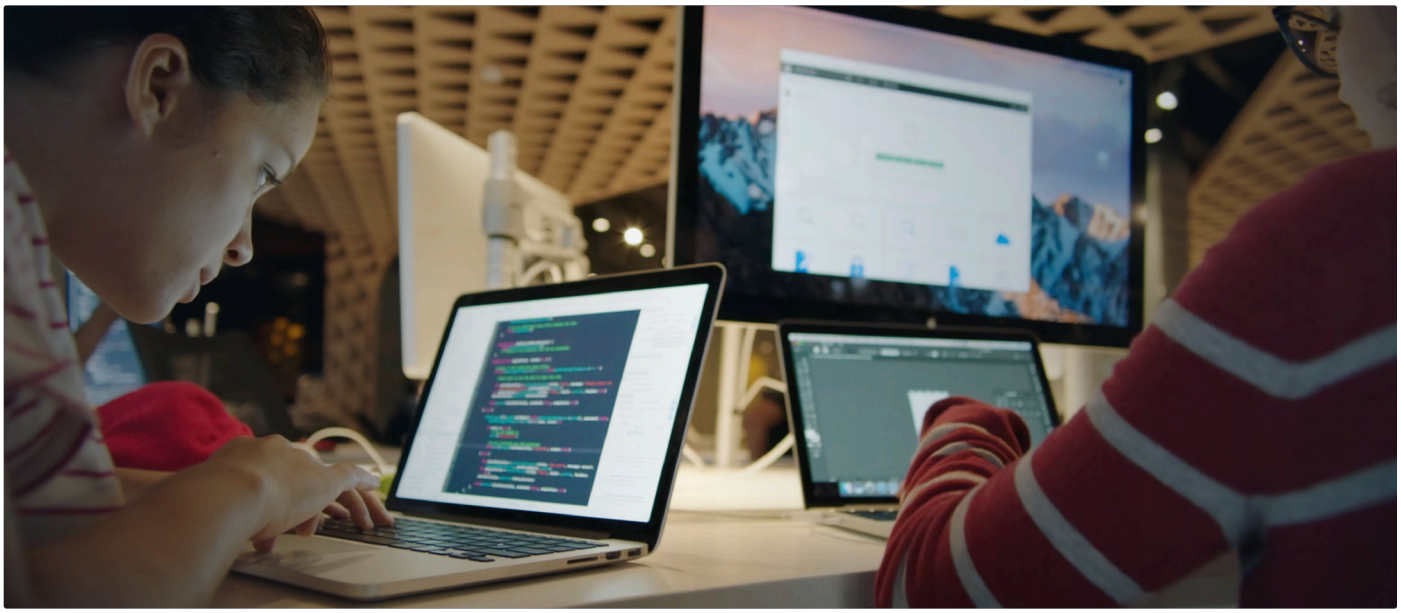
ANALYSIS GROUP

A Global Perspective on the Apple App Store Ecosystem

An exploration of small businesses within the App Store ecosystem



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When the App Store launched in 2008, it offered approximately 500 apps for the iPhone and iPod touch – an impressive number at the time but merely a fraction of what it offers now. Since then, the App Store has grown to offer millions of apps to one billion App Store customers worldwide, who have downloaded hundreds of billions of apps over the years.[i]

Those apps are at the center of a massive ecosystem. Last year, we estimated that the App Store ecosystem facilitated more than half a trillion dollars in billings and sales worldwide in 2019.[ii] The number was even larger in 2020, as the role played by apps grew during the coronavirus pandemic. As many users reduced their in-person interactions, they turned to apps to make purchases and to stay connected, entertained, and healthy. Most businesses, organizations, schools, and universities had to shift at once to digital technologies, including mobile technologies, which enabled remote work and learning. As online shopping and food and grocery orders soared, many small businesses had to start or accelerate their digital transition. This report documents substantial growth in the App Store ecosystem: **We estimate that billings and sales facilitated by the App Store increased by 24%, from $519 billion in 2019 to $643 billion in 2020**. (See Part 1.)

In January 2021, Apple launched the App Store Small Business Program, through which developers who earned less than $1 million per year on the App Store the prior year qualify for a reduced commission rate of 15%. Moreover, the App Store ecosystem facilitates the sales of a broader set of small businesses than those that monetize their apps directly through the App Store – for example, small developers who sell digital goods and services that are consumed on apps but purchased outside of the App Store; small developers who sell in-app advertising; and small businesses (not just developers) that sell physical goods and services through their own apps or through those of third-party platforms.

In this report, **we focus on small businesses and the ways in which the App Store supports their success**. We look at small developers, those with less than $1 million in earnings and fewer than one million downloads across all their apps in a given year (those criteria are not the same as those of the Apple Small Business Program). Small developers represented more than 90% of all developers on the App Store between 2015 and 2020. Many of them have grown quickly, and some businesses for which iOS apps are central to their business models have become large enough to become public companies or be acquired by other companies. In addition, small businesses – even those without their own apps – have benefitted from the App Store ecosystem through digital platforms, which connect them with consumers around the world through their apps. (See Part 2.)

The App Store aims to facilitate transactions between developers and users, and it becomes more valuable when developers create new and innovative apps. To encourage transactions and innovation, the App Store offers developers a global platform to distribute their apps to one billion App Store customers worldwide, with built-in support for various local payment methods. In addition, to help developers develop, distribute, and market their apps, Apple offers a large set of developer tools, resources, and educational and support programs. **Through these tools and the platform it provides, the App Store opens up meaningful opportunities for small developers**. (See Part 3.)

Part 1: How large is the App Store ecosystem? An update for 2020

Apple reported in 2020 that earnings it paid to developers summed up to about $39 billion worldwide in 2019. Such direct monetization through the App Store occurs through paid downloads and through in-app purchases of digital content and services, using Apple's in-app payment system. However, **direct monetization of apps significantly underestimates the size of the App Store ecosystem**. This is because developers can choose to monetize their apps in different ways, including several that do not involve transacting directly through the App Store. These other monetization strategies include selling digital goods and services outside of the App Store that can be used within apps on Apple devices (employed by, for example, multiplatform apps and reader apps such as streaming, education, and enterprise apps), selling physical goods and services (employed by, for example, grocery delivery apps), and offering ad-supported content (employed by, for example, social networking apps). Therefore, our study focuses on third-party iPhone and iPad apps, and account for billings generated through direct monetization via the App Store, and for sales generated through monetization outside of the App Store.[1]

We estimate that the App Store ecosystem facilitated $643 billion in billings and sales worldwide in 2020.[2] $86 billion originated from billings and sales of digital goods and services (13% of the total), $511 billion from sales of physical goods and services through apps (80% of the total), and $46 billion from in-app advertising (7% of the total). About 90% of total billings and sales facilitated by the App Store ecosystem in 2020 occurred outside of the App Store, meaning that Apple collected no commission on those sales. (See Table 1.)

Table 1: Estimated Billings and Sales Facilitated by the Apple App Store Ecosystem Worldwide, 2020*

Category	Billings and Sales ($ Billion)	Annual Change
Digital Goods and Services**	$86	+41%
Physical Goods and Services	$511	+24%
In-App Advertising***	$46	+4%
Total	**$643**	**+24%**

* Totals may not sum due to rounding.

** Estimated billings and sales from digital goods and services are not the same as total App Store billings. Our estimate also includes the volume of sales from digital goods and services purchased elsewhere but used on apps on Apple devices, and, conversely, subtracts billings from in-app purchases made via the App Store but used elsewhere. The estimate is based on a combination of third-party sources and Apple data. See Appendix for methodology.

*** Estimate of all in-app advertising sales for iOS apps.

1 Apps developed by Apple, such as Apple Music, and mobile browser apps, such as Google Chrome, are excluded from this analysis. Third-party apps featured within Apple TV are included in our analysis of video streaming.

2 We use the term "billings" to refer specifically to payments generated by paid downloads and in-app purchases, including subscriptions, that use the Apple in-app payment system, and the term "sales" to refer to money spent by customers purchasing goods and services in general. We use the term "facilitated" to include the various ways in which apps contribute to generating billings and sales.

While our analysis captures the major app monetization strategies in 2020, we do not capture *all* of the ways in which the App Store ecosystem facilitates sales or *all* of the benefits created by apps. A description of our methodology is included in the Appendix.

The App Store ecosystem facilitated $643 billion in billings and sales worldwide in 2020, a 24% increase compared to 2019.

The App Store ecosystem across app categories and regions

The three largest streams of sales from physical goods and services facilitated by the App Store ecosystem in 2020 originated from general retail ($383 billion), travel ($38 billion), and food delivery and pickup ($36 billion), all of which are part of the substantial mobile commerce ("m-commerce") category.

Out of total global billings and sales facilitated by the App Store ecosystem in 2020, China accounted for 47%, the US 27%, and Europe 12%. Compared to 2019, Europe's fraction of the global total increased slightly (up from 10%), while those of China and the US stayed the same. Table 2 provides further country and regional breakdowns by app categories. Appendix Tables 1 and 2 provide a similar breakdown for select countries in Europe, and Japan, Korea, and Australia and New Zealand, respectively.

Table 2: Estimated Billings and Sales Facilitated by the Apple App Store Ecosystem by Region and App Category, 2020*

	US	China	Europe****	Rest of the World	Total ($ Billion)
Digital Goods and Services**	**$33**	**$17**	**$9**	**$28**	**$86**
Physical Goods and Services	**$115**	**$277**	**$60**	**$59**	**$511**
M-Commerce					
General Retail	$74	$228	$44	$36	$383
Travel	$10	$12	$7	$9	$38
Food Delivery and Pickup	$10	$17	$4	$5	$36
Ride Hailing	$13	$6	$3	$4	$26
Grocery	$5	$11	$2	$4	$22
Digital Payment	$3	$3	-	-	$5
In-App Advertising***	**$27**	**$6**	**$5**	**$8**	**$46**
Total	**$175**	**$300**	**$74**	**$94**	**$643**

* Totals may not sum due to rounding.
** Estimated billings and sales from digital goods and services are not the same as total App Store billings.
*** Estimate of all in-app advertising sales for iOS apps.
**** Europe includes countries in Western, Central, and Eastern Europe (including the UK and the Nordic Region). Russia is included in the Rest of the World category.

Comparison with 2019: The impact of the coronavirus pandemic on the App Store ecosystem

In 2020, billings and sales facilitated by the App Store ecosystem rose by $124 billion, a 24% increase from 2019. However, this aggregate change masks important differences across categories and geographies. (See Table 3.) The large changes observed this year in many categories are consistent with our expectations, given the impact of the coronavirus pandemic.

Compared to 2019, total billings and sales of digital goods and services increased by 41%. The US and Europe saw the largest increases (+53% and +48%, respectively), followed by China (+27%). Within digital goods and services, all categories increased globally, with enterprise, video streaming, education, entertainment, and fitness seeing the largest increases. Video and music streaming increased more in Europe compared to the US and China, while education apps increased more in the US and Europe compared to China.

Apps have played a particularly central role during the coronavirus pandemic, as the virus increased mobile usage.[iii] The pandemic drove an increase in remote work, online schooling, gym closures, and home-based sources of entertainment such as video streaming. Each of these, in turn, contributed to the changes observed in the billings and sales of digital goods and services as most businesses, organizations, schools, and universities had to shift quickly to digital technologies.[iv] As many people reduced their in-person interactions with others, they turned to apps to make purchases and to stay connected, entertained, and healthy.[v]

In 2020, billings and sales of digital goods and services facilitated by the App Store ecosystem increased by more than 40%.

Compared to 2019, the sales of physical goods and services facilitated by the App Store ecosystem increased by 24%. As expected given the effect of the coronavirus pandemic, this aggregate figure includes large increases in some categories and large decreases in others. For example, sales facilitated by the App Store ecosystem in the travel and ride hailing sectors decreased by more than 30%, as mobility and tourism decreased in most of the world. Conversely, as online shopping soared and customers turned to online orders of food and groceries, and as many stores pivoted to a digital format, sales facilitated by the App Store ecosystem in the general retail, grocery, and food delivery and pickup categories all increased significantly. Looking at regional trends, **general retail sales within apps increased by nearly 70% in the US and more than 100% in Europe**. Similarly, **in-app food delivery and pickup and grocery increased by 30% and nearly 130% in the US, and by more than 60% and 50% in Europe**, respectively. In-app advertising revenues increased slightly, by 4%.

Table 3: Changes in Estimated Billings and Sales Facilitated by the Apple App Store Ecosystem by Region and App Category, 2019 to 2020

	US	China	Europe***	Rest of the World	Total % Change
Digital Goods and Services*	**+53%**	**+27%**	**+48%**	**+37%**	**+41%**
Physical Goods and Services	**+23%**	**+23%**	**+53%**	**+5%**	**+24%**
M-Commerce					
General Retail	+68%	+30%	+103%	+35%	+43%
Travel	-37%	-26%	-33%	-41%	-34%
Food Delivery and Pickup	+30%	+4%	+61%	+23%	+18%
Ride Hailing	-41%	-21%	-13%	-36%	-34%
Grocery	+128%	+54%	+53%	+16%	+56%
Digital Payment	+186%	+10%	-	-	+54%
In-App Advertising**	**+10%**	**-9%**	**-3%**	**+0%**	**+4%**
Total % Change	**+26%**	**+23%**	**+47%**	**+12%**	**+24%**

* Estimated billings and sales from digital goods and services are not the same as total App Store billings.

** Estimate of all in-app advertising sales for iOS apps. The source of our estimates for in-app advertising is Omdia. In 2021, Omdia considerably remodeled their historical estimates and projections based on new data and feedback from industry players. To calculate the changes in in-app advertising between 2019 and 2020, we rely on Omdia's revised 2019 figures, rather than the figures that were reported in our white paper last year.

*** Europe includes countries in Western, Central, and Eastern Europe (including the UK and Nordic Region). Russia is included in the Rest of the World category.

Throughout 2020, the coronavirus pandemic dramatically affected our daily lives. This study captures the many ways in which people have had to adjust their everyday activities, working or studying from home, shopping online, or turning to video streaming and online fitness during lockdowns, all of which affected the mobile economy and app usage. While some of these trends may gradually return to pre-pandemic levels, as economies reopen and in-person social interactions become more prevalent, we expect some of these changes to persist, as they represent fundamental and possibly permanent shifts in the way individuals, businesses, and organizations use digital tools.

Part 2: The success of small businesses on the App Store

The App Store ecosystem includes businesses of all sizes. Some businesses are large household names. Others are small, with just a few employees, or one self-employed individual.

In this section, we focus on small businesses that have achieved substantial success on the App Store. We consider various measures of success. First, we note that many small developers (a type of small business) have grown quickly, some to the point that they are no longer small. Second, we describe how some businesses for which iOS apps are central to their business models have become large enough to become public companies or to be acquired by other companies. Third, we discuss how small businesses, even those without their own apps, have also benefited from digital platforms on the App Store, which connect those businesses with consumers around the world through their apps.

The growth and success of small developers on the App Store (2015–2020)

Definition
We consider a developer to be a **small developer** in a given year if it had fewer than 1 million downloads and less than $1 million in earnings across all its apps in that year (those criteria are not the same as those of the Apple Small Business Program). We exclude from our analyses developers who never had more than 1,000 annual downloads between 2015 and 2020.

The App Store supports hundreds of thousands of small developers. In fact, between 2015 and 2020, more than 90% of all developers on the App Store met our definition of "small." (See Definition.) Moreover, **the number of small developers has grown, increasing by 40% between 2015 and 2020**.

> *More than 90% of all developers on the App Store in 2015–2020 were small developers.*

Small developers have achieved substantial success on the App Store. We show this through four analyses.

First, the App Store earnings of small developers grew substantially over the time period we studied. We analyzed the group of developers who were small in 2015.[3] As shown in Figure 1, **the earnings for this group of developers nearly tripled between 2015 and 2020**.

3 To limit the effect of a few large-scale successes driving the results, this analysis excludes developers that earned $10 million or more in any subsequent year.

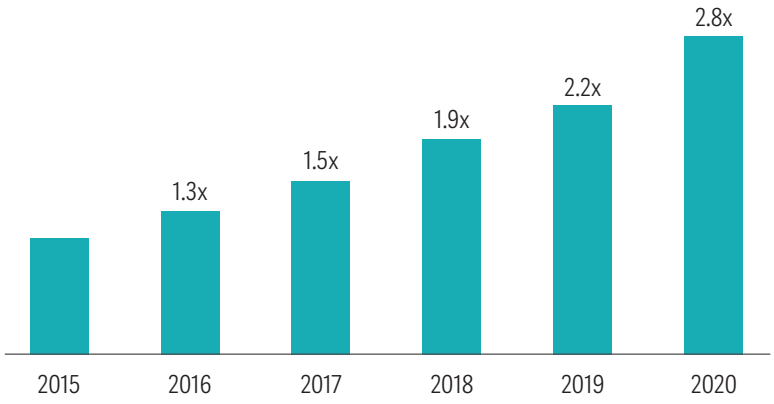
Examples of apps that have experienced significant growth in downloads and earnings

Loopsie (IT, 2018)
This app transforms photos into 3D images. Founded by 3 university friends, it now has 5 full-time employees. In 3 years, earnings grew from $16K to $2M+.

Makaron (CN, 2018)
Winner of Apple's 2018 "App of the Year" in the China App Store, this app from developer Versa produces images, videos, and more. Staff grew 5x since launching. The app has accumulated nearly 8M downloads, mostly in China, Japan, and Southeast Asia. In 2 years, the company valuation nearly tripled, reaching $150M.

Butterfly iQ (US, 2018)
This app powers a single whole-body ultrasound probe that works with smartphone and tablet apps. Within 2 years, the company doubled its workforce from 100 to 200.

Figure 1: Small Developers in 2015: Growth in App Store Earnings



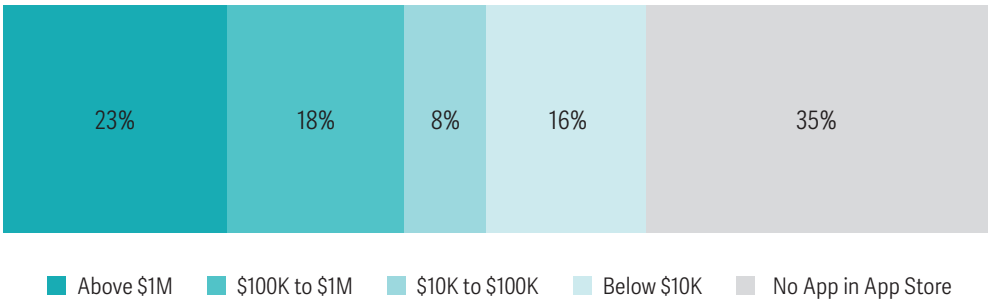
Second, many small developers have experienced high download growth. We examined the set of developers who were small and had at least 1,000 downloads in their first full year on the App Store.[4] Among this group, **more than one in five saw an increase in downloads of at least 25% annually** since their first full year on the App Store. These developers may monetize their apps in a variety of ways, including several that do not involve transacting directly through the App Store, or they may have other goals than monetizing their apps. Download growth is a reasonable proxy for their success.

Third, many small developers who sell digital goods and services on the App Store have experienced significant growth in App Store earnings. We examined the set of developers who were small and had earnings of at least $1,000 in their first year on the App Store. We find that **one in four saw an increase in earnings of at least 25% annually** since their first full year on the App Store, and **one in eight saw an increase of at least 100%**.

Finally, some small developers grew enough to exceed our definition of small. We identified the set of developers that had more than $1 million in earnings in 2020 and summed up their App Store earnings in 2015. As shown in Figure 2, **only 23% of developers with at least $1 million in earnings in 2020 already earned more than $1 million in 2015**. By contrast, 42% were active in the App Store but earned less than $1 million in 2015, and 35% were not active on the App Store in that year.

4 Our analyses of download and earning growth include developers whose apps were first released on the App Store in 2014 or later.

Figure 2: Where Were 2020's Large Developers in 2015? (Earnings)



While our focus is on the growth of small developers, it is important to remember that many small developers on the App Store who do not achieve the growth thresholds we describe above still enjoy substantial and continued success. Apps from developers that have experienced sustained success include:

Streaks (Australia, 2015) – This to-do list app to form good habits from Crunchy Bagel won the Apple Design Award in 2016. The team of two built a business that grew steadily over the past six years.

Cone (India, 2017) – Kushagra Agarwal created Cone, his first app, so he could identify colors in daily life, before releasing it to the public. He later created a filtering app to help the colorblind and a meditation app.

Afterlight (US, 2017) – This photo editor app began as the joint project of two brothers. Its earnings have grown steadily and the app is now supported by a team of six. The app has over 500,000 monthly users.

Notable successes: Going public or being acquired

"[The IPO]'s going to allow us to accelerate our growth into more markets and scale our mission…To realize that kind of change, you have to reach a lot of people, and the App Store has enabled us to do that." – Bumble

A number of businesses for which iOS apps are central to their business models have achieved other milestones of success: an IPO, in which shares of the private company are offered to the public, often after substantial growth and with great fanfare; or an acquisition, in which businesses are purchased by other companies that saw value in the acquisition.

More than 75 businesses in the US and Europe for which iOS apps are central to their business models went public or were acquired since 2011.

Methodology
We obtained IPO and acquisition data from Crunchbase. We examined IPOs and acquisitions in relevant categories between January 2011 and March 2021 for which the business headquarters were in the US or Europe. For IPOs, we focused on companies listed on prominent stock exchanges. For acquisitions, we focused on companies that were acquired for more than $250 million.

For each company examined, we assessed whether iOS apps were central to its business model at the time it went public or was acquired based on contemporaneous business documents and media coverage. We looked in particular for sources that addressed whether a substantial portion of the company's business was tied to the App Store at the time of the IPO or acquisition.

See Appendix Tables 3 and 4 for the full list of the IPOs and acquisitions included in our analysis.

This group of publicly offered or acquired businesses includes the creators of a variety of businesses, including:

- Snapchat, the social media app, which went public in 2017 at a $33 billion valuation
- Stitcher, the podcasting app, which was acquired in 2020 for $325 million
- Unity, the developer of a platform that allows developers to build mobile gaming apps, which went public in 2020 at a $13.7 billion valuation
- Bumble, a dating app, which went public in 2021 at an $8.2 billion valuation

This group also includes companies with a diversity of business models and monetization strategies, including:

- MyFitnessPal, a nutrition and exercise app, which monetizes via in-app advertising (adding paid subscriptions after it was acquired)
- Rovio, the developer of gaming app Angry Birds, which monetizes via both in-app purchases and in-app advertising
- Deliveroo, a food delivery startup, which collects a commission on transactions for physical goods and services

Using publicly available information, we identified a set of businesses in the US and Europe for which iOS apps are central to their business models that have gone public or been acquired since 2011. (See sidebar.)

IPOs: We identified 40 businesses in the US and Europe for which iOS apps are central to their business models that went public since 2011. These companies had an aggregate market valuation of more than $450 billion at the time of their IPOs. As shown in Table 4, this group includes companies in categories such as gaming, social networks, and food delivery and pickup.

Table 4: IPOs by Companies for Which iOS Apps Are Central to Their Business Models, US and Europe

Category	Number of IPOs			Aggregate Valuation at IPO ($ Billion)
	US	Europe	Total	
Games	3	8	11	$46
Social Network	7	0	7	$175
Food Delivery and Pickup	3	3	6	$66
Other	3	2	5	$38
App Developer Tools	4	1	5	$20
Ride Hailing	2	0	2	$106
Digital Marketplace	1	1	2	$7
Digital Payments	2	0	2	$1
Total	**25**	**15**	**40**	**$459**

Examples of IPOs and acquisitions of companies for which iOS apps are central to their business models

MyFitnessPal (US)
Fitness
Acquired in 2015 for $475M
In-app advertising

NetMarble (KR)
Mobile games
IPO in 2017 at $11B valuation
Digital goods and services, in-app advertising

MedPhone (BR)
Health care
Acquired in 2020 for $1.2M
Digital goods and services

Peak Games (TR)
Mobile games
Acquired in 2020 for $1.85B
Digital goods and services, in-app advertising

Bumble (US)
Online dating
IPO in 2021 at $8.2B valuation
Digital goods and services

Deliveroo (UK)
Food delivery
IPO in 2021 at $10.5B valuation
Physical goods and services

Acquisitions: We also identified 39 businesses in the US and Europe for which iOS apps are central to their business models that were acquired since 2011. As shown in Table 5, these companies were purchased for a total of more than $45 billion.

Table 5: Acquisitions of Companies for Which iOS Apps Are Central to Their Business Models, US and Europe

Category	Number of Acquisitions			Aggregate Price at Acquisition ($ Billion)
	US	Europe	Total	
Games	4	6	10	$8.6
App Developer Tools	6	2	8	$4.5
Other	4	2	6	$4.7
Enterprise	6	0	6	$4.3
Food Delivery and Pickup	3	0	3	$1.0
Social Network	2	0	2	$20.0
Utilities	2	0	2	$1.7
Retail	1	1	2	$1.0
Total	**28**	**11**	**39**	**$45.8**

Our analyses are conservative because they do not include many companies for which iOS apps matter for their success but that also derive a substantial portion of their business from channels and platforms outside of the App Store. For example, our lists do not include:

- Airbnb, which went public in 2020 at a $47 billion valuation, and whose iOS app had been downloaded 121 million times at the time of its IPO
- Trulia, which was acquired in 2014 for $3.5 billion, and whose iOS app had been downloaded 12 million times at the time of its acquisition
- Etsy, which went public in 2015 at a $1.8 billion valuation, and whose iOS app had been downloaded 20 million times at the time of its IPO
- Yelp, which went public in 2012 at an $898 million valuation, and whose iOS app had been downloaded eight million times at the time of its IPO[vi]

While our quantitative review focused on the US and Europe, IPOs and acquisitions of companies for which iOS apps are central to their business models have taken place across the world. (See sidebar for examples.)

Digital platforms, apps, and small businesses

Small businesses can benefit from the App Store ecosystem even when they do not have their own apps. In particular, with the growth of digital platforms worldwide, the apps of many online marketplaces and other platforms have become central to connecting millions of small businesses and entrepreneurs throughout the world with tens of millions of consumers. Through digital platforms and their apps, small businesses can build an online presence and can access digital tools that would be otherwise unavailable.

These platforms have developed in many different sectors, including:

- General retail, with marketplaces such as Taobao, eBay, Etsy, and Mercado Libre
- Travel, with Airbnb and VRBO, all of which connect hosts and guests worldwide
- Food delivery and pickup, with apps such as DoorDash, Deliveroo, Uber Eats, Grab, and Meituan Waimai, which have allowed millions of restaurants to offer online pickup and delivery options
- Grocery delivery, with apps such as Instacart and Cornershop

Hundreds of billions of dollars in sales are facilitated by the App Store ecosystem, much of which happens through large digital platforms.

Table 6: Select List of Large Digital Platforms

Category	Digital Platform	Origin Country	Estimated Number of Businesses*	Monthly Active Users (Million)**
General Retail	Taobao	China	10 million active storefronts	441.8
	Amazon	US	1.6 million active sellers worldwide	293.3
	eBay	US	20 million active sellers worldwide	113.9
	Mercado Libre	Argentina	12 million active sellers	99.9
	Etsy	US	4.4 million sellers	15.9
Travel	Airbnb	US	4 million hosts	38.2
	VRBO	US	2 million homes	3.0
Food Delivery and Pickup	Grab	Singapore	2 million merchant partners	79.3
	UberEats	US	600,000+ restaurants	69.8
	Meituan Waimai	China	6.8 million restaurants	61.4
	Doordash	US	390,000 merchants in US, CA, and AU	22.3
	Grubhub	US	265,000 partner restaurants in US	10.2
	Deliveroo	UK	115,000 restaurants and grocers	7.3
Grocery	Instacart	US	300 retailers, 3,000+ independent grocers	6.4
	Cornershop	Chile/Mexico	1,000+ stores in Latin America	1.6

* Sources: company documents or website, market research.
** Sources: App Annie and iiMedia. Includes all mobile users.

Digital platforms have also emerged in many other industries. Examples abound: ClassPass in the fitness space, Getaround for car sharing, Rover for dog walking, Care for child care and other services, Thumbtack for home services, Insight Timer for meditation classes, and Talk Space for mental health consultations.

Platforms have been central to connecting millions of small businesses worldwide with tens of millions of consumers through their apps.

Digital platforms can also connect specialized audiences, such as the Danish app Too Good to Go for reducing the food waste of restaurants and grocery stores, the French app Ollca for online orders at local shops, and the US-based EatOkra and Oya for locating Black-owned restaurants and women-owned businesses, respectively.

As the coronavirus pandemic swept through the world in early 2020, businesses and entrepreneurs had to adjust quickly. Many were able to offer alternative ways to reach customers through platform apps. For example, many restaurants and small shops in Europe turned to platforms such as Deliveroo, Ollca, and Cajoo, allowing them to pivot to mobile distribution strategies in a short amount of time.

Examples of apps with global reach

KidloLand (IN, 2012)
This award-winning learning app with 6M+ downloads worldwide provides learning resources for young children. Having started with 5 employees and 3 songs, it now employs 40 people and offers 3K+ songs, games, and stories.

Tangerine (EE/PT, 2020)
Created by 2 part-time developers, this self-care app was "App of the Day" in 100+ countries. The app has almost 6K daily active users and is expected to double its earnings in 2021.

Chani (US, 2020)
This app combines astrology, meditation, and mindfulness. In only 5 months, its team grew from 4 to 15 employees, and had over 520K+ downloads in the US, Canada, Europe, Australia, and another 40+ countries.

Part 3: How the App Store supports the growth of small developers

The App Store connects hundreds of thousands of small developers with one billion App Store customers who are interested in their apps throughout the world. Like other two-sided platforms, the App Store aims to facilitate transactions between developers and users. The ecosystem becomes more valuable when developers create new, diverse, and innovative apps, even when those apps are not directly monetized on the App Store. To encourage transactions between users and developers, the App Store offers developers a global platform to distribute their apps to one billion customers worldwide, with support for various local payment methods. Additionally, to help developers develop and market new apps, regardless of their business models, Apple offers a large set of tools and resources, as well as educational programs and support.

Access to local storefronts around the world

The App Store is a global marketplace visited by more than half a billion people each week through local storefronts in 175 countries, including 20 new storefronts in Europe, Asia, Africa, and Oceania that opened in 2020.[vii] This global distribution platform allows developers – including small developers with limited resources – to offer and seamlessly distribute their apps (and app updates) to customers around the world. In addition, the App Store assists developers in monetizing their apps globally, including with:

- Localized price tiers that are adjusted to each market or region and updated for changes in taxes and foreign exchange rates
- Payment processing, to make it easy for users around the world to pay for apps and make in-app purchases with local payment methods, including backup payment methods and a billing grace period for digital subscriptions to prevent payment and service interruptions and to help developers avoid losing customers
- Tax administration, to make it easier for developers to comply with local laws

The App Store's curated local storefronts support many languages, almost 200 local payment methods, and 45 local currencies, and help customers search and discover relevant apps.

> *About 40% of all downloads of apps from small developers came from users outside of the developers' home countries.*

The App Store's global distribution platform can offer small developers unique opportunities to grow and expand their businesses; indeed, the large majority of small developers take advantage and transact globally. In 2020, **about 40% of all downloads of**

Example of local app

YAMAP (JP, 2013)
This Japanese app for outdoor activities provides information about routes and trails in Japan, especially for mountain hikers. The app is available in Japanese and English, and 99% of users are from Japan.

apps from small developers came from users outside of the developers' home countries. Nearly 80% of small developers are active in multiple storefronts, and, on average, developers that monetize their apps on the App Store on multiple storefronts have earnings from users in more than 40 storefronts. There is a positive relationship between the size of a small developer and the number of storefronts in which it is active, indicating that for many small developers, global expansion provides an opportunity to grow their businesses.

While some small developers take advantage of the App Store's global distribution, others choose to offer apps with a local or regional focus, and are primarily distributed in a few countries. (See sidebars on pp. 13-14 for examples of both types.)

Access to payment methods

The App Store offers users the ability to pay for apps and make in-app purchases using most credit and debit cards, and in certain countries or regions, Apple Pay and store credit (from redeeming gift cards or adding funds to their Apple IDs). Apple also supports other third-party payment methods (alternative payment methods) in 69 storefronts, and continues to add support for new payment methods globally. Since 2015, 54 storefronts have added such alternative payment methods. Of those storefronts, 48 added carrier billing, whereby users can charge App Store purchases to their mobile phone carrier bills. In total, the App Store now offers carrier billing for more than 100 mobile carriers around the world.

> *In the last six years, new payment methods (other than credit and debit cards) have brought more than 60 million new-to-paid or reactivated customers in their first year alone.*

Developer quotes

"The App Store makes it easy to launch the app in different locations and in different currencies […] It's been a big help to not have to worry about different currencies or different payment methods." – flowkey

"As a small company, we didn't have the resources to go international by ourselves, but Apple gave us the tools we needed for expansion. For example, we would have never guessed we would be in Turkey, but the App Store analytics gave us a really clear sign that we needed to go there — and now people love us there." – Makaron

The wide range of supported payment methods – coupled with the App Store's assistance with tax administration and remittance, local currency conversions, and monitoring of fraudulent transactions – benefit developers who aim to monetize their apps globally but may lack the resources and infrastructure to do so. Without the App Store's integration of these alternative payment methods, it would have been particularly difficult (or prohibitive) for small developers to contract with numerous mobile carriers around the world, or arrange for users to pay using popular alternative payment methods and digital wallets such as TrueMoney in Thailand, KakaoPay in South Korea, and Alipay in China.

App Store billings from alternative payment methods are substantial and important for developers seeking to reach a growing mass of global users. A share of these billings is incremental, that is, they come from users who have not purchased anything from the App Store in the past 12 months ("new-to-paid" or "reactivated"). In the last six years,

new payment methods (other than credit and debit cards) have brought more than 60 million new-to-paid or reactivated customers in their first year of launch alone. This improved ability for developers to monetize their apps globally benefits small developers in particular because it would have been prohibitive for them to negotiate payment agreements around the world in the absence of the App Store's built-in payment support. The addition of new customers and the improved monetization increase the value of the App Store ecosystem to the benefit of users and developers.

Apple provides tools and technologies to help developers create and manage apps and games

Apple continuously invests in ways to make it easier for developers to create and manage new and innovative apps. For instance, Apple provides tools that are either free or included in the Apple Developer Program membership for all developers so that they can create, develop, test, publish, and upgrade apps.

- Apple provides an **Integrated Development Platform** – Xcode – for developers to design, code, test, and debug apps. Apple continuously updates the platform.
- In 2014, Apple introduced Swift, a **programming language** designed to make it easier for developers to create apps.
- Xcode includes all the technologies necessary for developers to add different functionalities to their apps. These **building blocks for apps** (called software development kits, or SDKs, and application programming interfaces, or APIs) let developers add new functionalities to their apps, often with a simple click and drag. Apple offers over 250,000 APIs, and, as Figure 6 illustrates, it has released new SDKs every year since 2008, adding up to more than 40.
- Apple provides tools to easily test, debug, and publish apps. For example, since 2014, TestFlight allows developers to invite users to test initial versions of their apps.
- Apple also provides design guidelines and resources, including templates for all necessary in-app components, to make it easier and less time-intensive for developers to design apps.

> *Apple's tools and technologies make it easier to create apps and games, and make it possible for anyone to try developing them.*

These tools and technologies make it easier to create apps and games, and they make it possible for anyone to try developing apps.

Did you know?

Developing apps has become **significantly cheaper** over the last decade.[viii]

The limited number of Apple devices and operating systems **minimizes fragmentation**, making it easier and less costly to develop apps, since they need to be designed for a small number of devices and operating system versions.[ix]

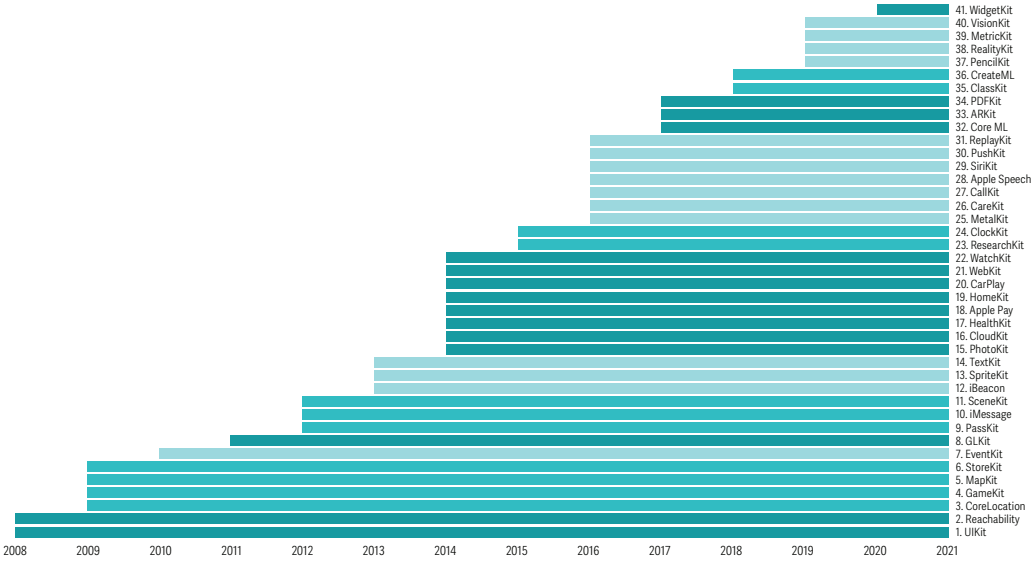
Apple makes it easy for developers to **port their iPhone and iPad apps to other Apple devices**, such as Macs, Apple TVs, and Apple Watches. For instance, Xcode allows developers to convert iOS apps into Mac apps, sometimes simply by clicking a checkbox.

Some developers have found that developing apps on iOS takes approximately **30% less time** than in other platforms, such as Android.[x]

Studies have shown that **some third-party SDKs are unsafe** and exhibit poor privacy practices, such as exploiting the app's permissions, leaking private information, and tracking users.[xi]

Apple also supports developers after their app launch, with tools such as crash reporting, performance metrics, phased rollouts, and ratings and reviews, allowing developers to measure the performance of their apps.

Figure 3: Availability of Select Apple SDKs



Apple SDKs offer certain advantages to developers over creating their own tools, or using alternative third-party solutions:

- As opposed to coding functionalities themselves, using SDKs allows developers to cut costs and reduce the technical skills needed to release an app. For example, the developers of the Japanese hiking app YamaReco explained that they used "SpriteKit on watchOS to draw trail maps" so they did not have to create a "completely new library from scratch."
- Compared to alternative third-party solutions, Apple SDKs automatically benefit from system updates and bug fixes. This prevents developers from having to deal with performance issues related to outdated third-party SDKs, such as apps crashing or storing data improperly.[xii] Additionally, because these SDKs have been developed by Apple, developers can trust that they are safe and free of malware, and will protect users' privacy.

Developers are indeed choosing to use these tools. For example, within the set of SDKs tracked by App Annie, more than 75% of installed location and payment SDKs were developed by Apple.

Some of Apple's SDKs, such as **MapKit**, **SiriKit**, and **CoreML**, are used by a large number of developers to add functionalities that can improve their apps. Many of them can be integrated into an app in a single package. This allows developers to build apps in a flexible

way, providing certain functionalities from the start while letting them add more services, such as support for Siri, later on.

Other SDKs developed by Apple have allowed developers to build and create new apps in entirely new product spaces. For example, **HealthKit**, released in 2014, allows more than 6,000 approved apps to securely collect and manage health and fitness data, while ensuring user data privacy. HealthKit allows developers to not have to build their own health tracking system, which, as the developers of the exercise app Wakeout! stated "would have been just another weight on our shoulders." Since 2018, **ClassKit** has allowed educators to manage student data, assign problems in different apps, and track students' progress. Developers have installed ClassKit more than 71,000 times. The release of **ARKit** in 2016 has allowed developers to create new apps or improve existing ones by adding augmented reality-based functionalities. This tool has become crucial for many developers, such as those of the home design app Primer: AR Home Design, who explained that "our app and our business would not exist without it. We don't just use ARKit … ARKit is the entire app."

Many widely successful apps rely on the environment and tools that Apple provides. Some of these rely on an extensive set of Apple SDKs, while others use particular tools to provide key new functionalities for their apps.

Examples of successful apps relying on Apple SDKs

YamaReco (Japan, 2016) – Launched with two employees and two part-time workers, this app helps hikers and mountain climbers check their route and location, even without phone signal. It has nearly 300,000 downloads.

Wakeout! (Guatemala, 2017) – This app uses HealthKit to provide brief workouts to users. It started with 80 exercises in 2017 and now offers 1,500. In 2020, its users accomplished more than 1.6 million exercises.

Learn Math Facts (US, 2019) – This app, which has over 100,000 downloads and is available in 10 languages, uses ClassKit, CoreML, and PencilKit to help children learn math through quizzes.

Primer: AR Home Design (US, 2020) – This app uses ARKit to let users visualize how different paints, wallpapers, and tiles would look in their own spaces. In the first year, the team grew from three to eight, and over 500,000 users visualized a virtual swatch from over 5,000 AR products.

Initiatives to strengthen and grow the iOS community

Another way Apple invests in making it easier for developers to create and manage new and innovative apps is by providing different educational and mentorship programs around the world. Through those initiatives, Apple provides support for small developers, entrepreneurs, and others interested in learning more about developing iOS apps, in order to strengthen and grow the iOS developer community. We group Apple's education support into three broad categories, depending on when these initiatives impact the life cycle of a developer: early support, education support, and entrepreneur support.

Coding education programs in numbers

1.9M students and educators reached in 2020

9K institutions using Apple curriculum

27 countries

15 languages

Thousands of WWDC scholarships

1K teams from over 300 universities across China registered for the Mobile App Contest initiative in 2020

Developer Academy in numbers

Over 10K graduates

51 nationalities

6x more women in 7 years

431 WWDC Scholars

Over 1.5K apps

Over 160 startups

1K students/year to enroll in the US

Apple Entrepreneur Camp in numbers

2019: 100 participants, 13 countries, 42 women companies

2021: first cohort of 13 Black founders and developers and their teams

- **Early support initiatives** target those new to coding, and can function as an entry point to iOS, and eventually the App Store, by connecting novice developers to the broader iOS space.
  - **Coding education programs** such as Everyone Can Code, Develop in Swift, and the app Swift Playgrounds provide learners of all ages and levels, as well as educators, with tools to learn to code in Swift.
  - The **WWDC Scholarship** provides an opportunity for students in STEM programs to attend the Apple Worldwide Developers Conference.
  - The **Student Mobile App Contest** seeks to introduce college students in China to the tools needed to launch new apps.
- **Education support initiatives** offer a comprehensive array of training modules on topics such as coding, marketing and presenting, and navigating the app economy.
  - The **Developer Academy** is one of Apple's largest education initiatives to date. Launched in 2013, the program is now active in Brazil, Indonesia, Italy, and France, and will soon be in Korea.[5] As part of its new Racial Equity and Justice Initiative, Apple selected Detroit for the first US academy, starting in 2021. Students can enroll in either a 30-day program or a 10 to 12-month course.
  - **Apple-supported certifications**, such as the App Development with Swift certification, recognize advanced proficiency in Swift, Xcode, and other important tools for iOS developers.[xiii]
- **Entrepreneur support initiatives** include camps, labs, and workshops, to help startups and developers in the App Store ecosystem launch or scale apps, learn about new tools, and take advantage of expert mentorship.
  - **Apple Entrepreneur Camp** targets underrepresented entrepreneurs with new or existing apps. Currently focused on women-owned businesses and Black founders and developers.

5 Brazil has 10 academies and three foundation programs; Indonesia has three academies and three foundation programs; Italy has one academy and seven foundation programs; and France has four foundation programs.

Developer quotes

"Apple Entrepreneur Camp was tremendous – it reshaped the app, the product and the business and gave us quite a substantial push." – Lake

"So I basically kicked off then and went on as a hobby project to...WWDC, and from there we founded the company. I brought over some people I met at WWDC, which was pretty cool, and took it from there. It got some traction and the company grew." – Vectornator

- **App Accelerators** in China (Shanghai) and India (Bengaluru) introduce developers to the tools needed to launch apps across multiple Apple platforms through labs and mentorships from Apple experts.
- **Developer Workshops** support entrepreneurs, small businesses, and developers in general, with group and one-on-one sessions with Apple experts on specific topics to help them improve their apps. Participants can learn about new technologies, such as CoreML, App Clips, Widgets, and watchOS, as well as business features, such as subscriptions and family sharing for in-app purchases. Apple organizes these workshops around the world. For example, the company joined France's new Station F campus with a "mentorship office" for entrepreneurs, where participants can readily access expert advice.[xiv] Another example is in Japan, where Apple has multiple workshops, including one-on-one sessions, to introduce developers to the subscription business model.

Many alumni from these initiatives have taken advantage of Apple's support and used Apple's developer tools to successfully launch apps on the App Store, to create startups that have expanded beyond the small business threshold, and to develop apps that have been downloaded globally.

Alumni Highlights

flowkey (Germany, 2015) – Available in 12 languages, this app from an Apple developer workshop participant helps users of all levels to learn and practice piano. Created by three friends, it now employs over 50 people. The app has three million users and over 100,000 paying subscribers.

Rogervoice (France, 2015) – This app from a Station F participant provides real-time transcription for phone conversations. Since launching, 50,000 users have called 290,000 contacts and spent four million minutes in calls. The number of employees has increased from 10 to 50.

Lake (Slovenia, 2017) – This coloring app, downloaded eight million times, features designs from artists worldwide, who participate in a revenue-sharing model. Lake was part of the 2019 Entrepreneur Camp and WWDC since launching. Employees almost doubled in the last three years.

Vectornator (Germany, 2017) – This graphic design app, created by a WWDC Swift Student Challenge winner, now employs a team of 40, including four WWDC Scholarship winners. In three years, it reached 30,000 ratings, about 400,000 monthly active users, and over four million downloads.

Noted. (UK, 2018) – This app from an Apple developer workshop participant is a recording and note-taking tool. Each month, over 70,000 active users, of whom about 1,000 are visually impaired, record 60,000 Apple Watch notes, and take more than 35,000 notes. In two years, the app earned over $500,000.

Appendix

Appendix Table 1: Estimated Billings and Sales Facilitated by the Apple App Store Ecosystem for Select European Countries and by App Categories, 2020*

	UK	Germany	France	Italy	Spain
Digital Goods and Services**	**$2.6**	**$1.5**	**$1.1**	**$0.5**	**$0.3**
Physical Goods and Services	**$26.4**	**$9.3**	**$6.3**	**$2.0**	**$2.1**
M-Commerce					
General Retail	$20.2	$6.8	$4.7	$1.4	$1.5
Travel	$2.0	$1.6	$0.7	$0.4	$0.4
Food Delivery and Pickup	$1.9	$0.5	$0.4	$0.1	$0.1
Ride Hailing	$1.3	$0.2	$0.3	$0.0	$0.1
Grocery	$1.0	$0.2	$0.2	$0.0	$0.1
In-App Advertising***	**$2.4**	**$0.4**	**$0.6**	**$0.4**	**$0.3**
Total	**$31.4**	**$11.2**	**$7.9**	**$2.9**	**$2.7**

* Totals may not sum due to rounding.
** Estimated billings and sales from digital goods and services are not the same as total App Store billings.
*** Estimate of all in-app advertising sales for iOS apps.

Appendix Table 2: Estimated Billings and Sales Facilitated by the Apple App Store Ecosystem for Select Countries and Regions and by App Categories, 2020*

	Japan****	Korea	Australia and New Zealand
Digital Goods and Services**	**$14.4**	**$1.5**	**$1.5**
Physical Goods and Services	**$16.4**	**$13.1**	**$5.4**
M-Commerce			
General Retail	$10.6	$10.6	$2.4
Travel	$2.3	$1.0	$1.0
Food Delivery and Pickup	$1.2	$0.4	$0.8
Ride Hailing	$0.5	$0.3	$0.7
Grocery	$1.8	$0.8	$0.5
In-App Advertising***	**$3.8**	**$0.4**	**$0.8**
Total	**$34.6**	**$14.9**	**$7.7**

* Totals may not sum due to rounding.
** Estimated billings and sales from digital goods and services are not the same as total App Store billings.
*** Estimate of all in-app advertising sales for iOS apps.
**** In estimating the portion of mobile sales that occurred in apps compared to mobile web browsers, we rely on estimates from J.P. Morgan's E-commerce Payments Trends Report. J.P. Morgan's estimate for the share of in-app sales in Japan decreased markedly between 2019 and 2020, reflecting changes in consumer m-commerce habits as Japan's m-commerce grows and matures. During this transition, a certain level of fluctuation in estimates are to be expected.

Appendix Table 3: IPOs by Companies for Which iOS Apps Are Central to Their Business Models, US and Europe

Games	Social Network	Food Delivery and Pickup
G5 Entertainment (2014)	Facebook (2012)	Deliveroo (2021)
GAN (2020)	HearMeOut (2016)	Delivery Hero (2017)
Hugo Games A/S (2015)	Life360 (2019)	DoorDash (2020)
IsCool Entertainment (2012)	Pinterest (2019)	Grubhub (2014)
Kahoot! (2019)	Snap (2017)	Just Eat (2014)
King.com (2014)	The Meet Group, Inc. (2011)	Olo (2021)
Nitro Games (2017)	Twitter (2013)	
Roblox (2021)		
Rovio Entertainment (2017)		
Rush Street Interactive (2020)		
Zynga (2011)		

App Developer Tools	Other	Digital Marketplace
Agora.io (2020)	Bumble (2021)	ACV (2021)
Millennial Media (2012)	DropCar (2018)	Scout24 (2015)
Nektan USA (2014)	Spotify (2018)	
Square (2015)	Sprout Social (2019)	
Unity Technologies (2020)	Storytel (2015)	

Digital Payments	Ride Hailing
Pushpay (2014)	Lyft (2019)
Shift4 Payments (2020)	Uber (2019)

Appendix Table 4: Acquisitions of Companies for Which iOS Apps Are Central to Their Business Models, US and Europe

Games	App Developer Tools	Enterprise
Big Fish (2014)	AdColony (2021)	AirWatch (2014)
Easybrain (2021)	Adjust (2021)	Epocrates (2013)
Glu Mobile (2021)	Fyber (2021)	Fiberlink (2013)
Goodgame Studios (2017)	Kony (2019)	MobileIron (2020)
Hutch (2020)	MoPub (2013)	PlanGrid (2018)
Machine Zone (2020)	Paydiant (2015)	Zenprise (2012)
Outfit7 (2017)	Teads US (2017)	
Peak Games (2020)	Vungle (2019)	
Small Giant Games (2018)		
Storm8 (2020)		

Other	Food Delivery and Pickup	Utilities
Grindr (2020)	Bite Squad (2018)	Check (2014)
iZettle (2018)	LevelUp (2018)	Waze (2013)
MyFitnessPal (2015)	Waitr (2018)	
Nearpod (2021)		
Shazam Entertainment (2017)		
Stitcher (2020)		

Retail	Social Network
Dosh (2021)	Instagram (2012)
Trendyol Group (2018)	WhatsApp (2014)

Methodological approach

To arrive at our results, we distinguish among three primary app monetization strategies that developers use:

- **The first monetization strategy is to sell and distribute digital goods and services.** Sales and distribution of digital goods and services can occur through the App Store in the form of paid app downloads and in-app purchases, or through the sale of digital content and subscriptions from multi-platform apps that allow for the use and consumption of the app both in the App Store ecosystem and elsewhere. Examples of apps using this monetization strategy include those for gaming, dating, video and music streaming, fitness and health, and news and magazines.
- **The second monetization strategy is to sell physical goods and services through the app.** Apps using this monetization strategy are m-commerce apps generally, including apps for ride hailing, food delivery and pickup, grocery delivery and pickup, general retail, and travel, as well as digital payment apps.
- **The third monetization strategy is to sell in-app advertising.** Examples of apps using in-app advertising as their primary monetization strategy are social network and short video sharing apps.

We employ different methodologies to estimate billings and sales facilitated by the App Store ecosystem for each of these monetization strategies. In so doing, we rely on a variety of data sources, including data from Apple, app analytics companies, market research firms, and individual companies. To ensure the reliability and robustness of our estimates, we validate and compare key inputs from different data sources.[6]

Sales and distribution of digital goods and services

Apps used to sell and distribute digital goods and services fall into two subcategories:

- Certain app developers choose to monetize their iOS apps only through the App Store, and those apps can only be used on the iOS platform.[7] Most billings from these apps come from games, which involve a one-time payment or, more often, in-app payments that allow app users to remove ads, unlock bonus levels, or access premium features.[8] This category also includes most photo-editing apps and dating apps, as well as apps for short video and weather, among others.
- Other apps allow for the consumption of digital goods and services, both within the App Store ecosystem and elsewhere. These so-called **multi-platform apps** allow consumers to pay through either the App Store or another platform or device. In

6 This methodological approach is consistent with the one used in our 2019 Apple App Store ecosystem study.

7 Developers may also offer the same digital goods and services through apps on other platforms, such as Android.

8 Our analysis does not include billings generated from the Apple Arcade gaming service. Apple Arcade provides participating developers with an additional business model – distinct from the App Store – in which Apple supports the development costs of Apple Arcade games. Many small and independent developers with games in Apple Arcade also monetize with other free-to-play or paid games on the App Store.

other words, consumers use non-device-specific subscriptions or purchases to enjoy the digital goods and services provided. Multi-platform apps can be further divided into consumer apps and enterprise apps.

- **Consumer apps** typically offer paid digital content – such as movies, music, audiobooks, news, meditation courses, and fitness classes – that can be consumed within the app. Moreover, they may offer paid digital services obtained on the app, such as educational services, password management, job search, and access to job platforms.
- **Enterprise apps** allow businesses and organizations to provide tools and capabilities through smartphones and tablets. Those include communication and collaboration apps, mobility management solutions, cloud-based business apps, and file hosting services. These apps usually make money by selling subscriptions to corporations and institutions outside of the App Store.

To distinguish between these two subcategories of apps, we manually review the most popular apps in each App Store category, focusing on their business models and monetization strategies. We use this information to ascertain (1) whether the app can be used on mobile or computer browsers or on a different app platform; and (2) whether an app on an Apple device can be used through a subscription or purchase made outside of the App Store.

Methodology for iOS apps that sell only through the App Store

For iOS apps that sell digital goods and services only through the App Store, we count total billings, which include Apple's commission.[9] We use billings because they represent the total amount customers pay.

Methodology for multi-platform apps

Background. For multi-platform apps, estimating the volume of sales facilitated by the App Store is complex because subscriptions and purchases associated with them are not device-specific. The lack of device specificity creates a dual challenge:

- First, consumers can pay to access multi-platform digital goods and services in different ways, regardless of where they consume those goods and services. In some cases, consumers pay through the App Store, but sometimes they do not.
- Second, multi-platform apps allow users to access content and services across different devices, including non-Apple devices. For example, consumers can stream videos through smart TVs, connected TV devices, video game consoles, smartphones, tablets, web browsers, and across different platforms (Apple, Android, etc.).

9 In 2020, Apple's commission rate was 30% for the sale of digital goods and services; for subscriptions, it was 30% for the first year and 15% for any subsequent years.

Because of these two characteristics of multi-platform apps, billings that flow through the App Store are not necessarily a reliable indication of Apple users' engagement with multi-platform apps. Consequently, we must be deliberate about attributing the appropriate share of billings and sales to the App Store ecosystem.

Example. To illustrate these challenges, consider the video streaming service Hulu. The Hulu app is free to download, but a subscription is necessary to watch content on the iPhone, iPad, and Apple TV apps. A Hulu subscription can be purchased in one of two ways:

- Through the Hulu app on an Apple device, in which case the purchase happens through the App Store. But a subscription purchased through the App Store can also be used to watch Hulu on other platforms. Consequently, it would be incorrect to attribute all of the App Store billings (the full subscription amount) to the App Store ecosystem, because it would overstate the value of the Hulu product enjoyed on Apple devices specifically.
- Outside of the app (on a Mac or PC via web browser, for example), in which case the purchase does not happen through the App Store, and there are no App Store billings. However, the subscription can be used to watch content on Hulu using apps on Apple devices. Consequently, it would be incorrect to use the App Store billings (which are zero) as an input to our App Store ecosystem results, because it would understate the value of the Hulu product enjoyed through apps on Apple devices.

Methodology. To address these challenges, we generally do not rely on App Store billings for multi-platform apps. Instead, we rely on the proportion of use that occurs on apps in the App Store ecosystem to estimate how much of the total sales of multi-platform apps (App Store plus non-App Store) is facilitated by the App Store ecosystem.

Consider, for example, not just Hulu but the entire video streaming industry, a market with more than $26 billion in total annual sales in the US in 2020.[xv] Users consume video streaming content over a mix of smartphone apps, tablet apps, desktop browsers, smart TVs, connected TV devices, and video game consoles. To estimate the volume of sales facilitated by the App Store ecosystem, we first take the portion of hours streamed on smartphone apps, tablet apps, and smart TVs of all types. We then apportion this share to Apple devices specifically using the Apple market share for each device category.

Using this framework and approach, we estimate the volume of sales facilitated by the Apple App Store ecosystem for several categories of apps offering similar types of goods and services. The app categories for which we estimate sales facilitated by the App Store are video and music streaming, e-books and audiobooks, news and magazines, and enterprise. We use third-party research to account for the variation in users' app consumption habits across categories and countries. For example, consumers often listen to music and audiobooks through apps on mobile devices, while they are more likely to stream videos on smart TVs. Those consumption habits may also vary by geography.

Additionally, when the data is available, we take into account any variation in the consumption patterns of iOS (and non-iOS) users by app type and geography.

For each app category, we estimate total sales by geography, relying on inputs from third-party sources, typically market research firms. [xvi] We then apportion those sales using the share of content consumed on apps on any platform by geography, based on information collected from marketing surveys, company reports, or data on usage patterns.[xvii] Finally, we apportion usage to Apple devices specifically using the Apple market share for each device category in each geography.[xviii]

We use a more tailored approach for enterprise apps for a number of reasons. First, usage patterns are more heterogeneous for enterprise apps. Second, app-based usage and desktop-based usage of enterprise products tend to be more integrated. Third, the pricing of enterprise products is less transparent and more complex than for consumer apps.

With these complexities in mind, we individually estimate sales from 10 major apps or families of apps – Microsoft Office 365, Google Workspace (i.e., enterprise versions of Google productivity tools such as Gmail and Google Docs), Adobe (Acrobat), WPS Office, Dropbox, Box, Baidu Drive, Webex, Zoom, and Slack. We also include an aggregate market-level estimate for mobility management apps, which allow employees to securely access business content.

Finally, for some categories of apps, we use billings from the App Store as a proxy for sales facilitated by the App Store ecosystem. We do this for categories of apps, such as meditation or fitness apps, for which consumers typically consume the content within the app, but may purchase it outside of the App Store. This methodology likely results in a conservative (or lower) estimate compared with an estimate relying on usage-based apportionment.

Additional dimensions not included in our estimates

In addition to providing an outlet for users to consume digital goods and services, the App Store has also made it generally easier for consumers to sign up for subscriptions through what App Annie described as "the App Store's simple, frictionless and secure payment channel," in particular for smaller apps.[xvix] Making it easier and more secure to sign up for new subscriptions or make purchases may lead to incremental sales for app developers – regardless of the platform chosen by users to consume the digital goods and services.

Sales of physical goods and services through the app

Many developers monetize their apps by selling physical products through their apps. These include:

- Apps that let customers **purchase physical goods and services**. We broadly refer to these as m-commerce apps. The group includes apps for general retail, ride hailing, food delivery and pickup, grocery delivery and pickup, and travel.

- Apps that enable **digital payments or transfers**, such as mobile point-of-sale apps that rely on QR codes and peer-to-peer transfer apps.

M-commerce

Globally, mobile apps are an increasingly important e-commerce channel due to their convenience. This growth has been most pronounced in China, the leader in m-commerce.[10] Apps of retailers such as Amazon and Target allow consumers to browse and purchase physical goods directly in the app, and offer in-store pickup or delivery. In addition, mobile apps – including those for ride hailing, food delivery and pickup, grocery delivery and pickup, and mobile pickup ordering – have been central to the creation or expansion of certain business models.

Sales on m-commerce apps do not flow through the App Store.[11] We therefore use third-party data to estimate the volume of sales of physical goods and services from transactions on mobile apps.[12] We provide results for several categories of apps: general retail, food delivery and pickup, travel, ride hailing, and grocery.

For each app category, we estimate the total volume of e-commerce or m-commerce sales by geography, relying on estimates of third-party sources, typically market research firms.[xx] We then apportion the volume of sales, if necessary, to purchases that occur via smartphone and tablet apps. For example, for online food delivery and pickup, customers may place orders via an app, a mobile browser, or a desktop browser. We estimate the share of each app category's sales that occurs via mobile apps, within each geography, using information collected from marketing surveys or data on usage patterns.[xxi] Finally, we apportion usage to Apple platforms based on the overall iOS market share.[13,xxii]

Digital payments

Digital payment apps have become increasingly popular worldwide, although the landscape differs substantially across countries. In China, currently the largest market for digital payments, two QR code-based payment apps, Alipay and WeChat Pay, dominate both online and brick-and-mortar points of sales. These apps charge merchants a fee on purchases paid for with their apps. In the US, app-based payment systems are a relatively nascent market,[xxiii] while peer-to-peer transfer apps such as Venmo and Cash App are already popular and have grown significantly in recent years.[xxiv]

10 In China, more than 80% of online retail is mobile. Additionally, most mobile commerce occurs through apps, and to a lesser – but increasing – extent through "mini-programs" on platforms such as WeChat, Baidu, and Alipay. *See* eMarketer; QuestMobile, "*China Mobile Internet 2019 Half Year Report*"; Aladdin, "*2019 Mini-Programs White Papers*," January 2, 2020..

11 Since the launch of the App Store, Apple's policy has been not to charge a commission on sales of physical goods and services or advertising.

12 The sales associated with purchases made on mobile browser apps are excluded.

13 Apportioning by iOS market share almost certainly results in a conservative estimate because owners of iOS devices tend to spend relatively more than owners of Android devices. (*See*, e.g., Comscore.)

We estimate the transaction fees collected by developers from customers or merchants for payments and transfers occurring through apps on the iOS platform.[14] For QR code-based payment apps in China, we start with an estimate of total payment volume (TPV) from a third-party research firm.[xxv] We then estimate WeChat Pay and Alipay total transaction fees using their published fee rates and deductible policies. For peer-to-peer transfer apps in the US, we use the ratio of total transaction fees to TPV from Venmo and Cash App to estimate the transaction fees collected by the apps. Finally, we apportion usage to Apple platforms based on data on the overall iOS share in each region.[xxvi]

In-app advertising

In-app advertising is a frequently used and effective method of monetizing apps whereby developers publish advertisements within their apps. Prominent examples of apps that primarily make money through in-app advertising are Facebook, Instagram, Twitter, YouTube, Pinterest, and TikTok. Examples of games are Rolly Vortex and Helix Jump. These apps tend to be free to download and use, but in-app advertising can also be a complementary monetization strategy for paid apps or apps with in-app purchases.

Users have been spending more and more time on their mobile devices, particularly using apps, which has led to an increased share of digital marketing expenditures going toward in-app advertising. Given that apps are used frequently throughout the day – for example, during commutes or moments of downtime – in-app advertising allows advertisers to reach users in ways that other marketing channels cannot. Compared with mobile web, the app environment is a more effective way for advertisers to reach their audiences, with in-app advertisements allowing for personalized and contextually relevant ad messages.

Technology research firm Omdia estimated that in-app ad sales for iOS apps[15] were $46 billion in 2020, with almost $19 billion (41%) tied to gaming apps.[xxvii] Omdia derived this estimate based on ad sales reported by large digital advertising firms, and then used data analytics from mobile ad platforms to apportion the iOS share, limited to in-app advertising only (i.e., by removing mobile web advertising), and to adjust for ad price differences between the iOS and Android app platforms. We use Omdia's research in this study. In 2020, Omdia considerably remodeled their historical estimates and projections based on new data and feedback from industry players.

14 Our study excludes digital payment apps and services based on near-field communication, such as Apple Pay. Mobile commerce transactions that occur within an app and are paid with Apple Pay are included in m-commerce sales.

15 This estimate includes revenue generated from the publishing of advertisements within apps only, and excludes advertising on mobile web (including mobile browser apps), search advertising, and Apple Search Ads.

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