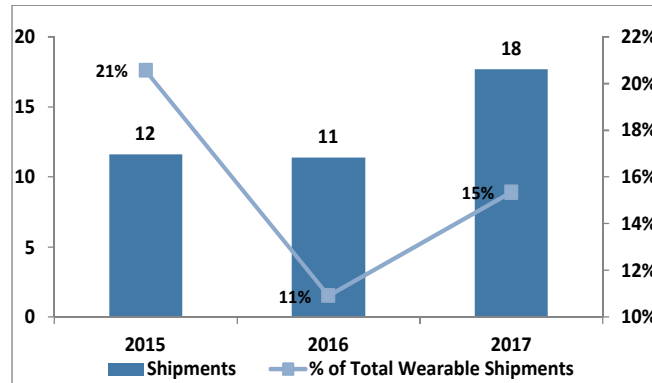
While we have seen a lot of new competition come into the already intensely competitive wearables market, capabilities are not uniform across smart watches, which are only a part of the overall wearables market. We estimate smart watches account for roughly 50% of the overall wearables market. The US smart watch market is estimated to be about 13mn units relative to the US wearables market of 30mn units.

### Apple Watch shipments gained momentum in 2017 after taking a pause in 2016

As shown in Figure 114, Apple Watch shipments took a pause after a hugely successful first year in which the company's share rose to 21% of the wearables market. Subsequently, Apple Watch shipments increased more than 50% y/y in 2017. Apple has disclosed that Apple Watch shipments continued to report strong growth in early 2018, including a mid-40% growth rate in the latest quarter.

**Figure 114: Apple Watch Shipments**

Units in Millions, % of Total Wearable Shipments



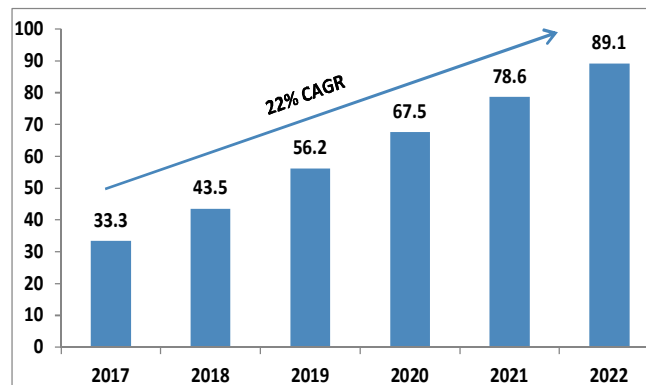
Source: IDC.

### See upside to industry expectations for market growth

IDC forecasts wearables unit growth to expand at a +12% CAGR through 2022, providing ample growth opportunities to all companies participating in the market. Within the wearables market, IDC forecasts the market for smart watches to expand at a +22% CAGR, from 33mn units in 2017 to 89mn units in 2022. We see upside to these already bullish third-party estimates for unit growth in the smart watch market, led by the introduction of additional capabilities in smart watches driven by new digital content and lifestyle tracking features. Additionally, we are in the early stages of 3G/4G capabilities being incorporated into smart watches, which will provide additional flexibility to consumers and should drive a replacement cycle for earlier generation smart watches.

**Figure 115: Global Smart Watch Shipment Forecast**

Units in Millions



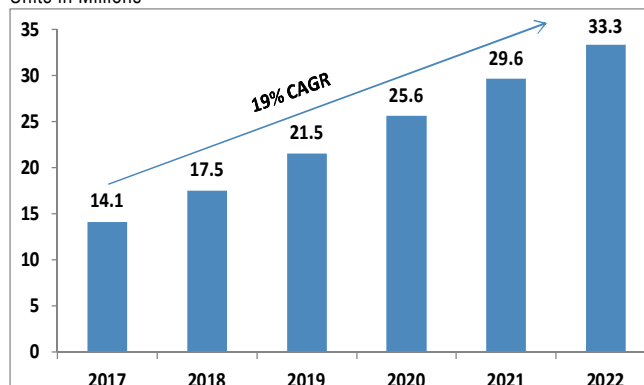
Source: IDC.

### North American smart watch market expected to grow at a +19% CAGR

The US market for smart watches is estimated to account for 14mn of the 115mn market. IDC estimates that the US smart watch market will rise at a +19% CAGR through 2022. The strong growth overall for shipments in the US is likely to be accompanied by a moderation in average ASPs as new entrants try to capture market share through less expensive product offerings.

**Figure 116: US Smart Watch Shipment Forecast**

Units in Millions



Source: IDC.

### Apple Watch penetration into iPhone installed base still relatively modest

Apple Watch is in almost all circumstances a purchase for a consumer who owns an iPhone. We see the Apple Watch appealing to all iPhone users, including secondary owners, as an excellent alternative to traditional watches given increasing features like the pedometer, heart rate monitor, and notification of calls and messages. We estimate that the sale of roughly 14K Apple Watches in FY17 implies only a 1.4% penetration of the iPhone installed base. We expect the increasing penetration of Apple Watch sales with iPhone users to continue to drive strong growth in Apple Watch units, making unit growth more sustainable than investors may expect. Table 22 illustrates our estimate for Apple Watch unit sales and the penetration of the installed base of iPhones.

**Table 22: Apple Watch Units and Penetration of Installed Base**

Units in Millions

	FY14	FY15	FY16	FY17	FY18E	FY19E	FY20E	FY21E
Apple Watch Units ('000s)	-	7,500	10,400	14,800	20,113	28,487	38,797	47,934
Installed Base of Phones (mns)	679	798	923	1,047	1,168	1,252	1,348	1,445
Penetration	-	0.9%	1.1%	1.4%	1.7%	2.3%	2.9%	3.3%

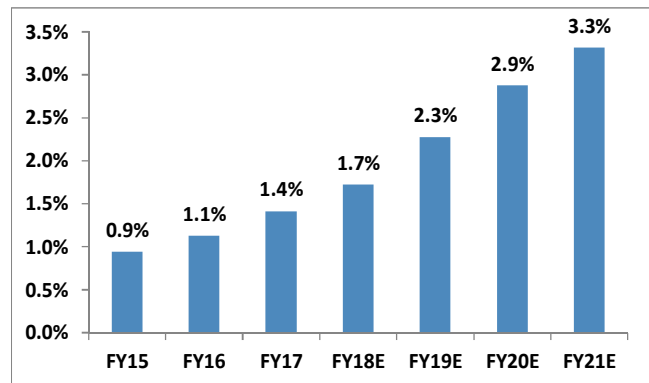
Source: IDC and J.P. Morgan estimates.

### Theoretically a TAM opportunity of \$385bn

Even if Apple's installed base of iPhones were to plateau today, we estimate Apple theoretically could still target a revenue opportunity of \$385bn with the Apple Watch if penetration were to reach closer to 100%. Realistically, the penetration of Apple Watches in the iPhone installed base will be lower and should ramp up steadily over time. We expect to see penetration increase in line with gains in the last two years (see Figure 117), which we believe will result in continued growth for Apple Watch (see Figure 118).

**Figure 117: Penetration of Apple Watch as % of Installed Base**

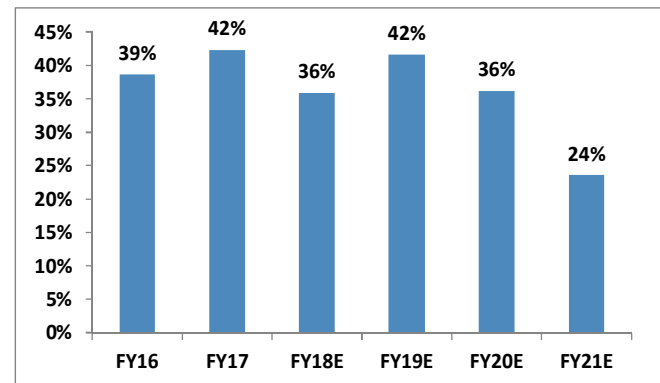
% of Installed Base



Source: IDC and J.P. Morgan estimates.

**Figure 118: Apple Watch Shipment Forecast**

Y/Y % Change



Source: IDC and J.P. Morgan estimates.

## Total Installed Base Analysis: Total of 1.4bn Devices; Rising at High-Single-Digit Rate Annually

Estimate total installed base of roughly 1.4bn devices globally and growing at a mid- to high-single-digit pace

As shown in Table 19, we estimate that the installed base of iPhones, iPads, Mac devices, and Apple Watches is 1.4bn, which we expect to grow at a high-single-digit rate through our forecast window.

Table 23: Apple Installed Base Analysis

Units in Millions

Installed Base	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018E	2019E	2020E	2021E
<b>iPhone Units Shipped (mns)</b>	4	14	25	47	93	136	153	193	232	215	216	216	219	222	225
New Subscriber Handsets									122	158	132	113	99	79	75
Apple's Market Share of New Subscribers									18	24	20	17	15	12	11
Industry Installed Base								6,907	7,127	7,276	7,388	7,502	7,617	7,734	7,853
<b>Switchers to iOS @1%</b>								69	71	73	74	75	76	77	79
<b>Replacement Driven Demand</b>									142	119	122	124	128	133	135
as % of Last Two Years Sales									41%	28%	27%	29%	30%	31%	31%
<b>New Installed Base Estimation</b>															
New iPhone Installed Base		17	42	89	175	293	413	543	633	729	823	915	1,006	1,095	1,185
New Phones Going into Secondary Market									71	59	61	62	64	67	68
<b>Secondary Installed Base</b>								136	165	194	224	253	246	253	260
<b>iPhone Installed Base</b>								679	798	923	1,047	1,168	1,252	1,348	1,445
iPad Units Shipped (mns)				7	32	58	71	68	55	46	44	44	44	43	42
<b>Total iPad Installed Base (mns)</b>				7	40	98	169	230	252	240	212	189	177	175	174
Mac Units Shipped (mns)				14	17	18	16	19	21	18	19	18	16	16	15
<b>Total Mac Installed Base (mns)</b>						49	65	84	104	123	128	129	128	127	123
Apple Watch Units Shipped (mns)				-	-	-	-	-	8	10	15	20	28	39	48
<b>Total Watch Installed Base (mns)</b>									8	18	33	45	63	87	115
<b>Total Installed Base (mns)</b>				7	40	147	234	992	1,162	1,304	1,420	1,531	1,621	1,738	1,856
<b>Growth in Installed Base</b>									17%	12%	9%	8%	6%	7%	7%

Source: Company reports and J.P. Morgan estimates.

## Total Installed Base Analysis: Switchers to iOS Are Key for Continued Growth

Key observations from our installed base calculations:

- iPhones are three-fourths of the total installed base, driving increased focus to continue to grow the iPhone installed base.
- Switchers to iOS devices and replacement demand are key to driving growth in installed base. With variations in replacement demand likely to be modest at best through the years, the primary driver of installed base growth should rest on the ability to get consumers to switch to iOS.
- As shown in Table 24, if Apple fails to get incremental consumers to switch, replacement demand and new subscriber demand are unlikely to expand enough to offset the shortfall, driving a decline in iPhone unit sales.
- As shown in Table 24, decline in iPhone unit sales should lead to only a modest single-digit increase in the installed base, restricting opportunities to drive both replacement-led demand and Services revenue growth in the long-run.
- Apple's strategy to focus on developing the best products, even though at a premium price, is to drive incremental consumers to switch to the iOS platform, which is key for growth.

**Table 24: Apple Installed Base Analysis**

Units in Millions

Installed Base	2015	2016	2017	2018E	2019E	2020E	2021E
<b>iPhone Units Shipped (mns)</b>	232	215	216	216	144	120	91
New Subscriber Handsets	122	158	132	113	99	79	75
Apple's Market Share of New Subscribers	18	24	20	17	15	12	11
Industry Installed Base	7,127	7,276	7,388	7,502	7,617	7,734	7,853
<b>Switchers to iOS @1%</b>	71	73	74	75	-	-	-
<b>Replacement Driven Demand</b>	142	119	122	124	130	108	79
as % of Last Two Years Sales	41%	28%	27%	29%	30%	30%	30%
<b>New Installed Base Estimation</b>							
New iPhone Installed Base	633	729	823	915	930	941	953
New Phones Going into Secondary Market	47	39	40	41	43	36	26
<b>Secondary Installed Base</b>	144	151	159	167	163	160	145
<b>iPhone Installed Base</b>	776	880	982	1,082	1,093	1,101	1,098
iPad Units Shipped (mns)	55	46	44	44	44	43	42
<b>Total iPad Installed Base (mns)</b>	252	240	212	189	177	175	174
Mac Units Shipped (mns)	21	18	19	18	16	16	15
<b>Total Mac Installed Base (mns)</b>	104	123	128	129	128	127	123
Apple Watch Units Shipped (mns)	8	10	15	20	28	39	48
<b>Total Watch Installed Base (mns)</b>	8	18	33	45	63	87	115
<b>Total Installed Base (mns)</b>	1,140	1,261	1,355	1,445	1,461	1,491	1,510
Growth in Installed Base	15%	11%	7%	7%	1%	2%	1%

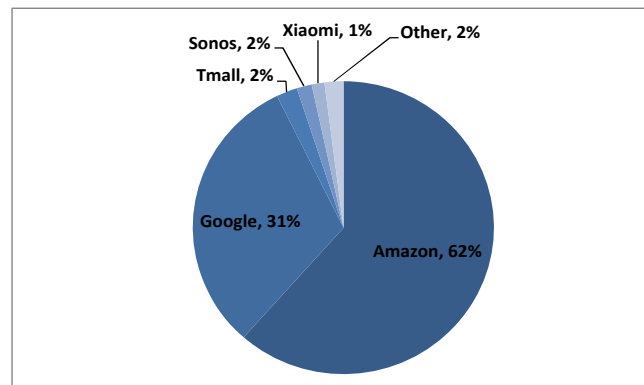
Source: Company reports and J.P. Morgan estimates.

## HomePod: Needs More Investments in GTM Strategy

### Amazon and Google captured the market early on

Apple launched its smart speaker, the HomePod, in early 2018, almost three years after Amazon's launch of its smart speaker, Alexa, in November 2014, and more than a year after Google announced the launch of the Google Assistant in November 2016. Not only has Apple lost the first-mover advantage in this market, it has also ceded the installed base to Amazon and Google, which is likely to see a longer life cycle relative to either the iPhone or the Apple Watch. As shown in Figure 119, Amazon has 62% share of the smart speaker market, followed by Google at 31%, and other players being fairly small.

**Figure 119: Smart Speaker Market Share by Brand, 2017**  
% of Total Shipments

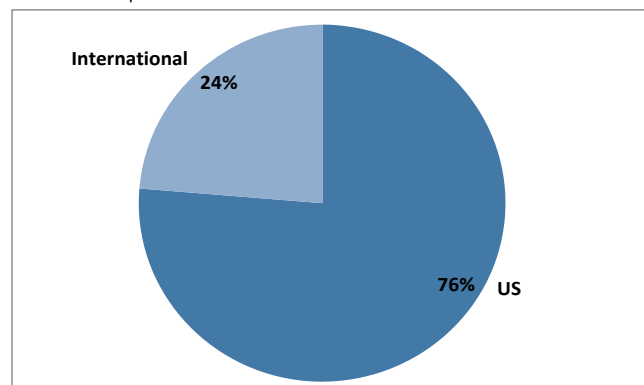


Source: IDC.

### US is the primary market for smart speakers currently; we expect improving network infrastructure to facilitate growth in international markets

IDC estimates that a total of 43.9mn smart speakers were sold globally in 2017. Of the 43.9mn units sold, IDC estimates that 76% or 33.5mn units were shipped in the US. We believe improvement in network infrastructure in international markets will facilitate stronger adoption of smart speakers in other regions.

**Figure 120: Smart Speaker Market by Geography, 2017**  
% of Total Shipments



Source: IDC.



### **Current installed base implies minor penetration of homes**

In the US, smart speaker sales rose from 14mn units in 2016 to 34mn units in 2017, more than doubling within a year. While significant, the overall penetration of homes remains fairly modest. An average of one speaker per home would imply a 25% penetration rate of the 136mn households in the US. However, we believe the real penetration is potentially much lower at around half that number with an average household owning two devices instead of one. Undoubtedly, penetration of smart speakers remains fairly low in international markets.

### **We expect Apple to further refine the hardware for the HomePod**

Apple historically has differentiated its products through superior design and aesthetics in addition to the capabilities of the product itself. However, we believe the HomePod, despite being late to the market relative to Amazon and Google, has failed to appeal to consumers in design and aesthetics. We expect Apple to refine the product further in coming generations.

### **Apple Music can be the driver for HomePod sales**

While the integration of HomePod with Apple Music could drive growth for Apple Music subscriptions longer-term, we expect Apple Music will drive HomePod sales near-term. Specifically, we expect Apple to look to integrate HomePod and Apple Music into a packaged offering in the near-term as the company looks to leverage the success of the Apple Music platform, which boasts 50% of the market share in streaming subscriptions with 43mn monthly active users in the US.

### **Despite HomePod's lackluster start, we do not rule out Apple's ability to innovate**

While the HomePod has not been a success for Apple to date, we do not rule out Apple's ability to innovate in terms of product and strategy to drive adoption. While admittedly HomePod has lagged competitors in the smart speaker market, Apple has successfully entered the smart watch market and wireless headphone market over the last few years and is well on its way to establishing itself as the leader in both. For example, the AirPods (wireless earbuds) have seen significant success in relatively short time after their launch in December 2016 and now have 2% share of the total headphone market (including earphones) organically, and closer to 27% when including Beats, which Apple acquired in 2014.

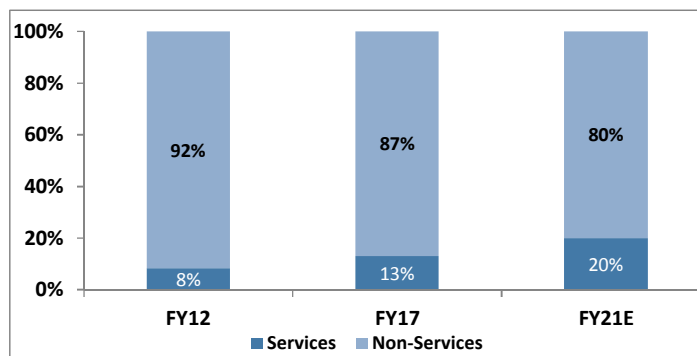
## Services: Leveraging the Installed Base to Drive Growth

### Services to be a \$68bn business segment by FY21

Apple has inarguably increased its focus on Services in the last few years. The Services segment comprises revenues from the App Store, iTunes, Apple Music, and Apple Care. As shown in Figure 121, Services accounted for only 8% of total company revenues in FY12, increasing to 13% in FY17. With Apple on track to easily exceed its target of doubling Services revenues of \$24bn in FY16 by FY20E, we believe Services will account for around 20% of total company revenues in FY21E.

Figure 121: Services a % of Total Revenues

% of Total Revenue



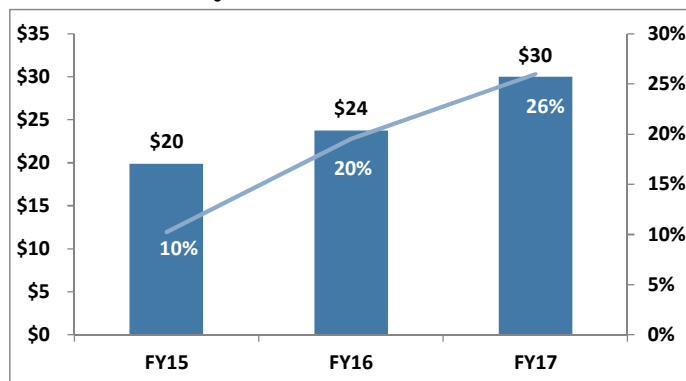
Source: Company reports and J.P. Morgan estimates.

### Services growth has accelerated in recent years

As shown in Figure 122, Services revenues have accelerated from \$19bn in FY15 (+10% y/y), to \$24bn in FY16 (+20% y/y), and to \$30bn in FY17 (+26% y/y).

Figure 122: Services Revenue

\$ in Billions, Y/Y % Change



Source: Company reports and J.P. Morgan estimates.

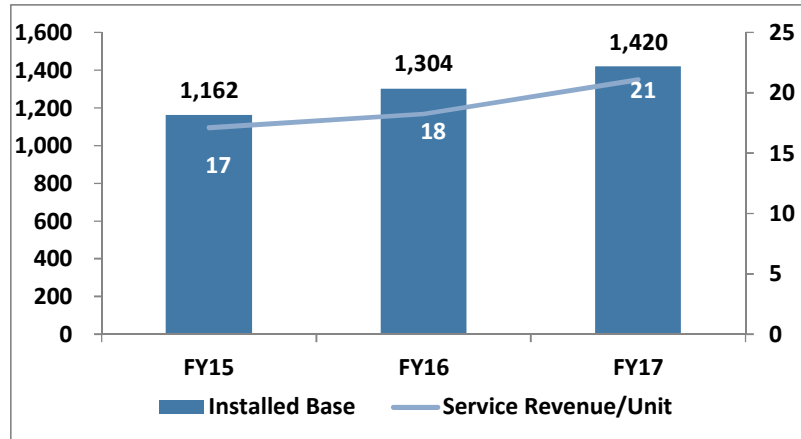
### Apple is benefiting from growth in the installed base and revenue per device

We believe the strong growth in Services revenue is being fueled by the combination of growth in the installed base as well as the service revenue derived from each device. As shown Figure 123, we estimate that the installed base of iOS devices (including secondary users) increased from 1.16bn in FY15, to 1.30bn in FY16, and

to 1.42 in FY17. Additionally, average revenue per device in the installed base also increased from \$17 in FY15, to \$18 in FY16, and to \$21 in FY17.

**Figure 123: Installed Base and Services Revenue per Device**

Installed Base in Millions, \$ per Device



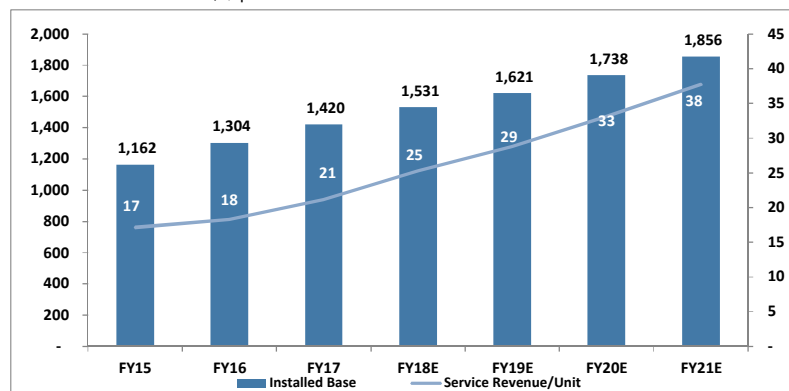
Source: Company reports and J.P. Morgan estimates.

### Expect revenue per device to increase, led by Apple Care and Apple Music

We expect revenue per device in the installed base to continue to increase in conjunction with a growing installed base. As shown in Figure 124, we forecast Service revenue per device to continue to increase at a +16% CAGR from \$21 in FY17 to \$38 in FY21. We expect the primary driver of the increase to be the higher adoption of Apple Care services (across the portfolio and across greater number of points in the indirect channel for Apple) and Apple Music.

**Figure 124: Installed Base and Services Revenue per Device Forecast**

Installed Base in Millions, \$ per Device



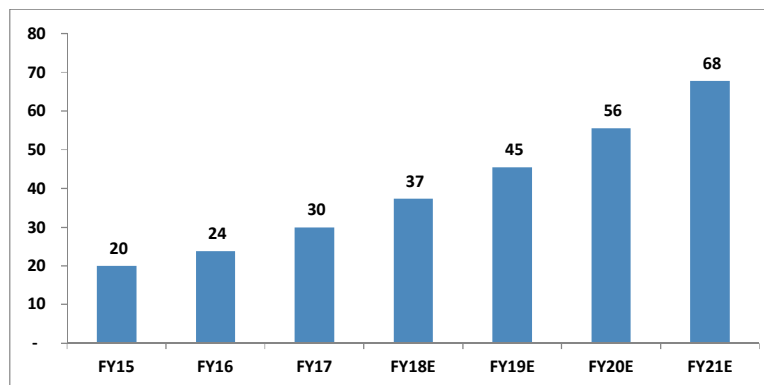
Source: Company reports and J.P. Morgan estimates.

### Forecast +23% CAGR in Services revenues from FY17 to FY21

As shown in Figure 125, we forecast Services revenues to rise at a +23% CAGR to \$68bn in FY21E from \$30bn in FY17.

Figure 125: Service Revenue Forecasts

\$ in Billions



Source: Company reports and J.P. Morgan estimates.

#### App Store and Apple Care account for a primary portion of Services revenues

Apple does not disclose the mix of its \$22bn in Services revenue. We estimate the mix of Services revenue is weighted towards purchases in the App Store as well as purchases of Apple Care. However, in addition to continued growth in App Store revenues, we expect to see additional drivers in the form of Apple Music and Apple Pay. *The next section takes a deeper dive into these two relatively new services.*

## Apple Music: A Service Offering as Good as It Sounds

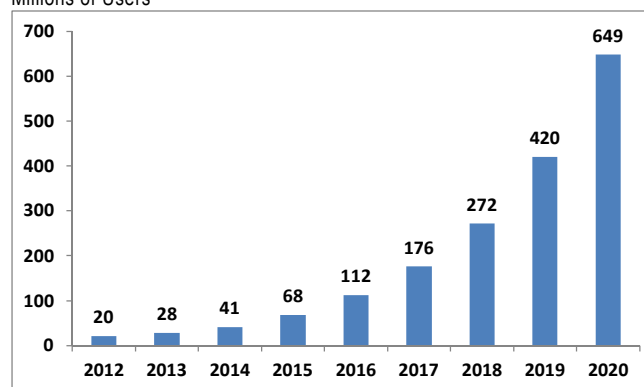
### Formidable addition to the Apple ecosystem

Apple Music, which launched in June of 2015, is an ad-free music streaming service that boasts a collection of 50mn songs. Apple offers Apple Music initially as a three-month free trial, after which consumers have the option to choose from various monthly subscriptions at different price points, which fluctuates from country to country. For example, customers can choose between a Student subscription at \$4.99/month, an Individual subscription at \$9.99/month, and a Family subscription at \$14.99/month (e.g., access for up to six people) in the US. Apple Music is available in 100 countries worldwide and, more importantly, on all Apple devices (including CarPlay) as well as non-Apple PCs, Android devices, and Sonos devices through iTunes or various “app stores”.

### Changing consumer preferences have led to the rise of streaming music

The music industry has seen a fundamental change over the last decade. The era of downloading music to a device and revenue models dependent on downloads has been replaced to a large extent by music as a service in the form of monthly subscriptions to users. The number of people who pay to stream music has grown at a +54% CAGR since 2012, culminating in an estimated 176 million people globally who stream music. This rise in steaming music has disrupted the traditional incumbents in the music industry and driven a change in business models for most music companies in order to survive. Additionally, it has led to an increased incentive for music distributors like Apple and Spotify to engage with musicians, producers, and music labels to create exclusive relationships to differentiate their streaming services relative to competition.

**Figure 126: Number of Paying Streaming Music Subscribers Globally**  
Millions of Users



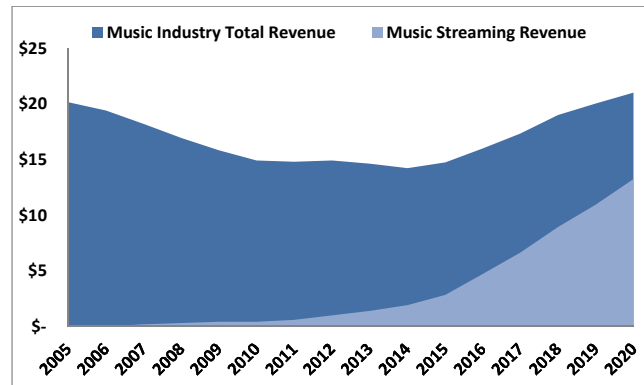
Source: IFPI Global Music Reports, 2012-2018.

### Streaming music drives growth in the music industry as a whole

The music industry had been struggling and revenues were declining drastically led by illegal downloads and unwillingness of consumers to pay for individual downloads. As shown in Figure 127, IFPI, a not-for-profit international organization registered in Switzerland and representing the recording industry, estimates that worldwide revenues for the recorded music industry declined from \$20bn in 2000 to as low as \$14bn by 2014 representing the challenges faced by the music industry in the early 2000s. However, with increasing adoption of streaming, the industry started to see an increase in total revenues and has now reached an estimated \$19bn in 2018.

While streaming services have had a strong pace of growth starting from 2014, the contribution of non-streaming services to overall revenues has declined rapidly. Streaming revenues are expected to continue to grow at a brisk pace offsetting the decline in alternate means of music distribution.

**Figure 127: Music Industry Revenue in Relation to Streaming Music Revenue**  
\$ Billions

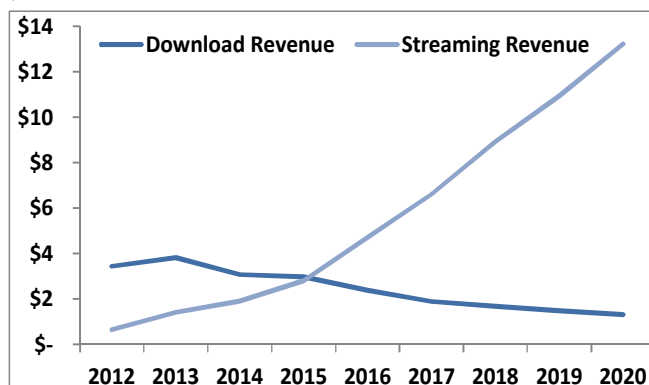


Source: IFPI Global Music Reports, 2012-2018, and J.P. Morgan estimates.

### Streaming growing at a solid pace and taking over the primary role from downloads

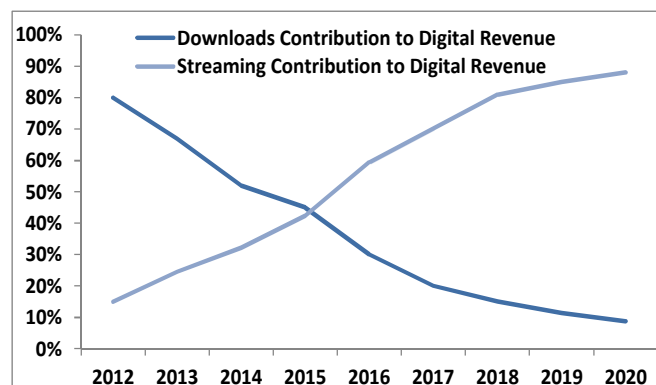
Taking a closer look at Digital Music revenues, we see the increase in streaming revenues complementing the decline in revenues through downloads. The +17% CAGR for Digital music revenues from 2012 to 2017 comprises a +59% revenue CAGR for streaming, partly offset by the -11% decline in revenues from downloads. As shown in Figure 129, streaming overtook contribution from downloads to total industry revenues in 2015, and streaming has continued to post strong growth since then.

**Figure 128: Digital Music Revenue Breakdown**  
\$ Billions



Source: IFPI Global Music Reports, 2012-2018.

**Figure 129: Digital Music Revenue Breakdown**  
% of Total



Source: IFPI Global Music Reports, 2012-2018.

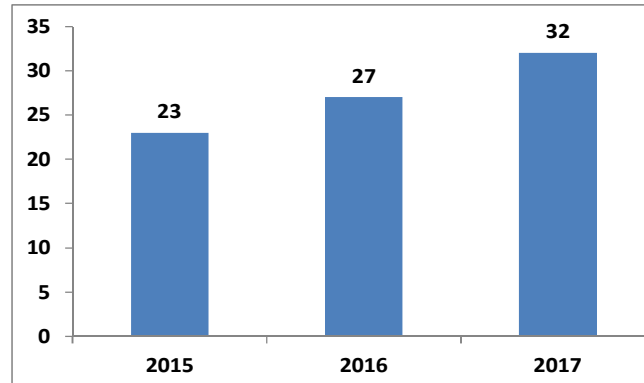
### Adoption of streaming music continues to increase

The easier access to music provided to consumers through streaming services has led to consumers spending more time consuming music content. In the United States, for example, consumers were listening to approximately 23 hours of music per week in 2015, which increased to 32 hours per week in 2017. We expect increasing

popularity of streaming services to continue to engage consumers further on their platforms.

**Figure 130: Average Number of Hours per Week Spent Listening to Music (U.S)**

Hours

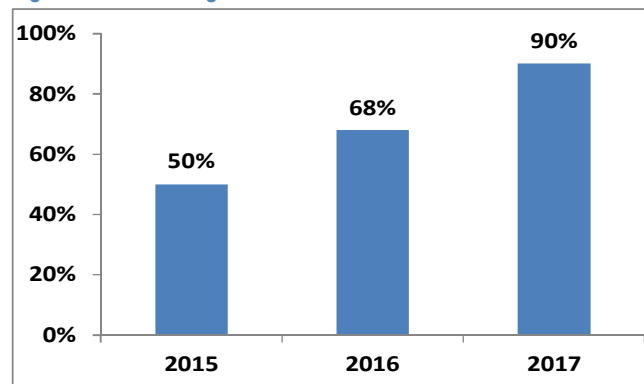


Source: Neilson 360 Music Report, 2017.

**Smartphones are the most popular way to stream music making Music a great addition to the Apple Services platform**

Smartphones have become the primary device of choice for consumers when it comes to streaming music. While only 50% of consumers were using the smartphone for streaming music in 2015, by the end of 2017 the percentage had increased to 90%. The tie-in of streaming music on the smartphone makes Apple Music a great addition to the Apple Services portfolio.

**Figure 131: Percentage of Music Streamers Who Listen to Music on a Smartphone**



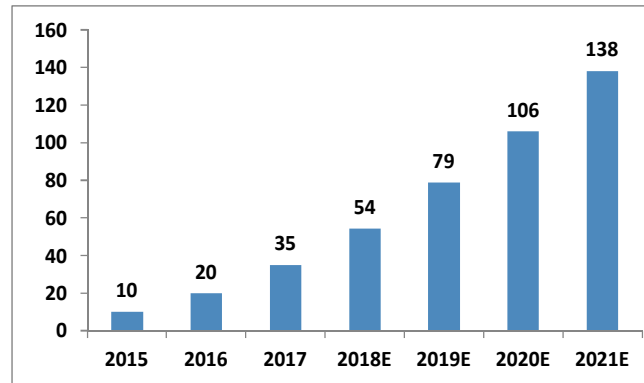
Source: Neilson 360 Music Report, 2017

**Apple Music MAUs have grown at +75% CAGR through mid-2018**

Apple Music was launched in the summer of 2015 and gained 10mn paid subscribers by the end of that year (in just six months). Most recently, Apple announced that Apple Music had surpassed 50mn+ monthly active users (MAUs). We estimate that Apple can end FY18E with roughly 54mn users and continue to drive solid growth in MAUs to more than double the subscriber base by end of FY21E.

Figure 132: Apple Music MAUs

Millions



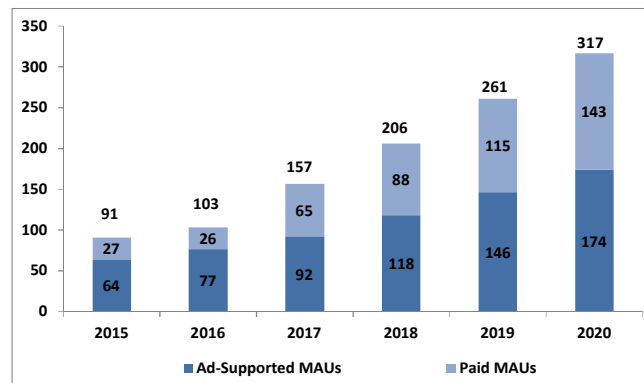
Source: Company reports and J.P. Morgan estimates.

### Apple Music's growth is impressive, but Spotify still holds the streaming crown

Spotify recently announced that it had surpassed 180mn MAUs, with 83mn of those users paying for the premium service. The difference of 180mn Spotify MAUs versus Apple Music's 50mn+ appears daunting, but one must consider that Apple Music does not offer a free ad-supported version of its service, so the true comparison has to be between Spotify's 83mn MAUs and Apple's 50mn+ MAUs. While Spotify as a service can monetize the free subscriber base for advertisement revenues, Apple continues to prioritize user experience for paying consumers. As shown in Figure 133, Spotify has been growing users rapidly as well and currently is the leader in the streaming market.

Figure 133: Spotify MAUs – Ad-Supported and Paid

Millions



Source: Company reports and J.P. Morgan estimates.

**Note: Tencent Music is the dominant music service in four nations included in the TAM: China, Malaysia, Hong Kong, and Thailand. When these nations are excluded the TAM for Apple Music is 2 billion users.**

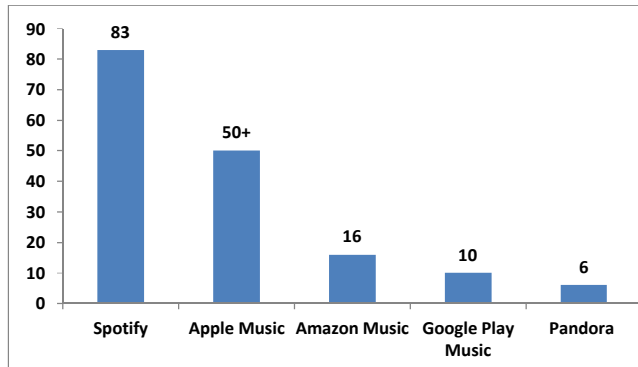
### Spotify and Apple Music are significantly ahead of competition outside of China

The key players in the streaming market include Google Play Music, Amazon Music, and Pandora in addition to Spotify and Apple Music. However, as shown in Figure 134, Spotify and Apple Music are way ahead of competitors in the market. Tencent has a near monopoly in Asia; however, excluding Tencent the other big five streaming services appear to have around 165mn users as of mid-2018.



Figure 134: Paid Subscribers for Top Streaming Services

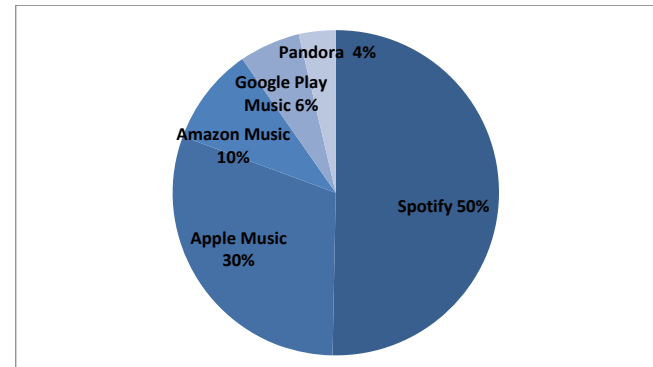
Millions



Source: Company reports and J.P. Morgan estimates. Paid subscribers based on last available data.

Figure 135: Top Streaming Services by Paid Subscribers, 2017

%



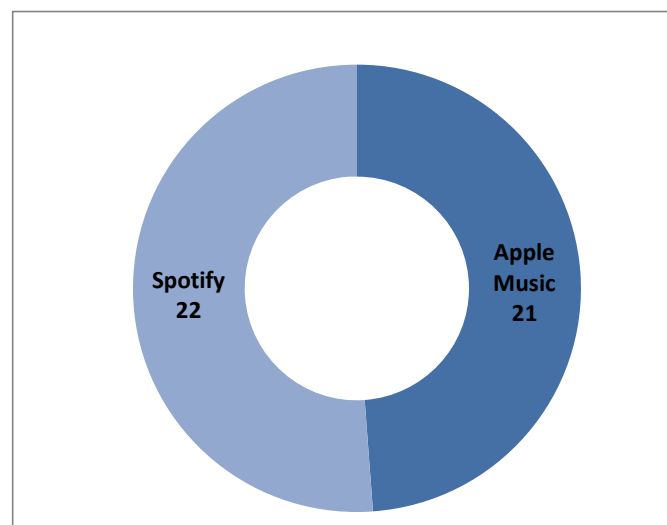
Source: Company reports and J.P. Morgan estimates.

### Globally Spotify is the leader; however, domestically Apple is roughly at par

While globally Spotify is the leader in streaming services, the user base is much more balanced in the US led by the tie-in of the smartphone to the choice of a subscription service and the high share for Apple in the US smartphone market. We estimate that Apple has roughly half of its subscriber base in the US, i.e., around 21mn users, which compares to Spotify's American user base of around 22mn. Additionally, with higher growth for Apple in the US relative to Spotify, we estimate Apple can soon surpass Spotify's domestic user base.

Figure 136: US Paid Subscribers for Apple and Spotify, 2017

Millions



Source: J.P. Morgan estimates.

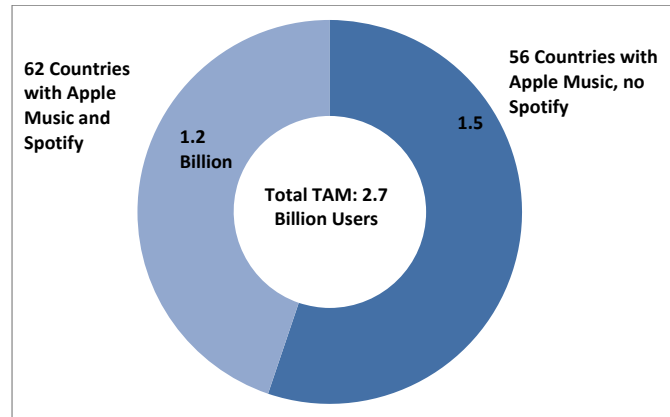
### JPM estimates TAM of 2.7bn users for Apple Music relative to >50mn subscribers currently

Based on an analysis of household spending in 118 countries where Apple Music currently operates, *JPM Internet analyst Doug Anmuth* estimates that total user TAM for Apple Music's paid service is around 2.7bn. The analysis is based on an

evaluation of household spending in 56 markets where Apple Music operates without the presence of Spotify and JPM estimates that the subscription service can reach approximately 1.5bn subscribers in those markets. Adding to this the 62 countries in which Apple Music and Spotify both operate brings in another 1.2bn potential consumers. This leads to a total TAM of 2.7bn subscribers in 118 countries.

**Figure 137: Apple Music Paid Subscriber TAM**

Billions of Users



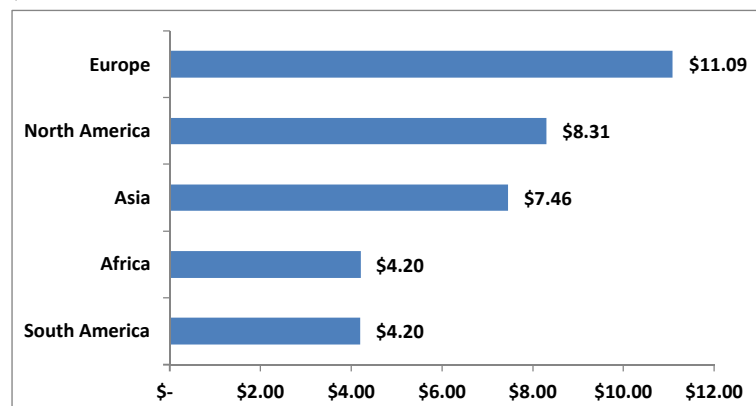
Source: Country-level data from World Bank, UN, OECD, Eurostat, and BEA; J.P. Morgan Internet Team estimates.

### Apple is positioned to address a large TAM with localized pricing

In the countries where Apple Music is available, our JPM Internet team observes that Apple Music is an affordable service, making up only 1% of household expenditures. The service is most expensive in Europe, at approximately \$11.09/month on average for an individual plan. This is especially striking when compared to regions such as South America and Africa where the individual subscription is offered for \$4.20/month on average. In the U.S, Apple Music is \$9.99/month for the individual plan and \$14.99/month for the family plan (up to six users). According to the 2017 IFPI Consumer Insight report, roughly 22% of streaming plans are family plans.

**Figure 138: Apple Music's Regional Price Differences**

\$

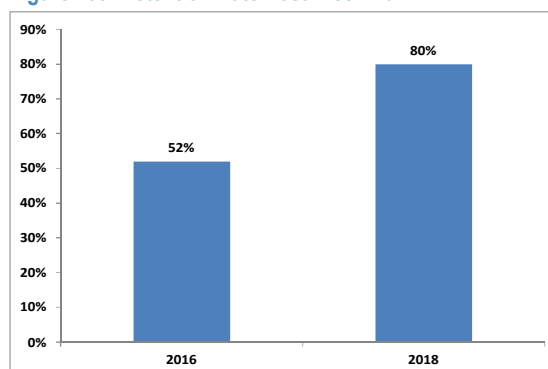


Source: Company data and J.P. Morgan estimates.

### Apple Music sees higher conversion rate of trial subscribers into paying subscribers

Apple's growth is assisted by the three-month free trial, which is the company's primary way of gaining new paying MAUs. Unlike Spotify, Apple Music does not offer a free ad-supported version of the product so reliance on the teaser free trial is vital to new consumer onboarding. One year after Apple Music's launch in mid-2015, Apple Music had a total of 33mn subscribers, with only 17mn paid subscribers, representing roughly 50% conversion rate. Now, three years after launch in 2018, Apple Music has 50mn+ subscribers in total, with 40mn of them paying subscribers, representing an increase of the conversion rate to 80%.

Figure 139: Retention Rate Post Free Trial



Source: MusicWatch Survey and Apple.

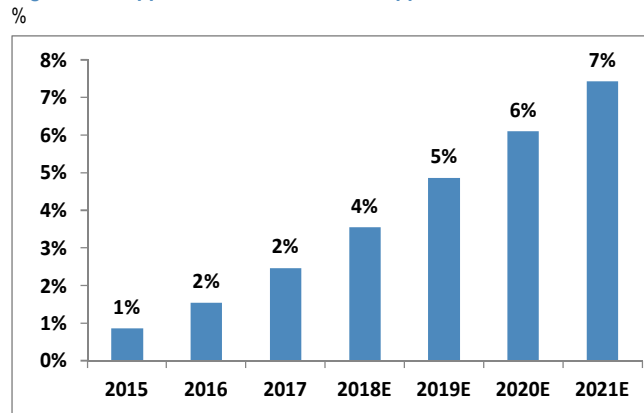
### Apple Music's retention rate nears Netflix levels of loyalty

Netflix, like Apple Music, does not have an ad-supported subscription, but rather a similar one-month free trial system to attract and retain new consumers. While Netflix has different business priorities, focusing more on original content generation and is in the video streaming industry, it is still an interesting comparison to make due to their similar free trial and no free ad-supported model. We believe Netflix has enjoyed ~90% retention post free trial, something that Apple Music is trending towards.

### Apple Music subscribers to account for a larger percentage of Apple device owners

We believe one of the drivers of growth for Apple Music will be the increase in penetration of subscribers in the installed base, in addition to benefits from the incremental increase in the installed base on an annual basis. We expect the tight coupling of the iPhone, the Apple Watch, and the HomePod with the Apple Music subscription will enable growth in subscriptions for Apple Music within existing installed base of devices. We estimate the penetration of Apple Music is quite low and in the low-single-digit range at this time. We expect growth in subscribers for Apple Music to be driven by an increase in penetration for Apple Music subscriptions within the installed base and with existing Apple users. Figure 140 shows our estimates.

Figure 140: Apple Music Penetration of Apple Devices



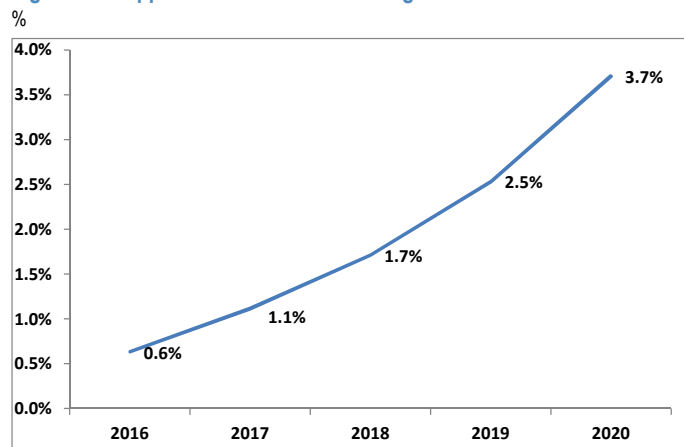
Source: Company reports and J.P. Morgan estimates.

**Note:** There is speculation that Spotify is working on an official iWatch application that will be released late Summer/early Fall.

**Apple Music also well positioned to gain penetration into streaming TAM with its leadership position in the industry, along with Spotify**

Based on our estimate for a total addressable market of 2.7bn subscribers in FY18 for Apple Music, we conclude that Apple Music currently serves only 1.7% of the total TAM. However, given Spotify's and Apple's strong positioning in streaming services, we believe Apple Music is well positioned to increase penetration of the total addressable market and drive strong revenue growth. As shown in Figure 141, we estimate in 2018 Apple Music only has 1.7% of the total addressable market for subscribers, which we forecast will rise to ~3.7% in 2020.

Figure 141: Apple Music as % of Streaming TAM



Source: J.P. Morgan estimates.

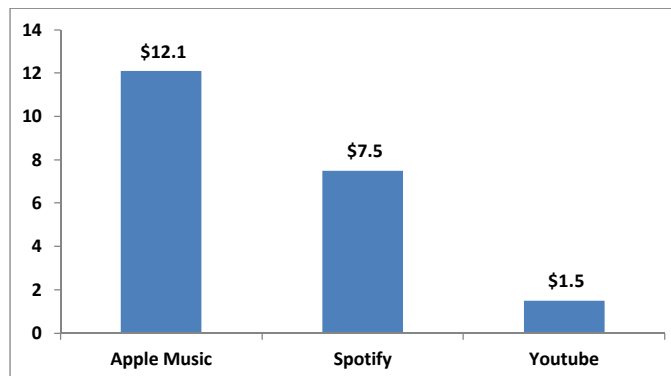
**Strong relationship with artists and music labels part of Apple Music's long-term strategy**

It is crucial to have a good working relationship with existing music labels and artists to ensure availability of quality content on the platform, but also in some cases use the relationships to create exclusivity for content and drive differentiation for the platform relative to competition. Apple is at an advantage over Spotify as it has the financial ability to deploy significantly more resources towards improving the company's product. Spotify pays approximately 71.7% of revenue to labels and publishers while Apple pays closer to 73%. Additionally, Apple pays 62% more to

artists versus Spotify as estimated based on payouts to artist per 1,000 streams, disclosed by the Recording Industry Association of America. While near-term margins could be lower on the higher payout, we believe it is likely to be a driver towards long-term differentiation.

Figure 142: Artist's Pay per 1,000 Streams

\$



Source: RIAA 2017 Analysis (The Recording Industry Association of America).

## JPM Apple Music Model

### Estimate \$32bn in revenues by FY25

As shown in Table 25, we estimate that Apple Music will account for \$32bn of revenues by FY25. Our key assumptions in the model include:

- Approximately 50% of subscribers in domestic and international regions, respectively.
- Family subscriptions and Individual subscriptions account for roughly 22% and 78%, respectively.

**Table 25: Apple Music Model**

\$ in Millions

	2017 Dec-17	2018E Dec-18	2019E Dec-19	2020E Dec-20	2021E Dec-21	2022E Dec-22	2023E Dec-23	2024E Dec-24	2025E Dec-25
<b>Installed Base of Apple Pay Devices</b>	<b>1,420</b>	<b>1,531</b>	<b>1,621</b>	<b>1,738</b>	<b>1,856</b>	<b>1,963</b>	<b>2,076</b>	<b>2,192</b>	<b>2,321</b>
Y/Y % Change	9%	8%	6%	7%	7%	6%	6%	6%	6%
<b>Apple Music Paid Subscriptions</b>	<b>35</b>	<b>54</b>	<b>79</b>	<b>106</b>	<b>138</b>	<b>173</b>	<b>207</b>	<b>238</b>	<b>262</b>
Y/Y % Change	75%	55%	45%	35%	30%	25%	20%	15%	10%
% of Installed Base	2%	4%	5%	6%	7%	9%	10%	11%	11%
<b>Apple Music Revenue - Domestic</b>									
Number of Family Subscriptions	4	6	9	12	15	19	23	26	29
Average Subscription Price	\$15	\$15	\$15	\$15	\$15	\$15	\$15	\$15	\$15
Family Subscription Revenue	\$693	\$1,073	\$1,556	\$2,101	\$2,732	\$3,415	\$4,097	\$4,712	\$5,183
Number of Individual Subscriptions	14	21	31	41	54	67	81	93	102
Average Subscription Price	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10	\$10
Individual Subscription Revenue	\$1,636	\$2,536	\$3,678	\$4,965	\$6,454	\$8,068	\$9,682	\$11,134	\$12,247
Total Domestic Revenue	\$2,329	\$3,610	\$5,234	\$7,066	\$9,186	\$11,483	\$13,779	\$15,846	\$17,430
<b>Apple Music Revenue - Abroad</b>									
Number of Family Subscriptions	4	6	9	12	15	19	23	26	29
Average Subscription Price	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11
Family Subscription Revenue	\$520	\$806	\$1,168	\$1,577	\$2,050	\$2,563	\$3,075	\$3,537	\$3,890
Number of Individual Subscriptions	14	21	31	41	54	67	81	93	102
Average Subscription Price	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7	\$7
Individual Subscription Revenue	\$1,104	\$1,710	\$2,480	\$3,348	\$4,353	\$5,441	\$6,529	\$7,508	\$8,259
Total Abroad Revenue	\$1,623	\$2,516	\$3,648	\$4,925	\$6,403	\$8,004	\$9,604	\$11,045	\$12,150
<b>Total Apple Music Revenue</b>	<b>\$3,952</b>	<b>\$6,126</b>	<b>\$8,883</b>	<b>\$11,992</b>	<b>\$15,589</b>	<b>\$19,486</b>	<b>\$23,384</b>	<b>\$26,891</b>	<b>\$29,580</b>
Y/Y % Change	113%	55%	45%	35%	30%	25%	20%	15%	10%
Number of Media Subscriptions	-	-	-	5	10	17	26	36	46
Average Subscription Price (Incremental to Music)	\$5	\$5	\$5	\$5	\$5	\$5	\$5	\$5	\$5
Media Subscription Revenue	\$0	\$0	\$0	\$319	\$621	\$1,035	\$1,553	\$2,143	\$2,751
<b>Apple Music + Media Revenue</b>	<b>\$3,952</b>	<b>\$6,126</b>	<b>\$8,883</b>	<b>\$12,310</b>	<b>\$16,210</b>	<b>\$20,522</b>	<b>\$24,937</b>	<b>\$29,034</b>	<b>\$32,331</b>
Y/Y % Change	113%	55%	45%	39%	32%	27%	22%	16%	11%

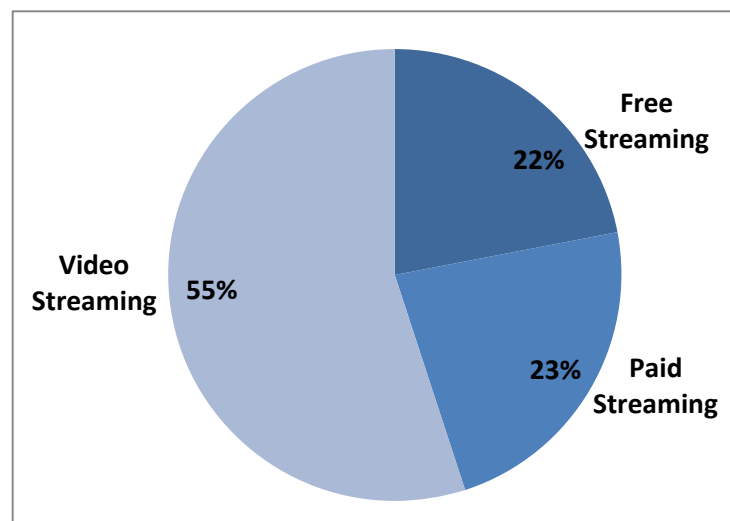
Source: Company reports and J.P. Morgan estimates.

**Apple Music potentially opens up the opportunity for introduction of original content in the future**

In a 2017 Bloomberg interview Jimmy Iovine, one of the heads of Apple Music, expressed that Apple could potentially include original video content into the music streaming service. More recent comments by Apple executives have indicated that the firm is investing heavily in delivering original content, although it has not disclosed any details. As shown in Figure 143, video already accounts for 55% of streaming. We believe video streaming and original content are going to be next big steps for Apple Music in differentiating itself relative to competition.

**Figure 143: Breakdown of Streaming in 2017**

% of Total



Source: IFPI 2017 Music Consumer Insight Report.

## Apple Pay: Cashing In on Mobile Payments

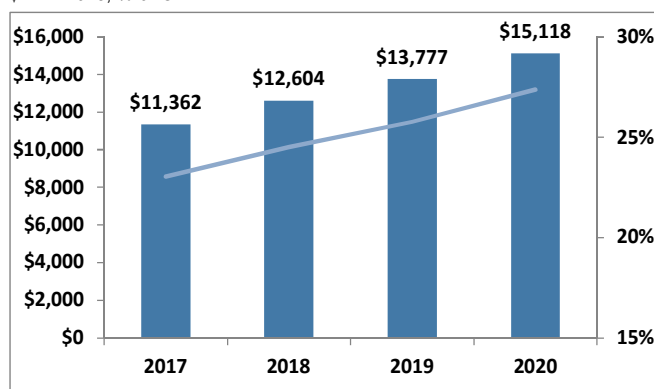
### Apple Pay set to leverage the move to digital money

Apple Pay, which was launched in October of 2014, is a mobile payment and digital wallet service that allows consumers to make secure payments in stores, apps, and websites as well as send and receive money via Apple Messages or Siri. In addition, Apple Pay includes the Wallet app, which stores the Apple Pay Cash card (“digital money”), credit cards, debit cards, as well as other items, such as boarding passes, tickets, and reward cards. The Wallet app supports most major credit cards and debit cards around the world. Apple Pay is available on most Apple devices, including the iPhone, iPad, Mac and Apple Watch, that have some combination of at least two user identifications or “two-factor authentication” (e.g., passcode, PIN, Touch ID or Face ID). Apple Pay incorporates near field communication (NFC) in order to enable wireless payments via point-of-sale systems. Utilizing this technology, Apple Pay supports contactless in-person payments via the iPhone and Apple Watch, which is generally faster than average card transactions. Importantly, Apple does not store card numbers on the device itself or on any of its servers. Instead, Apple Pay uses a device-specific number and unique transaction code; thus, consumers’ card numbers are never shared by Apple with merchants.

### Credit and debit card purchase volume growth a positive trend for Apple Pay

As illustrated in Figure 144, *JPM Payments analyst Tien-tsin Huang* expects the aggregate credit and debit card purchase volume for Visa and Mastercard to grow 10% from \$11trn in 2017 to \$15trn in 2020, which is a positive trend for Apple Pay, as credit card transactions of Apple device owners are increasingly being done through Apple Pay. Importantly, credit and debit card transactions only accounted for 23% of GDP, which is estimated to be closer to 30% in 2020, implying a significant growth opportunity for Apple Pay going forward.

**Figure 144: Credit and Debit Card Purchase Volume Forecast**  
\$ in Billions, % of GDP



Source: J.P. Morgan Payments, Processors & IT Services team, IMF.

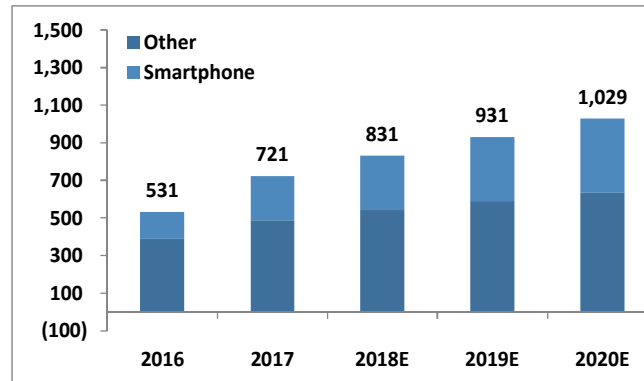
### Growing usage of mobile payments by consumers

As seen in Figure 145, mobile payment users rose +36% y/y to 721mn in 2017 and are expected to continue to increase at an +13% CAGR through 2020. Importantly, that growth rate is even higher for smartphone mobile payment users. Specifically, smartphone mobile payment users rose +67% y/y to roughly 240mn in 2017 and are expected to expand at a +19% CAGR through 2020.



**Figure 145: Global Mobile Payment Users**

Units in Millions



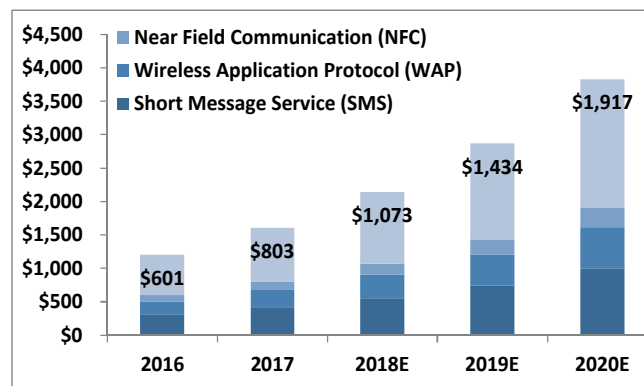
Source: eMarketer.

### Mobile payment market growth is expected to accelerate

As illustrated in Figure 146, the mobile payment market rose +34% y/y to \$803mn in 2017, which only accounted for 2% of GDP. However, the mobile payment market is forecasted to grow +34% per annum to \$2bn in 2020.

**Figure 146: Global Mobile Payment Market Forecast**

\$ in Millions



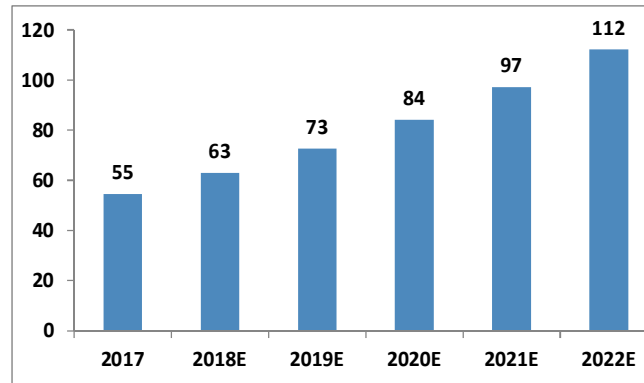
Source: Allied Market Research and J.P. Morgan estimates.

### Growing installed base of NFC terminals supports Apple Pay growth

Near field communication (NFC) is the process by which consumers use digital wallets to purchase items at point-of-sale (POS) terminals in merchant locations. Recently, NFC has seen a massive rate of adoption, particularly in the US where over two-thirds of merchants have an NFC-capable POS terminal, which we believe is key to growing mobile payments. As seen in Figure 147, the installed base of NFC-ready POS terminals stood at 55mn in 2017 and is expected to grow +16% per year to 112mn in 2022, which we think is being supported by Visa's and Mastercard's recent mandates that all POS terminals be NFC enabled by 2020.

**Figure 147: Global Installed Base of NFC-Ready POS Terminals**

Units in Millions



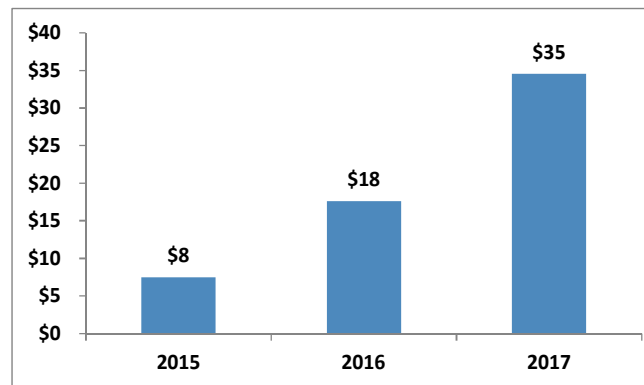
Source: Berg Insights Group.

### Apple Pay also entering the P2P payment market with Apple Pay Cash

Peer-to-Peer (P2P) payment has also seen a rise in consumer adoption given its ability to transfer money from one person to another person in a relatively seamless manner, unlike traditional methods that require the use of the banking system. Apple Pay Cash, launched in December of 2017, allows users to transfer and receive money, via Apple Messenger or Siri, free of charge when using a debit card and includes a 3% charge when using a credit card. Additionally, after receiving money, users can store the money in their Apple Pay Cash card, which is stored in the Wallet app. To that end, we think the strong adoption of P2P payments is most evident by Venmo's (owned by PayPal) recent success as seen in Figure 148. Specifically, Venmo's purchase volumes have increased at a +115% CAGR since 2015.

**Figure 148: Venmo's Purchase Volume**

\$ in Billions



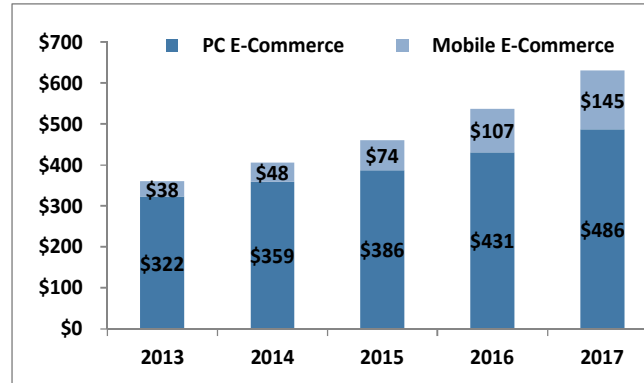
Source: Company reports.

### Apple Pay participating in e-commerce growth through Macs as well

In 2017, Apple introduced the MacBook touch bar, which allows users to seamlessly check out of merchant websites with the Apple Touch-ID. As illustrated in Figure 149, PCs remain the dominant form factor for e-commerce in the US as they accounted for 77% of the total. In addition, PC e-commerce grew 11% per annum from \$322bn in 2013 to \$486bn in 2017.

Figure 149: US E-Commerce by Device

\$ in Billions



Source: Comscore.

## Apple Pay Model

We forecast revenues of \$6bn by 2025E led by double-digit increases in Apple Pay users amongst the large installed base of Apple devices and an increase in the average value of mobile transactions over time.

**Table 26: Apple Pay Model**

\$ in Millions

	2017 Dec-17	2018E Dec-18	2019E Dec-19	2020E Dec-20	2021E Dec-21	2022E Dec-22	2023E Dec-23	2024E Dec-24	2025E Dec-25
<b>Installed Base of Apple Pay Devices</b>	<b>1,420</b>	<b>1,531</b>	<b>1,621</b>	<b>1,738</b>	<b>1,856</b>	<b>1,963</b>	<b>2,076</b>	<b>2,192</b>	<b>2,321</b>
Y/Y % Change	9%	8%	6%	7%	7%	6%	6%	6%	6%
<b>Number of Apple Pay Users</b>	<b>284</b>	<b>383</b>	<b>486</b>	<b>608</b>	<b>743</b>	<b>883</b>	<b>1,038</b>	<b>1,206</b>	<b>1,392</b>
% of Apple Users	20%	25%	30%	35%	40%	45%	50%	55%	60%
Y/Y % Change	117.8%	34.8%	27.0%	25.1%	22.1%	19.0%	17.5%	16.2%	15.5%
Annual Mobile Payment Transactions per User	\$1,114	\$1,291	\$1,540	\$1,863	\$2,049	\$2,254	\$2,479	\$2,727	\$3,000
Apple Pay Transaction Charge	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
<b>Apple Pay Revenue</b>	<b>\$474</b>	<b>\$741</b>	<b>\$1,123</b>	<b>\$1,700</b>	<b>\$2,282</b>	<b>\$2,986</b>	<b>\$3,860</b>	<b>\$4,933</b>	<b>\$6,266</b>
Y/Y % Change	114.1%	56.3%	51.5%	51.3%	34.3%	30.8%	29.3%	27.8%	27.0%

Source: Company reports, J.P. Morgan estimates.

## Appendix I: Apple Supply Chain

### Well-Expected Spec Upgrades for New iPhones

Apple introduced new iPhones (LCD iPhone XR and OLED iPhones XS/XS Max) and Apple Watch Series 4 at an event on September 12. The specs are largely in line with [our forecast from October 2017](#) and market expectations, whereas the starting price is slightly above market expectation (LCD iPhone price starting \$749, instead of \$699). Key spec changes/upgrades include:

- **Display:** 6.1" LCD for iPhone XR and 5.8"/6.5" OLED for iPhone XS/XS Max, all with edge-to-edge display.
- **AP:** Faster and more powerful A12.
- **Memory:** DRAM is upgraded from 2GB (iPhone 8) and 3GB (8 Plus/X) to 3GB (iPhone XR) and 4GB (iPhone XS/XS Max); for NAND, the highest spec is migrated to 512GB.
- **Camera:** Both OLED models carry dual cameras and dual-OIS; LCD model has continued with single camera.
- **Touch:** LCD iPhone XR has adopted out-cell X-Y touch but has removed 3D touch.
- **Dual-sim:** All models will support dual-sim (Nano-SIM and e-SIM), with iPhone XS Max and iPhone XR in China supporting two physical SIMs due to unavailability of e-SIM.
- **Casings:** iPhone XR colors now include Yellow, White, Coral, Black, Blue, and Red.
- **Acoustic:** All models adopt a powerful receiver similar to iPhone X.
- **Waterproof:** iPhone XS/XS Max are upgraded to IP68 rating waterproof.

Table 27: iPhone Specification Comparison

	iPhone XS Max	iPhone XS	iPhone XR	iPhone X	iPhone 8 Plus	iPhone 8	iPhone 7 Plus	iPhone 7
Announced	9/12/18	9/12/18	9/12/18	9/12/17	9/12/17	9/12/17	9/7/16	9/7/16
Availability	9/21/2018	9/21/2018	10/26/2018	10/27/17	9/22/17	9/22/17	9/16/16	9/16/16
Display	6.5" OLED	5.8" OLED	6.1" LCD	5.8" OLED	5.5" LCD	4.7" LCD	5.5" LCD	4.7" LCD
Touch	Out-Cell	Out-Cell	Out-Cell	Out-Cell	In-Cell	In-Cell	In-Cell	In-Cell
Resolution	2688 x 1242	2436 x 1125	1792 x 828	2436 x 1125	1920 x 1080	1334 x 750	1920 x 1080	1334 x 750
Pixel per inch	456	459	326	459	401	326	401	326
OS	iOS 12	iOS 12	iOS 12	iOS 11	iOS 11	iOS 11	iOS 10	iOS 10
AP	A12	A12	A12	A11, 2.39 GHz	A11, 2.39 GHz	A11, 2.39 GHz	A10, 2.34 GHz	A10, 2.34 GHz
RAM (DRAM)	4 GB	4 GB	3 GB	3 GB	3 GB	2 GB	3 GB	2 GB
Storage (NAND)	64/256/512 GB	64/256/512 GB	64/128/256 GB	LPDDR4X	LPDDR4X	LPDDR4X	LPDDR4	LPDDR4
Rear Camera	Dual-12 MP	Dual-12 MP	12 MP	64/256 GB	64/256 GB	64/256 GB	32/128/256 GB	32/128/256 GB
OIS	Dual OIS	Dual OIS	Single OIS	Dual-12 MP	Dual-12 MP	12 MP	Dual-12 MP	12 MP
Face ID	Yes	Yes	Yes	Dual OIS	Single OIS	Single OIS	Single OIS	Single OIS
3D Touch	Yes	Yes	No	Yes	No	No	No	No
Battery	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wireless Charging	3,714 mAh	2,658 mAh	2,942 mAh	2,716 mAh	2,691 mAh	1,821 mAh	2,900 mAh	1,960 mAh
	Yes, Qi	Yes, Qi	Yes, Qi	Yes, Qi	Yes, Qi	Yes, Qi	No	No
	standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Casing	Stainless Steel	Stainless Steel	Aluminum	Stainless Steel	Aluminum	Aluminum	Aluminum	Aluminum
	Frame, 2.5D	Frame, 2.5D	Frame, 2.5D	Frame, 2.5D	Frame, 2.5D	Frame, 2.5D	Frame, 2.5D	Frame, 2.5D
	Glass	Glass	Glass	Glass	Glass	Glass	Unibody	Unibody
Dual-sim	Yes	Yes	Yes	No	No	No	No	No
Launch Price	\$1,099	\$999	\$749	\$999/1,149	\$799/949	\$699/849	\$769/869/969	\$649/749/849

Source: Company reports and J.P. Morgan.

### Apple Watch sees a strong upgrade – units likely to keep surprising

Apple Watch units have been growing ~40% yoy, after the launch of the LTE-enabled Apple Watch. The Series 4 launch also is a strong upgrade in the product line-up, with 30% larger screen size and broader price coverage. We believe this is positive for **Quanta** (main EMS) and **ASE** (SiP module).

### The Higher Price and Tariff Uncertainties to Cap Demand

iPhone XS and iPhone XS Max are available from Sep 21 in 33 countries with prices from \$999 and \$1099 respectively, which is in line with expectations, similar to iPhone X last year. iPhone XR will start pre-orders from Oct 19 and shipping from Oct 26 in 59 countries with price from \$749, similar to our preview but a tad more expensive than market consensus at \$699. The available timing for LCD iPhone is also later than expected and one month behind the OLED iPhones.

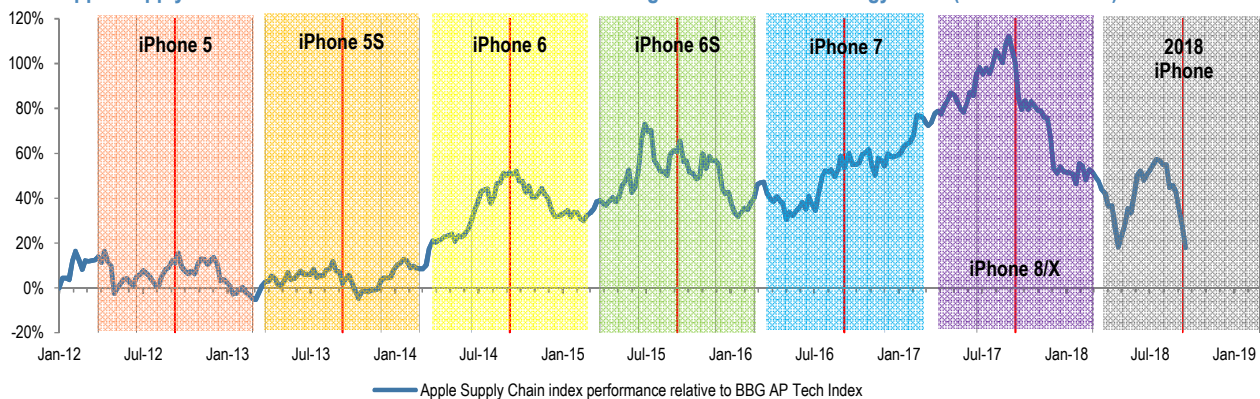
Given the higher entry price range and the lingering trade tariff uncertainties, we believe flat Y/Y comp would be a challenging goal to achieve. We already witness some Asia iPhone suppliers revising down outlook, likely driven by muted initial volumes for iPhone XS. However, we do not expect order cut on iPhone XR before the phone is on the market in late October. We expect negative sentiment across the Apple names whereas iPhone XS/XS Max plays including **Largan** (dual-lens), **Alps** (dual-OIS), **LG Innotek** (dual-camera), **AAC** (acoustic component), **Samsung** (OLED), and **Honhai** (casing and assembly) may see larger swing in the next month.

## Low Volume Expectation in 2H18; Position for 2019 Upgrade

The Apple Supply China Index has underperformed the Bloomberg APAC Tech Index by over the past month. We think the Street expectations are fairly low but Apple supply chain stocks are likely to stay muted for the next few months unless any positive data flow.

However, we believe the market focus by year end will shift to 2019 iPhone, which may see the most significant design change and upgrade in rear camera. We believe chances for both OLED iPhone models to incorporate Triple Camera plus Time-of-flight ("ToF") 3D sensing in 2019 are high, and the LCD model will likely be upgraded to dual camera from single. The key beneficiaries in Asia would be **Win Semi, LG Innotek, and Largan**. See our [Global 3D Sensing & Triple Camera](#) sector report. We are also positive on **TSMC, AAC, Chipbond, Catcher, Flexium and Pegatron in Asia**.

Figure 150: Apple Supply Chain Index – Performance Relative to Bloomberg Asia Pacific Technology Index (BPRTECH Index)



Source: Bloomberg. Note: This chart calculates outperformance through the formula "Apple Supply Chain Index Return - BPRTECH Index Return." Market data are until 20 September 2018. Past results are not an indicator of future performance.

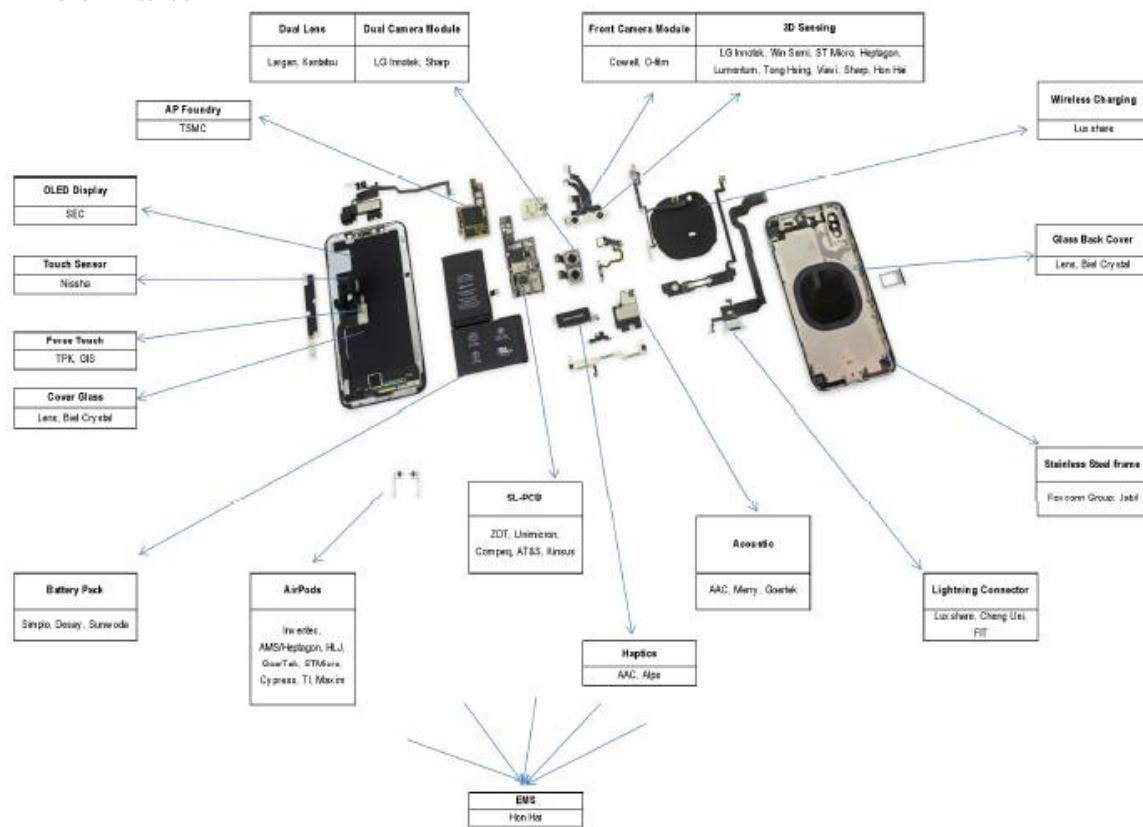
Table 28: Triple Camera + ToF 3D Sensing Spec

Mn units, %

	Triple Camera			3D sensing	
	Camera 1	Camera 2	Camera 3	ToF Rx Sensor	ToF Tx Emitter
<b>Spec</b>	12MPx, RGB Super Wide	12MPx, RGB Wide	12MPx, RGB Telephoto	5MPx, Mono	GaAs VCSEL
<b>Supplier Candidates</b>	Image Sensor: Sony Lens: Largan, Kantatsu  Actuator: Alps, Minebea Module: LG Innotek, Sharp	Image Sensor: Sony Lens: Largan, Kantatsu  Actuator: Alps, Minebea Module: LG Innotek, Sharp	Image Sensor: Sony Lens: Largan, Kantatsu  Actuator: Alps, Minebea Module: LG Innotek, Sharp	Image Sensor: Sony Lens: Largan, Genius  Filter: Viavi  Module: LG Innotek, Hon Hai subsidiary	Epi-wafer: IQE  Laser diode: Lumentum/WinSe mi, Finisar, IIVI, ams Lens: ams  Module: LG Innotek, Hon Hai subsidiary

Source: J.P. Morgan.

Figure 151: iPhone X Breakdown



Source: IHS, J.P. Morgan



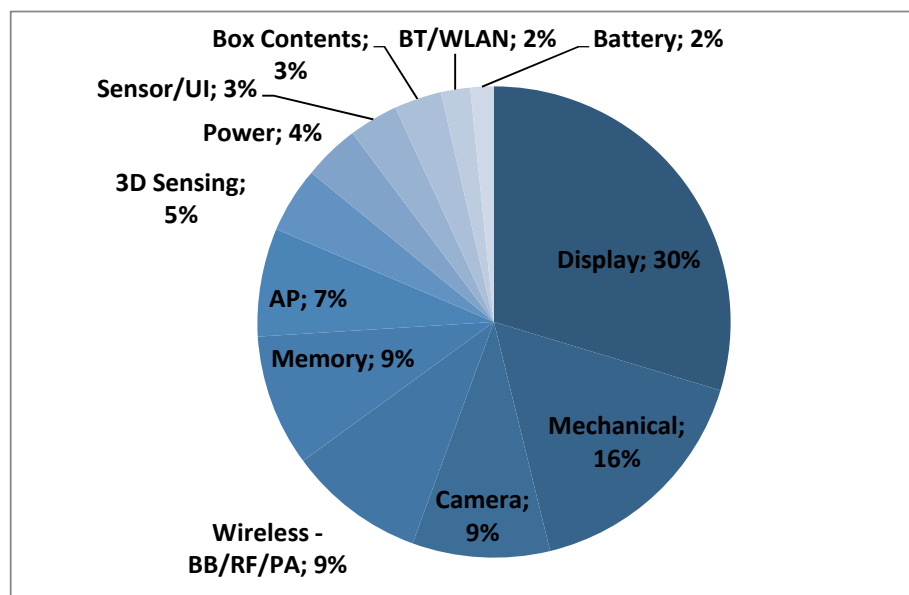
Table 29: iPhone X BOM Analysis

US\$	iPhone X – 64GB	% of Total BOM
<b>Memory</b>	<b>33.5</b>	<b>9%</b>
<b>Display</b>	<b>110.0</b>	<b>30%</b>
<b>AP</b>	<b>27.5</b>	<b>7%</b>
<b>Camera</b>	<b>35.0</b>	<b>9%</b>
OIS+VCM	7.0	2%
Lens	6.0	2%
Other	22.0	6%
<b>3D Sensing</b>	<b>16.7</b>	<b>5%</b>
Emitter Lens and Optical Parts	3.5	1%
Receiver Lens	0.6	0%
Others	12.6	3%
<b>Wireless - BB/RF/PA</b>	<b>34.6</b>	<b>9%</b>
<b>Sensor/UI</b>	<b>12.4</b>	<b>3%</b>
MEMS Sensors	2.0	1%
Acoustic Receiver Module	5.0	1%
Acoustic Speaker Box	2.0	1%
MEMS Microphone	0.3	0%
Other	3.2	1%
<b>BT/WLAN</b>	<b>7.4</b>	<b>2%</b>
<b>Power</b>	<b>14.3</b>	<b>4%</b>
<b>Battery</b>	<b>6.0</b>	<b>2%</b>
<b>Mechanical</b>	<b>61.0</b>	<b>16%</b>
Unibody Frame	50.0	13%
Rear Cover Glass	5.0	1%
Other Enclosure Parts	6.0	2%
<b>Box Contents</b>	<b>12.0</b>	<b>3%</b>
<b>Total BOM</b>	<b>370.4</b>	<b>100%</b>

Source: IHS, J.P. Morgan estimates.

Figure 152: iPhone X BOM Analysis

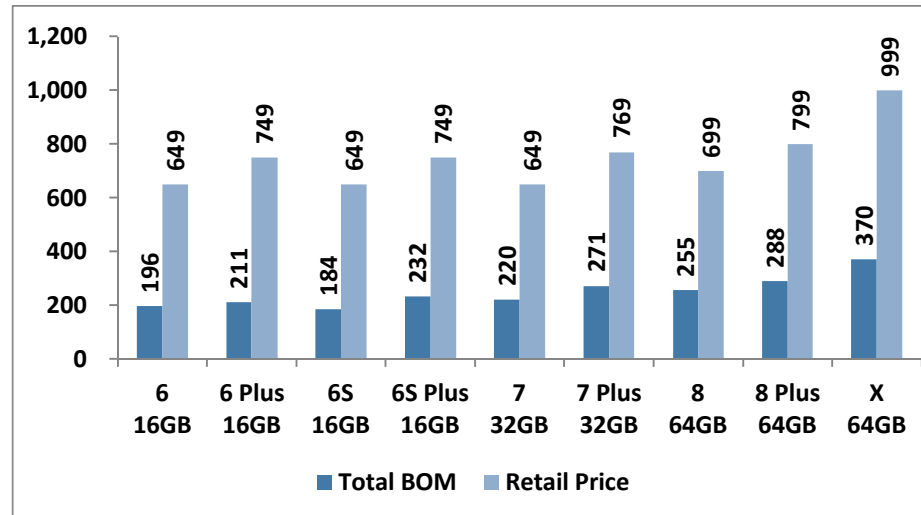
% of Total



Source: IHS, J.P. Morgan estimates.

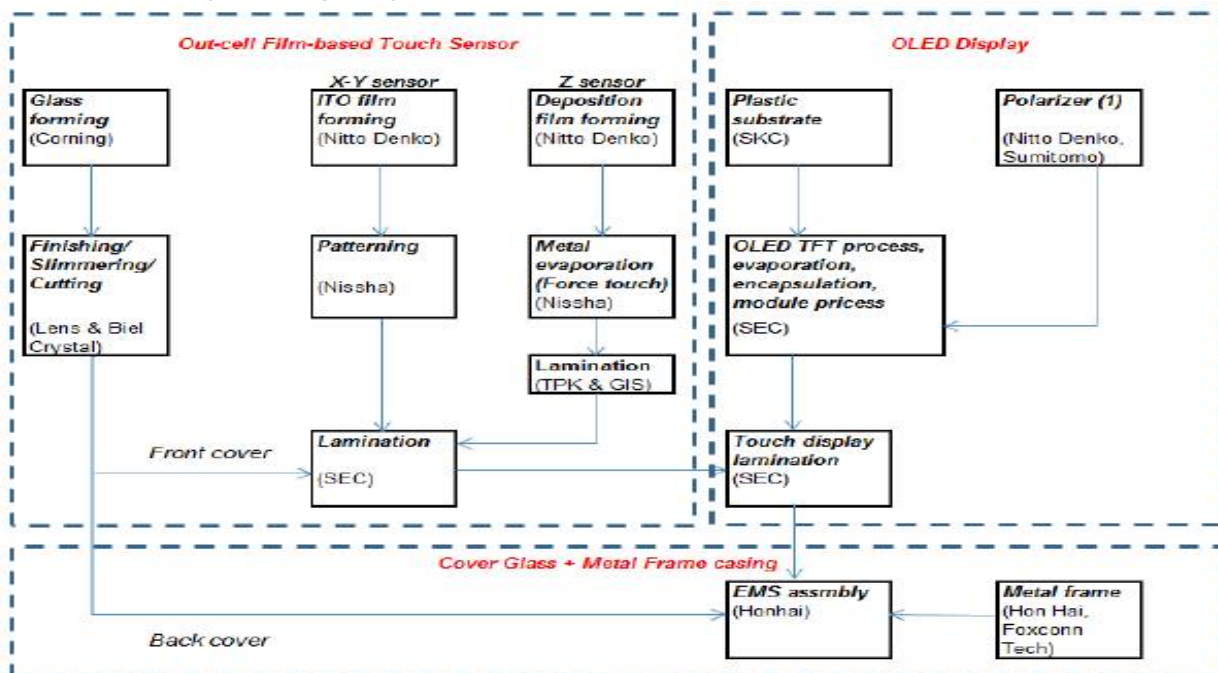
Figure 153: iPhone BOM Cost Trend

US\$



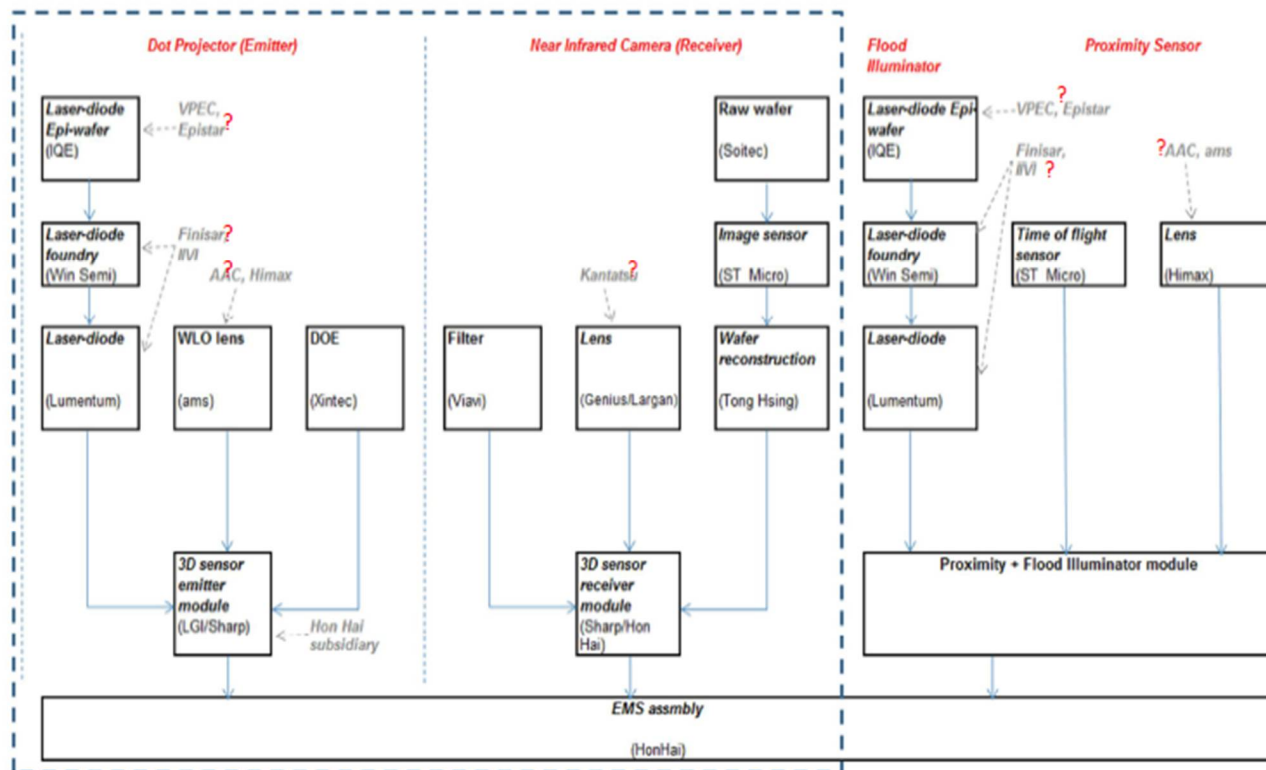
Source: IHS, J.P. Morgan estimates.

Figure 154: iPhone X Display and Casing Supply Chain



Source: J.P. Morgan.

Figure 155: iPhone 3D Sensing Supply Chain



Source: J.P. Morgan.

## Appendix II: List of Acquisitions

Table 30: List of Key Apple Acquisitions

Company	Date	Acquisition Value (\$ mn)	Business
Akonia Holographics	30-Aug-18		Lenses for augmented reality glasses
Texture	12-Mar-18		Digital magazine subscription service
Buddybuild	2-Jan-18		Offers tools for App development
Shazam	11-Dec-17	400	Music and Image recognition
InVisage	9-Nov-17		Smartphone Camera Sensors
PowerbyProxi	1-Oct-17		Design wireless power solutions
Regaind	29-Sep-17		Photo and facial analysis
Vrvana	22-Sep-17	30	AR headsets
SensoMotoric Instruments	16-Jun-17		Eye tracking glasses and systems
Lattice Data	13-May-17	200	ML to convert dark data to structured data
Beddit	9-May-17		Monitor daily sleep habits
Tuplejump	22-Sep-16		Big Data solutions to capture and analyze data
Glimpse	22-Aug-16		Personal health data recording platform
Turi	5-Aug-16	200	Help developers build scalable artificial intelligence solutions
LegbaCore	3-Feb-16		Security consultancy – firmware and software security
Flyby Media	29-Jan-16		Augmented Reality – technology for mapping spaces
Emotient	7-Jan-16		Emotion recognition using facial data
Faceshift	Nov-15		Motion capture platform
Perceptio	Sep-15		Advanced artificial intelligence systems for smartphones
VocalIQ	Sep-15		Speech Technology
Mapsense	Sep-15		Cloud-based mapping virtualization
Metaio	May-15		Augmented Reality tools
Linx	14-Apr-15	20	Multi-aperture camera equipment for mobile devices
Semetric	21-Jan-15		Media analytics
Beats Electronics	Aug-14	3000	Subscription music service and audio devices
BookLamp	29-Jun-14		Personalized book recommendations to readers
SnappyLabs	6-Jan-14		PhotoApp Developer
Topsy	2-Dec-13	200	Social Analytics – analyzing Twitter Data
Acunu	1-Dec-13		Provide analytics on databases
PrimeSense	24-Nov-13	300-350	3D sensor technology
Cue	3-Oct-13	40	Personal assistant app
AlgoTrim	28-Aug-13		Mobile solutions for data compression

Source: Bloomberg, Company data, and J.P. Morgan estimates.

## Appendix III: Comps Table

Table 31: Valuation Comps Table

	Stock Price				FY19		
	09/26/2018	Market Cap (bns)	P/E	P/E (ex-Cash)	EV/Revenue	EV/EBITDA	FCF Yield
<b>Smartphone</b>							
Apple	\$220.42	\$1,065	16.0x	14.1x	3.3x	11.1x	6%
LG Electronics	₩69,500	₩11,374	6.0x	6.3x	0.2x	2.1x	12%
Samsung	₩47,400	₩304,276	6.6x	4.7x	0.8x	2.3x	13%
Xiaomi	¥16.36	¥369	27.8x	38.8x	2.0x	30.9x	3%
<b>Smartphone Average</b>			<b>14.1x</b>	<b>16.0x</b>	<b>1.6x</b>	<b>11.6x</b>	<b>9%</b>
<b>Internet</b>							
Alibaba	¥1,134	¥2,979	30.3x	28.6x	7.1x	21.1x	4%
Alphabet	\$1,194.06	\$826	20.9x	18.5x	5.6x	12.2x	4%
Amazon	\$1,974.85	\$963	53.4x	53.3x	3.4x	23.1x	3%
eBay	\$33.58	\$33	13.1x	13.0x	2.9x	8.9x	8%
Facebook	\$166.95	\$482	17.6x	16.1x	6.5x	11.4x	4%
JD.com	¥172.80	¥247	35.0x	31.3x	0.4x	21.6x	3%
Netflix	\$377.88	\$165	76.8x	78.8x	8.9x	58.2x	-1%
Spotify	\$182.05	\$33	NA	NA	12.9x	NA	NA
Tencent	¥330.00	¥3,142	29.9x	30.3x	7.4x	21.1x	4%
<b>Internet Average</b>			<b>34.6x</b>	<b>33.7x</b>	<b>6.1x</b>	<b>22.2x</b>	<b>3%</b>
<b>Software</b>							
Adobe Systems	\$268.47	\$131	34.5x	33.7x	12.1x	26.4x	3%
Microsoft	\$113.98	\$874	23.2x	21.7x	6.1x	13.9x	5%
SAP	€ 121.88	€ 132	25.0x	25.5x	5.6x	16.8x	3%
VMware	\$155.84	\$64	23.6x	20.3x	5.8x	15.8x	6%
<b>Software Average</b>			<b>26.6x</b>	<b>25.3x</b>	<b>7.4x</b>	<b>18.2x</b>	<b>4%</b>
<b>Hardware</b>							
Corning	\$35.40	\$32	17.7x	19.5x	2.9x	9.8x	3%
HP Inc	\$25.97	\$42	12.1x	12.3x	0.7x	8.9x	8%
Xerox	\$27.10	\$7	7.7x	11.9x	1.2x	6.8x	13%
<b>Hardware Average</b>			<b>12.5x</b>	<b>14.6x</b>	<b>1.6x</b>	<b>8.5x</b>	<b>8%</b>
<b>Household and Personal Care (HPC)</b>							
Church & Dwight	\$59.40	\$15	24.2x	27.7x	4.0x	17.0x	5%
Clorox	\$150.37	\$19	21.9x	24.5x	3.4x	15.9x	5%
Colgate-Palmolive	\$67.10	\$58	20.9x	23.0x	4.1x	13.9x	5%
Estee Lauder	\$141.73	\$52	26.7x	27.2x	3.6x	16.6x	3%
Kimberly-Clark	\$113.07	\$39	16.2x	19.0x	2.5x	11.1x	6%
Procter & Gamble	\$83.26	\$207	17.7x	19.3x	3.4x	13.1x	5%
<b>HPC Average</b>			<b>21.3x</b>	<b>23.5x</b>	<b>3.5x</b>	<b>14.6x</b>	<b>5%</b>
<b>Total Average</b>			<b>21.8x</b>	<b>22.6x</b>	<b>4.0x</b>	<b>15.0x</b>	<b>6%</b>

Source: J.P. Morgan estimates, Bloomberg. Note: JPM estimates for AAPL; consensus estimates for all other companies.

## Appendix IV: Summary Financials

Table 32: Apple Summary Table

Y/Y % Change

	1Q – December			2Q – March			3Q – June			4Q – September			Annual		
	2017	2018	2019E	2017	2018	2019E	2017	2018	2019E	2017	2018E	2019E	2017	2018E	2019E
<b>Revenue</b>	<b>78,351</b>	<b>88,287</b>	<b>93,452</b>	<b>52,896</b>	<b>61,137</b>	<b>64,708</b>	<b>45,408</b>	<b>53,265</b>	<b>60,776</b>	<b>52,578</b>	<b>63,248</b>	<b>69,994</b>	<b>229,233</b>	<b>265,937</b>	<b>288,931</b>
% chg y/y	4.0%	12.7%	5.9%	4.6%	15.6%	5.8%	7.2%	17.3%	14.1%	12.2%	20.3%	10.7%	6.6%	16.0%	8.6%
Cost of Sales	48,175	54,381	57,724	32,305	37,715	40,018	27,920	32,844	37,687	32,648	39,165	43,610	141,048	164,105	179,039
SG&A	3,946	4,231	4,766	3,718	4,150	4,530	3,783	4,108	4,741	3,814	4,427	4,900	15,261	16,916	18,936
as % of sales	5.0%	4.8%	5.1%	7.0%	6.8%	7.0%	8.3%	7.7%	7.8%	7.3%	7.0%	7.0%	6.7%	6.4%	6.6%
R&D	2,871	3,407	4,112	2,776	3,378	3,947	2,937	3,701	4,619	2,997	3,826	4,340	11,581	14,312	17,018
as % of sales	3.7%	3.9%	4.4%	5.2%	5.5%	6.1%	6.5%	6.9%	7.6%	5.7%	6.1%	6.2%	5.1%	5.4%	5.9%
<b>Operating Income (COI)</b>	<b>23,359</b>	<b>26,268</b>	<b>26,850</b>	<b>14,097</b>	<b>15,894</b>	<b>16,213</b>	<b>10,768</b>	<b>12,612</b>	<b>13,730</b>	<b>13,119</b>	<b>15,829</b>	<b>17,145</b>	<b>61,343</b>	<b>70,603</b>	<b>73,938</b>
operating margin	29.8%	29.8%	28.7%	26.7%	26.0%	25.1%	23.7%	23.7%	22.6%	25.0%	25.0%	24.5%	26.8%	26.5%	25.6%
bp chg y/y	-155 bp	-6 bp	-102 bp	-102 bp	-65 bp	-94 bp	-14 bp	-4 bp	-109 bp	-15 bp	8 bp	-53 bp	-89 bp	-21 bp	-96 bp
Other income/(expense)	821	756	300	587	274	300	540	672	300	797	300	300	2,745	2,002	1,200
Pre-tax Income	24,180	27,024	27,150	14,684	16,168	16,513	11,308	13,284	14,030	13,916	16,129	17,445	64,088	72,605	75,138
Income Tax	6,289	6,965	4,073	3,655	2,346	2,477	2,591	1,765	2,105	3,203	2,419	2,617	15,738	13,495	11,271
tax rate %	26.0%	25.8%	15.0%	24.9%	14.5%	15.0%	22.9%	13.3%	15.0%	23.0%	15.0%	15.0%	24.6%	18.6%	15.0%
<b>Net Income</b>	<b>17,891</b>	<b>20,059</b>	<b>23,078</b>	<b>11,029</b>	<b>13,822</b>	<b>14,036</b>	<b>8,717</b>	<b>11,519</b>	<b>11,926</b>	<b>10,713</b>	<b>13,709</b>	<b>14,828</b>	<b>48,350</b>	<b>59,109</b>	<b>63,867</b>
<b>Diluted EPS</b>	<b>\$3.36</b>	<b>\$3.89</b>	<b>\$4.87</b>	<b>\$2.10</b>	<b>\$2.73</b>	<b>\$3.01</b>	<b>\$1.67</b>	<b>\$2.34</b>	<b>\$2.60</b>	<b>\$2.07</b>	<b>\$2.84</b>	<b>\$3.27</b>	<b>\$9.19</b>	<b>\$11.79</b>	<b>\$13.75</b>
Diluted Shares (avg.)	5,328	5,158	4,743	5,262	5,068	4,659	5,233	4,927	4,587	5,184	4,830	4,528	5,263	5,012	4,644
EBITDA ex-equity income	26,346	29,013	29,747	16,429	18,633	19,189	13,122	15,277	16,891	15,603	18,738	20,365	71,500	81,661	86,192
% chg y/y	-0.9%	10.1%	2.5%	-0.2%	13.4%	3.0%	3.9%	16.4%	10.6%	9.0%	20.1%	8.7%	2.2%	14.2%	5.5%
EBITDA margin	33.6%	32.9%	31.8%	31.1%	30.5%	29.7%	28.9%	28.7%	27.8%	29.7%	29.6%	29.1%	31.2%	30.7%	29.8%
bp chg y/y	-166 bp	-76 bp	-103 bp	-151 bp	-58 bp	-82 bp	-92 bp	-22 bp	-89 bp	-86 bp	-5 bp	-53 bp	-134 bp	-48 bp	-88 bp
Cash	246,090	285,097	236,827	256,841	267,226	219,138	261,516	243,743	221,595	268,895	234,446	215,590	268,895	234,446	215,590
Debt	87,549	122,400	114,600	98,522	121,840	114,600	108,339	114,600	114,600	115,680	114,600	114,600	115,680	114,600	114,600
Gross Leverage	1.3x	1.7x	1.4x	1.4x	1.6x	1.4x	1.5x	1.5x	1.4x	1.6x	1.4x	1.3x	1.6x	1.4x	1.3x
Net Debt	(158,541)	(162,697)	(122,227)	(158,319)	(145,386)	(104,538)	(153,177)	(129,143)	(106,995)	(153,215)	(119,846)	(100,990)	(153,215)	(119,846)	(100,990)
Net Leverage	-2.3x	-2.2x	-1.5x	-2.3x	-1.9x	-1.3x	-2.2x	-1.6x	-1.3x	-2.1x	-1.5x	-1.2x	-2.1x	-1.5x	-1.2x
Operating Cash Flow	27,056	28,293	29,549	12,523	15,130	9,239	8,363	14,488	24,344	15,656	17,675	16,341	63,598	75,586	79,473
Capital Expenditures	(3,334)	(2,810)	(3,738)	(2,975)	(4,195)	(3,559)	(2,277)	(3,267)	(3,343)	(3,865)	(3,479)	(3,850)	(12,451)	(13,751)	(14,489)
Free Cash Flow	23,722	25,483	25,811	9,548	10,935	5,680	6,086	11,221	21,001	11,791	14,196	12,492	51,147	61,835	64,984
Share repurchases	(10,851)	(10,095)	(20,000)	(7,161)	(22,756)	(20,000)	(7,093)	(20,783)	(15,000)	(7,795)	(20,000)	(15,000)	(32,900)	(73,634)	(70,000)

Source: Company reports and J.P. Morgan estimates.

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## Apple: Summary of Financials

Income Statement - Annual						Income Statement - Quarterly					
	FY16A	FY17A	FY18E	FY19E	FY20E		1Q18A	2Q18A	3Q18A	4Q18E	
Revenue	215,091	229,233	265,937	288,931	313,781	Revenue	88,287A	61,137A	53,265A	63,248	
COGS	(131,376)	(141,048)	(164,105)	(179,039)	(194,525)	COGS	(54,381)A	(37,715)A	(32,844)A	(39,165)	
Gross profit	83,715	88,185	101,832	109,892	119,256	Gross profit	33,906A	23,422A	20,421A	24,083	
SG&A	(14,194)	(15,261)	(16,916)	(18,936)	(21,402)	SG&A	(4,231)A	(4,150)A	(4,108)A	(4,427)	
Adj. EBITDA	69,981	71,500	81,661	86,192	91,533	Adj. EBITDA	29,013A	18,633A	15,277A	18,738	
D&A	(10,505)	(10,157)	(11,058)	(12,254)	(13,227)	D&A	(2,745)A	(2,739)A	(2,665)A	(2,909)	
Adj. EBIT	59,476	61,343	70,603	73,938	78,306	Adj. EBIT	26,268A	15,894A	12,612A	15,829	
Net Interest	-	-	-	-	-	Net Interest	-	-	-	-	
Adj. PBT	60,824	64,088	72,605	75,138	79,406	Adj. PBT	27,024A	16,168A	13,284A	16,129	
Tax	(15,685)	(15,738)	(13,495)	(11,271)	(11,871)	Tax	(6,965)A	(2,346)A	(1,765)A	(2,419)	
Minority Interest	-	-	-	-	-	Minority Interest	-	-	-	-	
Adj. Net Income	45,139	48,350	59,109	63,867	67,535	Adj. Net Income	20,059A	13,822A	11,519A	13,709	
Reported EPS	8.18	9.19	11.79	13.75	15.45	Reported EPS	3.89A	2.73A	2.34A	2.84	
Adj. EPS	8.18	9.19	11.79	13.75	15.45	Adj. EPS	3.89A	2.73A	2.34A	2.84	
DPS	-	-	-	-	-	DPS	-	-	-	-	
Payout ratio	-	-	-	-	-	Payout ratio	-	-	-	-	
Shares outstanding	-	-	-	-	-	Shares outstanding	-	-	-	-	
Balance Sheet & Cash Flow Statement						Ratio Analysis					
	FY16A	FY17A	FY18E	FY19E	FY20E		FY16A	FY17A	FY18E	FY19E	FY20E
Cash and cash equivalents	20,484	20,289	22,674	20,000	20,000	Gross margin	38.9%	38.5%	38.3%	38.0%	38.0%
Accounts receivable	15,754	17,874	23,894	26,442	31,757	EBITDA margin	32.5%	31.2%	30.7%	29.8%	29.2%
Inventories	2,132	4,855	6,963	7,753	9,623	EBIT margin	27.7%	26.8%	26.5%	25.6%	25.0%
Other current assets	68,499	85,627	63,750	63,750	63,750	Net profit margin	21.0%	21.1%	22.2%	22.1%	21.5%
Current assets	106,869	128,645	117,280	117,945	125,130	ROE	36.5%	36.9%	49.4%	67.1%	90.6%
PP&E	27,010	33,783	38,686	40,922	43,377	ROA	14.7%	13.9%	16.3%	18.5%	20.3%
LT investments	170,430	194,714	172,773	156,591	135,962	ROCE	22.1%	19.9%	24.5%	30.0%	35.2%
Other non current assets	17,377	18,177	22,546	22,546	22,546	SG&A/Sales	6.6%	6.7%	6.4%	6.6%	6.8%
Total assets	321,686	375,319	351,285	338,004	327,015	Net debt/equity	51.9%	71.2%	87.4%	111.0%	148.2%
Short term borrowings	11,605	18,473	17,472	17,472	17,472	P/E (x)	27.0	24.0	18.7	16.0	14.3
Payables	37,294	49,049	45,693	50,879	56,131	P/BV (x)	9.5	8.7	10.5	12.0	15.1
Other short term liabilities	30,107	33,292	37,256	38,760	43,864	EV/EBITDA (x)	13.8	13.5	11.8	11.2	10.6
Current liabilities	79,006	100,814	100,420	107,111	117,467	Dividend Yield	-	-	-	-	-
Long-term debt	75,427	97,207	97,128	97,128	97,128	Sales/Assets (x)	0.7	0.7	0.7	0.8	0.9
Other long term liabilities	39,004	43,251	48,572	48,572	48,572	Interest cover (x)	-	-	-	-	-
Total liabilities	193,437	241,272	246,120	252,811	263,167	Operating leverage	207.1%	47.7%	94.3%	54.6%	68.7%
Shareholders' equity	128,249	134,047	105,165	85,193	63,847	Revenue y/y Growth	(8.0%)	6.6%	16.0%	8.6%	8.6%
Minority interests	-	-	-	-	-	EBITDA y/y Growth	(15.2%)	2.2%	14.2%	5.5%	6.2%
Total liabilities & equity	321,686	375,319	351,285	338,004	327,015	Tax rate	25.8%	24.6%	18.6%	15.0%	15.0%
BVPS	23.24	25.47	20.98	18.34	14.60	Adj. Net Income y/y Growth	(15.6%)	7.1%	22.3%	8.0%	5.7%
y/y Growth	13.0%	9.6%	(17.6%)	(12.6%)	(20.4%)	EPS y/y Growth	(11.2%)	12.3%	28.4%	16.6%	12.3%
Net debt/(cash)	66,548	95,391	91,926	94,600	94,600	DPS y/y Growth	-	-	-	-	-
Cash flow from operating activities	65,824	63,598	75,586	79,473	83,933						
o/w Depreciation & amortization	10,505	10,157	11,058	12,254	13,227						
o/w Changes in working capital	484	(5,550)	34,936	3,352	3,171						
Cash flow from investing activities	(45,977)	(46,446)	15,588	(14,489)	(15,682)						
o/w Capital expenditure	(12,734)	(12,451)	(13,751)	(14,489)	(15,682)						
as % of sales	5.9%	5.4%	5.2%	5.0%	5.0%						
Cash flow from financing activities	(20,483)	(17,347)	(88,790)	(83,840)	(88,880)						
o/w Dividends paid	(12,150)	(12,769)	(13,676)	(13,840)	(13,880)						
o/w Net debt issued/(repaid)	22,057	29,014	459	0	0						
Net change in cash	(636)	(195)	2,385	(18,856)	(20,629)						
Adj. Free cash flow to firm	53,090	51,147	61,835	64,984	68,251						
y/y Growth	(24.2%)	(3.7%)	20.9%	5.1%	5.0%						

Source: Company reports and J.P. Morgan estimates.

Note: \$ in millions (except per-share data). Fiscal year ends Sep. o/w - out of which

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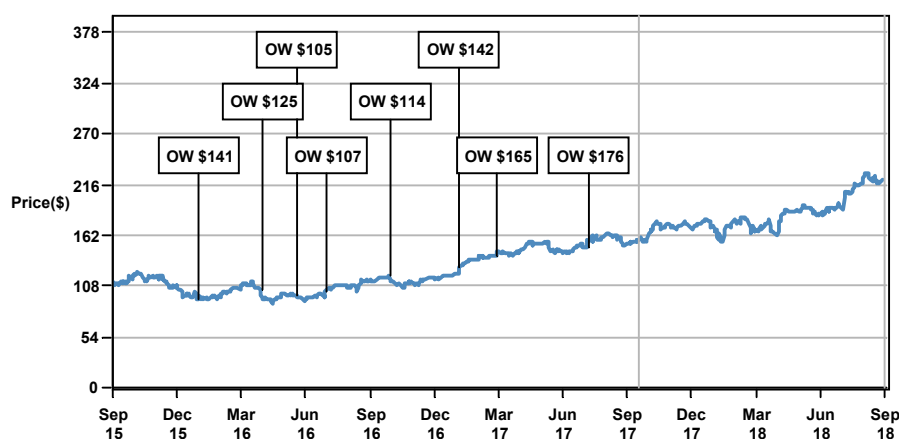
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Apple (AAPL, AAPL US) Price Chart



Date	Rating	Share Price (\$)	Price Target (\$)
27-Jan-16	OW	93.42	141.00
27-Apr-16	OW	104.35	125.00
16-Jun-16	OW	97.55	105.00
27-Jul-16	OW	102.95	107.00
26-Oct-16	OW	118.25	114.00
01-Feb-17	OW	128.75	142.00
26-Mar-17	OW	140.88	165.00
02-Aug-17	OW	150.05	176.00

Source: Bloomberg and J.P. Morgan; price data adjusted for stock splits and dividends.  
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