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Working Paper

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AEI Economics Working Paper, No. 2023-15

Provided in Cooperation with:

American Enterprise Institute (AEI), Washington, DC

Suggested Citation: Hauge, Janice A.; Jamison, Mark A.; Tecza, Jakub (2023) : Mobile Platform Preference: A Comparison of U.S., Indian and Japanese Firms, AEI Economics Working Paper, No. 2023-15, American Enterprise Institute (AEI), Washington, DC

This Version is available at:

<https://hdl.handle.net/10419/280676>

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September 2023

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Mobile platform preference: A comparison of U.S., Indian and Japanese firms*

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September 28, 2023

Abstract

We examine businesses' choices of mobile platforms – iOS and Android – contrasting firms in the U.S., India, and Japan. Using Crunchbase® data on startups seeking external funding, we find that many of the 47 business categories analyzed are likely to use mobile platforms, but some have a negative propensity to do so. Many that tend to use platforms exhibit no platform preferences, implying substitutability. Many that do exhibit a platform preference also tend to not use platforms, indicating an indifference as well. Results across India, Japan, and the U.S. are largely similar, with the exception of more business categories exhibiting platform preferences in the U.S.

Keywords: platforms; network effects, competition; differentiation; startups
JEL codes: L26, L86, M13, O30

* The authors thank the Digital Markets Initiative for financial support and Crunchbase® for access to data. The authors are responsible for all errors and omissions.

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I. Introduction

The proliferation of smartphones has changed the way people interact with technology and access information. People are able to seamlessly integrate communications, information retrieval, and entertainment through a single, portable interface. The intuitiveness of touchscreens and of the app ecosystem has expanded the information age regardless of users' technical proficiency.

Behind this digital transformation lies a thriving app ecosystem, comprising millions of applications that cater to various needs and preferences of users. Enabling this app economy are two main mobile operating systems, iOS (Apple's operating system) and Android (Alphabet's operating system), which serve as platforms on which businesses build tools and applications and interact with others. In some instances these platforms provide a place to connect with customers; they also can be used for internal communications, as well as connecting with investors and other stakeholders.

Understanding the dynamics behind how companies choose to build on one of these platforms, or build on both, is of importance for several reasons. First, it sheds light on the competitive forces driving the markets and how platforms affect app availability and features, as well as user experience. Second, gaining insights into these choices can aid mobile app developers in making informed platform selections that align with their business objectives and target audiences. Additionally, from a policy perspective, understanding platform choices provides valuable insights into the nature of competition between iOS and Android.

Providing platforms is big business. As of 2018, seven of the world's ten largest companies were based on platform business models, including Apple, Alphabet, Microsoft, and Tencent (Schenker, 2019). Apple has more than 2 billion active devices worldwide as of February 2023 (Apple, 2023). Also as of February 2023, Google sites were the most visited multi-platform web properties in the U.S., with over 274 million unique visitors (Statista, 2023b). Tencent's revenues grew 135 percent from 2017 through 2021, before declining one percent in 2022 (Statista, 2023a).

The sizes of these enterprises have led to governments' concerns over potential market power. The European Commission is investigating Apple as of the time of this writing, and in 2023 expressed its preliminary view that Apple has a dominant position and has abused that position by (1) imposing its in-app purchase payment technology on music streaming app developers and (2) restricting app developers' abilities to inform iPhone and iPad users of alternative music subscription services (European Commission, 2023). The U.S. Federal Trade Commission (FTC)

is suing Amazon for making it difficult for consumers to unsubscribe from Amazon Prime (Federal Trade Commission, 2023).

One area of focus for competition regulators has been rivalry or the lack thereof between iOS and Android. The reason these two mobile platforms are in focus, is that with a combined global share of 99%, they could appear to constitute a de-facto duopoly, with iOS' share at 28% and Android's share being 72% (Statista, 2023c). The European Commission concluded in 2018 that Alphabet's platform is its own market, meaning that it is not in competition with Apple for app developers (European Commission, 2018). Several state legislatures have entertained legislation that would regulate Apple and Alphabet app stores over concerns of market power (Zakrzewski, 2021). Epic Games claimed in its antitrust suit against Apple that iOS monopolizes the app distribution market (Epic Games, Inc., 2020)¹.

Much of the debate has revolved around the effects of a platform owner directly participating in its own marketplace and competing with third-party providers; such platforms may have an incentive to engage in anticompetitive behavior, such as sabotaging rivals, charging excessive fees, or self-preferencing. This concern has been expressed regarding Apple and Android mobile platforms, as well as Amazon's e-commerce and Google search (see e.g., Ford & Stern 2022; Deutscher 2021).

Although there is an extensive academic and practitioner literature on digital platforms (e.g. Eisenmann, Parker, & Van Alstyne, 2009; Gawer & Cusumano, 2002), relatively little attention has been paid to the types of businesses that choose to use these platforms and to the forms of competition between the platforms. Among the exceptions are Jamison, Tęcza, and Wang (2023) who examine the effects of vertical integration on mobile platforms. They find evidence that rival app providers benefit from Apple's vertical integration, but not from Alphabet's. Dubé (2022) examines Amazon's e-commerce marketplace specifically to study Amazon's treatment of third-party sellers. He finds that Amazon follows practices equivalent to those of many western traditional/brick and mortar retail chains. Crawford et al. (2022) study the effects on consumers and third-party merchants of Amazon selling its own products in the Home & Kitchen department of Germany's Marketplace between 2016 and 2021. They find modest positive impacts on platform users.

¹ As of the time of this writing, Epic Games owns Fortnite, which is among the most popular online video games in the world, with over 400 million registered users as of September 2023, and revenue of \$5.8 billion in 2021 (Avada, 2023).

Most similar to our research is that of Ajit and Jamison (2021). They examine U.S. firms' choices of building on iOS versus Android. Sixteen of the 47 business categories examined were likely to use mobile platforms. Ten of these 16 exhibited no preference between iOS and Android, implying substitutability. Businesses that were unlikely to use mobile platforms viewed the platforms as differentiated. iOS was more popular than Android: 60 percent of businesses choosing to be on mobile platforms chose to be only on iOS. In contrast, only 8 percent chose to be on Android only.

Following Ajit and Jamison (2021), we study choices made by businesses that use mobile platforms, some of which develop apps. While their study focused on the U.S., we incorporate firms in India and Japan into this study to see if the pattern in the U.S. is an anomaly or exists more generally. We choose India and Japan because officials in those countries have been investigating platform competition. Apple's App Store has been under investigation in India by the Competition Commission of India (CCI) since September 2021 (Gallagher, 2023). Japan intends to force Apple to permit sideloading of apps (Evans, 2023).

We study nearly 1.4 million enterprises, many of which use either or both platforms for their businesses. U.S. companies make up 89 percent of these enterprises, India accounts for 7 percent, and Japan makes up 4 percent (see Table 1). We consider how various categories of businesses cluster on platforms, and we analyze differences between the two ecosystems in terms of types of companies that use them. In general, we find that businesses in categories that show a statistically significant propensity to use a mobile platform tend to view the platforms as substitutes or complements, implying that the platforms appear to compete for these businesses. If a category² of business tends to express a preference between iOS and Android, being on a platform is generally not very important to businesses of that type, implying that there is little or no opportunity for market power. given that they use a mobile platform,

The rest of this paper is organized as follows. We begin with a description of the data. We then examine preferences for or against using platforms. Next, we analyze platform preferences for firms that use platforms. Each section discusses its underlying model and results. Finally, we summarize and discuss potential directions for future research.

² For ease of composition, we often refer to the categories as having propensities or making choices. In reality the firms that identify with the categories have the propensities or make the choices.

II. Data

We obtain our data from Crunchbase – a proprietary database of public and private companies and other organizations. Although Crunchbase is primarily geared towards investors including venture capitalists, it has found increased use in academic research (see e.g., Dalle et al., 2017; Ferrati & Muffatto, 2020). The database contains companies operating in more than 200 countries; however, it is heavily skewed towards the U.S., which accounts for about 50 percent of the companies in Crunchbase.

Crunchbase provides a wealth of data on acquisitions, funding rounds, investors, initial public offerings, organizations, and other relevant features. The data collection process employed by Crunchbase is extensive and diverse. It draws data from a network of over 3,700 global investment firms, which regularly submit monthly portfolio updates. Additionally, a community of executives, entrepreneurs, and investors actively contributes information. To ensure the accuracy and reliability of the data, subject matter experts, and artificial intelligence algorithms collaborate to validate and curate the dataset.

Crunchbase focuses on early-stage and innovative companies that either seek external funding or have already secured it. Specifically, it highlights early-stage funding sources such as seed capital, angel investors, and accelerators. As a result, our research is primarily centered around companies that have demonstrated growth potential and that believe they require outside capital for their expansion plans.

Crunchbase's business categorization is broad and inclusive. Our research extends to a wide array of businesses that leverage mobile platforms, not just companies developing apps. This means that our findings go beyond the realm of mobile applications and provide insights into various industries that utilize mobile technologies for their operations.

As Ajit and Jamison (2021) explain, the pattern of the launching of startups since 1985 is quite similar among the U.S. and the rest of the world, implying that the forces driving startups were nearly the same for the U.S. as for the rest of the world. The number of startups grew during the dot com bubble from 1995 to 2000, dropped with the dot com crash in 2000, and declined and subsequently climbed during the recession and economic recovery following the terrorist attack on New York's World Trade Center in 2001.

Business creation for companies documented in Crunchbase peaked in 2015 and then declined rapidly, consistent with a study by Engine (2021) of the startup ecosystem in the U.S. This decline resulted from a change in sizes of firms seeking funding (Ajit and Jamison, 2021).

We rely on the database's version downloaded on June 13, 2023. Given the full list of organizations, first we isolate those that are of interest to us, that is, companies from the U.S., India, and Japan. Next, we discard organizations that do not have any firm category recorded. The remaining firms constitute our sample. Table 1 provides summary statistics.

[INSERT TABLE 1 ABOUT HERE]

III. Choice to be on a Mobile Platform

Discussion

We begin our analysis by studying firms within categories of businesses that are most likely to be associated with the use of mobile platforms. To identify which firms have a mobile focus, we run a keyword search as in Ajit & Jamison (2021). Specifically, we search for *Mobile*, *Apps*, *Mobile apps*, *iOS*, and *Android* within the *category list* variable and other descriptions of the businesses. Of the 1,358,882 firms in our database, we identify 52,522 as having one of the above platform-related keywords. Seventy-nine percent of these are from the U.S., sixteen percent are from India, and five percent are from Japan (see Table 1).

We are interested in whether a firm's specific category predicts the likelihood of the business associating with mobile platforms (or not associating with such) as in the findings of Ajit & Jamison (2021). We expect that firms that find mobile platforms most helpful for their businesses will demonstrate a stronger preference for using mobile platforms than other (non-mobile-platform-focused) firms demonstrate. Knowing that firms in this subset of categories are likely to be the largest users of mobile platforms, the platform providers are expected to design their platforms accordingly, for example, by emphasizing features specifically helpful to that subset of categories.

Analysis

Using the 1,358,882 firms referenced above, we fit a logistic regression of the following form:

$$mobile_i = \alpha + \sum_{c \in C} \beta_c d_{i,c} + \varepsilon_i \quad (1)$$

The dependent variable $mobile_i$ equals 1 if firm i has any of the mobile keywords mentioned earlier. On the right-hand-side of the equation, α denotes the constant, and the sum $\sum_{c \in C} \beta_c d_{i,c}$ represents the set of category dummy variables with corresponding coefficients. Each indicator $d_{i,c}$ equals 1 if firm i belongs to category c and equals 0 otherwise. The coefficients β_c measure the propensity to have a mobile presence for each business category. The bigger the coefficient β_c , the more mobile-focused a given category of firms is. Finally, ε_i is the logit error term. We fit Equation (1) separately for India, Japan, and the U.S.

Results

Table 2 shows the results from estimating the model; these results are consistent with Ajit and Jamison (2021). The three columns with coefficients contain results for the U.S., India, and Japan respectively. The results for the U.S. show more statistically significant coefficients than for the other two countries, perhaps reflecting the larger number of U.S. firms in our sample: the number of U.S. firms in the full sample is 13 times larger than the number of Indian firms and 22 times larger than the number of Japanese firms. For the U.S., 33 of the categories are statistically significant, which is more than twice the number for either India or Japan, each of which has 16 statistically significant categories.

[INSERT TABLE 2 ABOUT HERE]

Otherwise, the results across the three countries are largely similar: Table 3 shows 15 categories are statistically significant with the same sign for multiple countries. Shading indicates economic significance.³ All categories that are statistically significant for all three countries also are economically significant, except for two, *Commerce and Shopping* and *Manufacturing*. *Commerce and Shopping* is never economically significant, while *Manufacturing* is economically significant for India and Japan, but not the U.S.

³ Following Ajit and Jamison (2021), we consider a coefficient to be economically significant if it is greater than one in absolute value.

[INSERT TABLE 3 ABOUT HERE]

Table 4 shows that only the categories *Energy* and *Sales and Marketing* are statistically significant for multiple countries with different signs. Mobile platforms are statistically and economically important for *Energy* apps in Japan, but unimportant in India and avoided in the U.S. Mobile platforms are statistically important, but not economically important, for *Sales and Marketing* apps in the U.S., but unimportant in India and avoided in Japan.

[INSERT TABLE 4 ABOUT HERE]

Table 5 shows categories that are statistically significant for only one country. Sixteen relate to the U.S. and are unique to the U.S., probably because of the smaller numbers of firms for India and Japan. Results from a straightforward simulation procedure confirm this assertion.⁴ India is unique for one category, *Events*, and businesses in this category in India largely do not use mobile platforms. For Japan, businesses in *Financial Services* tend to use mobile platforms, while businesses in the *Science and Engineering* and the *Sustainability* categories tend to not use mobile platforms. Overall, six of the coefficients are also economically significant. The positive impacts are the most important as these represent value created for the platform users: these are *Financial Services* for Japan and *Gaming and Payments* for the U.S. The *Gaming* and *Payments* importance in the U.S. could help explain whether the Epic Games lawsuit against Apple was legitimate or simply rent seeking.

[INSERT TABLE 5 ABOUT HERE]

Our U.S. results in Table 2 are generally consistent with the previous Ajit and Jamison (2021) study. While our analysis largely replicates theirs, there are two key differences on

⁴ To see what happens to statistical significance when we reduce the sample size of U.S. firms to that of India and Japan, we performed a simple simulation. From the sample of U.S. firms, we randomly drew a subsample equal to that of India and counted the number of statistically significant results. We repeated this process 100 times, and then calculated the average number of significant results across those 100 draws. The simulated average was very close to the realized number of statistically significant results in the Indian sample (16). We repeated the exercise for Japan, with a qualitatively similar result. Simulation results are available on request.

top of the addition of India and Japan. First, while Ajit and Jamison consider only firms that were founded in 2007 or later, we consider all firms in the database irrespective of when they were founded. The rationale behind the original restriction of firms to 2007 or younger was the launch of the iPhone in 2007. However, it is conceivable that older firms would acquire mobile focus later on as new technologies become available. Hence, we do not restrict our sample according to the iPhone founding year. Secondly, as the Crunchbase database is being continuously updated with companies, both old and newly founded, the number of recorded firms is growing over time. Consequently, we end up with a larger sample size, solely due to the secular growth of the database.⁵

IV. Mobile Platform Preference

Discussion

After learning the types of firms most likely to be mobile-focused, we turn to a more specific question: conditional on mobile platform presence, what is a firm's preference: Does it prefer to be on iOS, Android, or both platforms? This analysis helps us understand the nature of the rivalry between iOS and Android. If some types of businesses have strong preferences, then we can conclude that the rivalry might not be strong for those businesses as the users do not view iOS and Android as good substitutes. Ajit and Jamison (2021) generally found substitutability between the platforms, with strong preferences reserved primarily for business categories that tended to not use mobile platforms, implying that a few firms governed those results.

Analysis

Again we examine how platform preferences vary by business category, and whether those preferences are consistent across the countries in question. The sample for this exercise consists of firms that have the 'iOS' keyword or the 'Android' keyword or both of those

⁵ Between February and June 2023, the sample size of the full Crunchbase database grew by about 11%, from 2,597,998 to 2,894,725 observations. For comparison, the sample included 760,590 firms in May 2019 (Ferrati & Muffatto, 2020).

keywords. Unlike in the previous model where the dependent variable admitted two possible responses (mobile or not), in this analysis we have three possibilities: iOS, Android, or both. Therefore, we employ the multinomial logit model, which allows for multiple responses. Specifically, the model is:

$$y_{ij} = \alpha_j + \sum_{c \in C} \beta_{cj} d_{ic} + \varepsilon_{ij} \quad (2)$$

The dependent variable y_{ij} equals 1 if firm i chooses the alternative j (that is, one of the three platform options). On the right side, α_j is a response-specific constant, and $\sum_{c \in C} \beta_{cj} d_{ic}$ is, as before, a set of category dummies and corresponding coefficients. The only difference is that now the coefficients differ depending on the response j . Finally, ε_{ij} is an error term.

The results of a multinomial model are relative, in the sense that the coefficient estimates are interpreted in comparison to a reference response. For instance, if we designate ‘both’ as the reference response, then a positive coefficient for a category c , for iOS, would imply that that category of firms prefers being on iOS only, rather than being on both platforms.

Results

Tables 6, 7, and 8 show the results for the U.S., India, and Japan respectively. Each table shows the business categories in the first column and the regression coefficients and standard errors in the remaining columns. Column 2 shows businesses’ propensities to use iOS only relative to using both platforms. Column 4 shows businesses’ propensities to use Android only relative to using both platforms. Column 6 shows the propensities of businesses that use only one platform to use Android rather than iOS. In some instances, there is insufficient variation to estimate coefficients. These include *Mobile, Platforms, and Software* for all countries, *Agriculture and Farming, Government and Military, Natural Resources, and Sustainability* for India and Japan; *Energy* for India; and *Biotechnology, Transportation, and Privacy and Security* for Japan. These exclusions mean that there are 44 categories for the U.S. analysis, 39 categories for the Indian analysis, and 37 categories for the Japanese analysis.

[INSERT TABLE 6 ABOUT HERE]

We begin with the U.S. results in Table 6 and Figure 2. Figure 2 summarizes the platform preferences for business categories that have statistically significant preferences for the U.S. There are 10 possible platform preference combinations: (1) No preferences; (2) iOS only preferred to being on both and to being on Android only; (3) iOS only preferred to being on both and no preference with respect to Android only; (4) iOS only preferred to being on Android only and no preference with respect to being on both; (5) Being on both preferred to being on iOS only and to being on Android only; (6) Being on both preferred to being on iOS only and no preference with respect to Android only; (7) Being on both preferred to being on Android only and no preference with respect to iOS only; (8) Android only preferred to being on both and to being on iOS only; (9) Android only preferred to being on iOS only and no preference with respect to being on both; and (10) Android only preferred to being on both and no preference with respect to iOS only.

[INSERT FIGURE 2 ABOUT HERE]

A business can choose to identify with more than one category, and most businesses tend to be associated with two or three categories (see Figure 1). U.S. businesses that are included in our mobile users indicated a total of 31,508 category choices. However, *Mobile, Platforms, and Software*, which are excluded from our analysis, were each chosen 5,605 times. So only 14,693 choices affect our analysis. Five categories captured half of the choices: *Apps, Internet Services, Information Technology, Media and Entertainment, and Hardware*. We call these our top-tier categories. Eight categories capture the next 25 percent of choices: *Sales and Marketing, Gaming, Data and Analytics, Design, Commerce and Shopping, Consumer Electronics, Content and Publishing, and Professional Services*. We call these our second-tier categories. The remainder of the categories are our bottom-tier.

Table 6 and Figure 2 imply that iOS and Android are generally substitutes or complements. Businesses in 23 of the 44 categories for our U.S. analysis have no preference for iOS or Android, or being on both, indicating that the platforms are substitutes or complements within those 23 categories. Three of our top-tier categories and two of our second-tier categories – comprising 4,298 or 29% of the category choices – are in this no-preference

group. Of our remaining top tier categories, *Apps* businesses tended to prefer to be on both platforms rather than a single platform, and *Information Technology* had a strong preference to be on iOS only if it was on a platform. *Information Technology* businesses preferred to not be on any mobile platform, based on the simple logit results shown in Table 2.

Figure 2 shows that more categories have firms preferring iOS rather than Android or being on both. But three of those categories that prefer iOS to other platform arrangements, if they are on a platform, actually prefer being on no mobile platform at all, implying that the iOS preference has little importance. Indeed 8 of the 20 categories that have statistically significant preferences for a specific platform, given that they are already on a platform, actually show no inclination to use any platform in the first place, as shown in Table 2.

We now turn our attention to India. Indian firms chose 3,136 categories, excluding *Mobile*, *Platforms*, and *Software*. Our top-tier for India has only four categories: *Apps*, *Information Technology*, *Internet Services*, and *Design*. There are six categories in our India second tier: *Sales and Marketing*, *Commerce and Shopping*, *Media and Entertainment*, *Professional Services*, *Hardware*, and *Advertising*.

[INSERT TABLE 7 AND FIGURE 3 ABOUT HERE]

Table 7 and Figure 3 show that 25 of the 38 categories in the India multinomial analysis have no statistically significant preference between the platforms. Of those categories where there are statistically significant preferences, only two – *Apps* and *Internet Services* – are top-tier, but firms choosing *Internet Services* as a category did not have a statistically significant preference for using mobile platforms for that category. Businesses choosing *Apps* preferred being on both platforms.

Only three of the second-tier categories reflect statistically significant preferences. One of the three, *Advertising*, prefers iOS to all other arrangements and is economically significant. Another, *Sales and Marketing*, prefers being on Android alone to iOS, and also prefers being on both platforms to iOS only, but the category choice does not exhibit a statistically significant association with mobile platforms. The firms choosing the third second-tier category, *Hardware*, have a statistically significant preference for not being on mobile platforms.

The remaining eight categories that have statistically significant associations between platforms do not have statistically significant preferences to be on a platform (except *Consumer Electronics*, which is positive), meaning that the associated firms appear to be largely indifferent between receiving their platform preference and not being on a platform at all.

We conclude that firms in India largely find the platforms as close substitutes or complements, or are inconsequential to their businesses. The exceptions might be firms in the *Advertising*, *Internet Services*, and *Gaming* categories, which prefer iOS, indicating that these are niche markets for the platform and not indicators of market power.

We now turn our attention to Japan. Japanese firms chose 450 categories, excluding *Mobile*, *Platforms*, and *Software*. Our top tier for Japan has five categories: *Apps*, *Hardware*, *Information Technology*, *Internet Services*, and *Media and Entertainment*. There are seven categories in our Japanese second tier: *Commerce and Shopping*, *Consumer Electronics*, *Data Analytics*, *Design*, *Gaming*, *Professional Services*, and *Sales and Marketing*.

[INSERT TABLE 8 AND FIGURE 4 ABOUT HERE]

Table 8 and Figure 4 show that 33 of the 36 categories in the Japan multinomial analysis have no statistically significant preference between the platforms. Of those categories where there are statistically significant preferences, only two of our five top-tier categories exhibit preferences – *Apps* and *Media and Entertainment* – although firms in the *Media and Entertainment* category did not have a statistically significant preference for using mobile platforms for that category. *Apps* is the most important category for this analysis as it is top-tier and statistically significant in our logit analysis. Firms relating to *Apps* prefer to be on both platforms, but if they choose to be on only one, they tend to prefer iOS. The other category for which there are preferences – *Design* – is in our second tier. It exhibits economically significant association with Android or both platforms.

We conclude that firms in Japan largely find the platforms as close substitutes or complements, or are inconsequential to their businesses. The exception might be firms in the *Design* category, but *Design* represents only 17, or less than 4%, of the 450 category choices by Japanese businesses.

V. Conclusion

We examine businesses' choices regarding mobile platforms for the U.S., India, and Japan using data from Crunchbase. We find that mobile platforms are important for businesses that are seeking capital: of the 47 categories of business in our database, U.S. businesses identifying with 20 of the categories exhibit positive, statistically significant preferences to use mobile platforms. Of these 20, 9 are economically significant. But this prominence does not appear to lead to market power. Thirteen categories of businesses for the U.S. prefer to not be on a mobile platform. For India, businesses identifying with 9 of the categories exhibit a positive, statistically significant preference for being on a mobile platform, 7 of which are economically significant, but another 7 of the 47 categories show negative propensities for being on a platform. For Japan, 10 exhibit a positive, statistically significant propensity to be on a platform, 9 of which are economically significant, and 6 have a negative propensity.

Our research indicates that types of businesses for which mobile platforms are important find that iOS and Android compete for their business. We find no evidence that the platforms are exercising market power. If it is true that they are not, then regulatory efforts meant to attack market power are actually disrupting an otherwise well-functioning marketplace. Such interventions will ultimately harm platform users.

More research is needed. We do not investigate how platform choice affects businesses. We do not have sufficient data on Indian and Japanese firms to investigate platform choice based on firms' choices to be in multiple Crunchbase categories. Ajit and Jamison (2021) perform such an analysis for U.S. firms and find that it supports the conclusion that platforms compete for users. We are also unable to analyze how platform preferences might change over time, nor how consumer choices might affect businesses' choices.

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Tables and Figures

Table 1: Number of firms by country and mobile status

Status	U.S.	India	Japan	Total
all firms	1,211,862	93,047	53,973	1,358,882
firms with any platform keyword	41,193	8,553	2,776	52,522
firms on iOS only	3,493	545	80	4,118
firms on Android only	502	221	85	808
firms on both platforms	1,610	438	57	2,105

Table 2: Propensity towards mobile focus by firm category

	(1) U.S.	(2) India	(3) Japan
Administrative Services	-0.377*** (0.112)	0.050 (0.377)	-0.749 (0.848)
Advertising	4.097*** (0.152)	3.320*** (0.320)	5.995*** (0.761)
Agriculture and Farming	-0.113 (0.389)	0.175 (1.048)	-0.155 (2.619)
Apps	11.952*** (0.129)	10.370*** (0.254)	13.917*** (0.726)
Artificial Intelligence	0.048 (0.156)	0.143 (0.417)	0.527 (0.837)
Biotechnology	-0.172 (0.200)	-0.132 (0.867)	2.347 (1.461)
Clothing and Apparel	0.654*** (0.241)	0.174 (0.568)	0.442 (1.364)
Commerce and Shopping	0.501*** (0.070)	0.416** (0.180)	0.915* (0.525)
Community and Lifestyle	0.399*** (0.110)	0.421 (0.380)	0.751 (0.816)
Consumer Electronics	1.658*** (0.065)	1.438*** (0.239)	1.278*** (0.303)
Consumer Goods	-0.115 (0.178)	-0.191 (0.459)	-0.436 (0.678)
Content and Publishing	-0.178 (0.112)	-0.309 (0.369)	-0.204 (0.628)
Data and Analytics	-0.196** (0.085)	-0.671*** (0.241)	-0.784 (0.495)
Design	-0.316*** (0.077)	-0.153 (0.176)	0.090 (0.397)
Education	0.109 (0.113)	0.188 (0.264)	-0.210 (0.612)
Energy	-0.505** (0.213)	-0.403 (1.000)	3.096** (1.411)
Events	0.127 (0.182)	-1.167* (0.636)	-0.866 (1.023)
Financial Services	0.104 (0.117)	0.245 (0.371)	1.462* (0.784)
Food and Beverage	0.583*** (0.176)	-0.153 (0.458)	0.859 (0.922)
Gaming	1.366*** (0.192)	0.956 (0.717)	0.925 (0.620)
Government and Military	0.130 (0.183)	-0.152 (0.976)	0.214 (1.789)
Hardware	-2.933*** (0.050)	-2.416*** (0.166)	-2.204*** (0.264)
Healthcare	-2.494*** (0.059)	-2.041*** (0.195)	-2.991*** (0.301)
Information Technology	-0.225*** (0.048)	-0.464*** (0.127)	0.031 (0.227)
Internet Services	0.040	-0.071	-0.003

	(0.046)	(0.129)	(0.240)
Lending and Investments	0.360*	0.308	0.603
	(0.211)	(0.660)	(1.325)
Manufacturing	-0.756***	-1.009***	-1.350***
	(0.093)	(0.327)	(0.355)
Media and Entertainment	0.610***	0.570**	0.348
	(0.084)	(0.253)	(0.376)
Messaging and Telecoms	0.183**	0.453	0.007
	(0.091)	(0.330)	(0.755)
Mobile	11.809***	10.886***	12.761***
	(0.124)	(0.256)	(0.712)
Music and Audio	-0.410***	-0.297	-0.819
	(0.142)	(0.621)	(0.768)
Natural Resources	0.029	0.406	-1.931
	(0.327)	(1.045)	(6.412)
Navigation and Mapping	1.125***	2.358***	4.777***
	(0.171)	(0.674)	(1.227)
Other	-0.272***	-0.050	0.435
	(0.059)	(0.202)	(0.427)
Payments	1.277***	0.730	1.570
	(0.186)	(0.556)	(1.171)
Platforms	2.371***	2.201***	1.146**
	(0.163)	(0.483)	(0.533)
Privacy and Security	-0.478***	-0.387	-0.363
	(0.084)	(0.326)	(0.559)
Professional Services	-0.549***	-0.514***	-0.347
	(0.062)	(0.168)	(0.319)
Real Estate	-0.510***	-0.448	-0.356
	(0.111)	(0.430)	(0.793)
Sales and Marketing	0.193**	-0.117	-0.879***
	(0.090)	(0.202)	(0.329)
Science and Engineering	-0.072	-0.152	-1.073**
	(0.096)	(0.301)	(0.453)
Software	1.242***	1.209***	1.197***
	(0.049)	(0.163)	(0.277)
Sports	0.973***	0.278	0.879
	(0.125)	(0.454)	(1.387)
Sustainability	0.208	0.777	-2.533*
	(0.238)	(1.136)	(1.384)
Transportation	0.228**	0.454	0.337
	(0.111)	(0.350)	(0.637)
Travel and Tourism	0.803***	-0.567	-0.306
	(0.187)	(0.493)	(0.921)
Video	-0.132	0.301	0.454
	(0.115)	(0.408)	(0.577)
_cons	-9.801***	-8.456***	-10.649***
	(0.123)	(0.249)	(0.710)
Observations	1211862	93047	53973
Pseudo R ²	0.935	0.951	0.956

Standard errors in parentheses

*** p<.01, ** p<.05, * p<.1

Table 3: Categories statistically significant for more than one country with the same sign (shading indicates economic significance)

	U.S.	India	Japan
Advertising	+	+	+
Apps	+	+	+
Commerce and Shopping	+	+	+
Consumer Electronics	+	+	+
Data and Analytics	-	-	NA
Hardware	-	-	-
Healthcare	-	-	-
Information Technology	-	-	NA
Manufacturing	-	-	-
Media and Entertainment	+	+	NA
Mobile	+	+	+
Navigation and Mapping	+	+	+
Platforms	+	+	+
Professional Services	-	-	NA
Software	+	+	+

Table 4: Categories statistically significant for more than one country with inconsistent signs (shading indicates economic significance)

	U.S.	India	Japan
Energy	-	NA	+
Sales and Marketing	+	NA	-

Table 5: Categories statistically significant for only one country (shading indicates economic significance)

	U.S.	India	Japan
Administrative Services	-		
Clothing and Apparel	+		
Community and Lifestyle	+		
Design	-		
Events		-	
Financial Services			+
Food and Beverage	+		
Gaming	+		
Lending and Investments	+		
Messaging and Telecoms	+		
Music and Audio	-		
Other	-		
Payments	+		
Privacy and Security	-		
Real Estate	-		
Science and Engineering			-
Sports	+		
Sustainability			-
Transportation	+		
Travel and Tourism	+		

Table 6. Propensities to be associated with particular platform arrangements, U.S.

Business Category	iOS v. Both		Android v. Both		Android v. iOS	
	Coeff.	St. Err.	Coeff.	St. Err.	Coeff.	St. Err.
Administrative services	0.3589	0.3370	-0.3087	0.6521	-0.6676	0.6215
Advertising	0.1322	0.1848	0.0445	0.3246	-0.0877	0.3097
Agriculture and farming	0.2597	0.8301	-13.1801	1075.3	-13.4398	1075.3
Apps	-0.3698 ***	0.0623	-0.1981 *	0.1054	0.1717 *	0.0989
Artificial intelligence	-0.3927	0.3431	-0.0510	0.5438	0.3417	0.5269
Biotechnology	-0.1199	0.5901	-13.8876	828.90	-13.7677	828.90
Clothing and apparel	0.9060 **	0.3561	0.0461	0.6884	-0.8599	0.6303
Commerce and shopping	0.2700 **	0.1195	0.0008	0.2072	-0.2692	0.1925
Community and lifestyle	0.1356	0.1772	-0.1911	0.3457	-0.3267	0.3267
Consumer electronics	0.3228 *	0.1832	0.3357	0.2728	0.0129	0.2451
Consumer goods	0.1061	0.4002	-0.0181	0.6209	-0.1242	0.5581
Content and publishing	0.2773 *	0.1600	0.4362	0.2724	0.1589	0.2501
Data and analytics	-0.1148	0.1730	0.0281	0.2830	0.1429	0.2665
Design	-0.1585	0.1197	-0.2831	0.2081	-0.1246	0.1993
Education	0.0914	0.1603	-0.3239	0.3045	-0.4153	0.2880
Energy	-0.4360	0.9195	-13.1471 ***	919.67	-12.7110	919.67
Events	0.0035	0.2450	-1.4376 *	0.7530	-1.4412 *	0.7380
Financial services	-0.1058	0.2639	0.1814	0.4095	0.2872	0.3867
Food and beverage	-0.0361	0.2246	-1.5117 **	0.7349	-1.4756 **	0.7239
Gaming	0.1435	0.1068	-0.9866 ***	0.2535	-1.1302 ***	0.2444
Government and military	-0.1730	0.5204	-0.2003	0.8341	-0.0274	0.7897
Hardware	-0.0229	0.1324	0.1699	0.2051	0.1928	0.1894
Healthcare	0.3035 **	0.1494	-0.4889	0.3196	-0.7924 **	0.3039
Information technology	0.3339 ***	0.0905	-0.0173	0.1499	-0.3512 **	0.1391
Internet Services	0.0830	0.0847	-0.0690	0.1447	-0.1520	0.1355
Lending and investments	-0.1906	0.4812	-0.6861	0.8612	-0.4955	0.8396
Manufacturing	0.5908	0.4036	1.2676 **	0.4798	0.6768 *	0.3632
Media and entertainmen	0.0409	0.1209	-0.0901	0.2165	-0.1309	0.2029
Messaging and telecoms	-0.1980	0.1797	0.5248 *	0.2702	0.7228 **	0.2470
Music and audio	0.5367 **	0.2018	-0.0288	0.3810	-0.5655	0.3503
Natural resources	14.7492	1240.0	1.3350	2056.6	-13.4142	1640.7
Navigation and mapping	0.4243 *	0.2186	-0.4059	0.3974	-0.8302 **	0.3748
Other	-0.3945 **	0.1398	0.0594	0.2157	0.4538 **	0.2065
Payments	-0.1084	0.3433	-0.3287	0.5614	-0.2203	0.5360
Privacy and security	-0.1702	0.2620	0.4603	0.3580	0.6305 **	0.3212
Professional services	-0.3170 **	0.1245	-0.2262	0.2101	0.0908	0.2020
Real estate	-0.5768 **	0.2933	-0.0424	0.4241	0.5344	0.4159
Sales and marketing	-0.2716 **	0.1375	-0.2432	0.2419	0.0284	0.2316
Science and engineering	-0.1149	0.2124	-0.0665	0.3405	0.0484	0.3242
Sports	0.1204	0.1603	-0.4229	0.3600	-0.5433	0.3453
Sustainability	0.1818	0.5592	-13.3804	691.31	-13.5622	691.31
Transportation	-0.0412	0.2729	0.0556	0.4468	0.0968	0.4184
Travel and tourism	-0.0986	0.2077	-0.4151	0.4503	-0.3164	0.4358
Video	0.1417	0.1746	-0.3583	0.3267	-0.5001 *	0.3038
Constant	-0.8242 ***	0.0610	-0.9064 ***	0.1003	-1.7305 ***	0.0931

Number of observations = 5605 Wald chi2(88) = 257 Pseudo R-square = 0.0264 Log pseudolikelihood = -4743

Table 7. Propensities to be associated with particular platform arrangements, India.

Business Category	iOS v. Both		Android v. Both		Android v. iOS	
	Coeff.	St. Err.	Coeff.	St. Err.	Coeff.	St. Err.
Administrative services	2.4736 **	1.1163	1.4020	1.2968	-1.0716	0.8699
Advertising	1.2089 ***	0.3504	0.3698	0.4401	-0.8391 **	0.4041
Apps	-0.2470 *	0.1350	-0.2507	0.1721	-0.0037	0.1681
Artificial intelligence	-0.2825	0.8213	0.6204	0.8904	0.9029	0.9252
Biotechnology	14.8923	2205.8	-0.3382	3809.0	-15.2305	3105.3
Clothing and apparel	1.2190	0.8175	0.7058	1.0234	-0.5133	0.8178
Commerce and shopping	0.1110	0.1833	0.0364	0.2346	-0.0746	0.2280
Community and lifestyle	0.0614	0.6514	-0.3491	0.8670	-0.4105	0.8203
Consumer electronics	0.9593 *	0.5296	0.8578	0.6292	-0.1015	0.6319
Consumer goods	-0.0670	1.4395	0.4355	1.4807	0.5025	1.4661
Content and publishing	-0.0655	0.4924	-0.0374	0.5698	0.0282	0.5458
Data and analytics	-0.3728	0.4437	-0.0352	0.5317	0.3376	0.5477
Design	-0.1397	0.1662	0.1489	0.2036	0.2886	0.2018
Education	0.1398	0.3650	-0.0601	0.4865	-0.1999	0.4662
Events	-1.7941	1.2791	0.3306	1.0964	2.1247	1.3818
Financial services	0.6747	0.7446	0.4152	0.9574	-0.2594	0.8530
Food and beverage	-1.4633	1.0623	-14.5067	1065.1	-13.0433	1065.1
Gaming	0.9304 **	0.3139	0.0517	0.4728	-0.8787 **	0.4304
Hardware	-0.7796 **	0.3665	-0.5715	0.4478	0.2081	0.4688
Healthcare	0.0254	0.6930	-0.5977	0.8139	0.5723	0.7976
Information technology	0.1848	0.1460	-0.0890	0.1873	-0.2739	0.1838
Internet Services	0.3739 **	0.1697	0.0058	0.2199	-0.3681 *	0.2116
Lending and investments	-0.7859	1.5301	0.5941	1.6194	1.3800	1.5845
Manufacturing	14.9854	1278.1	-0.5160	2129.5	-15.5014	1703.3
Media and entertainmen	0.1758	0.3920	0.5338	0.4623	0.3580	0.4349
Messaging and telecoms	0.3637	0.6565	1.4643 **	0.6933	1.1006 *	0.5858
Music and audio	-0.4956	1.4744	1.6978	1.2410	2.1934 *	1.2968
Navigation and mapping	0.9499	0.7009	-0.4888	1.0426	-1.4387	0.9988
Other	-0.2130	0.3357	0.3989	0.3597	0.6120 *	0.3662
Payments	-0.3066	0.8174	-0.8947	1.0845	-0.5881	0.9970
Privacy and security	-0.8276	0.9403	1.0518	0.7952	1.8793 **	0.9040
Professional services	-0.1179	0.2480	-0.0704	0.3081	0.0475	0.3060
Real estate	-1.4119 *	0.7267	-0.6144	0.7556	0.7975	0.8617
Sales and marketing	-0.5790 **	0.2172	0.0145	0.2520	0.5935 **	0.2602
Science and engineering	0.2778	0.4484	0.3338	0.5402	0.0560	0.5429
Sports	0.2883	0.5770	-1.3913	1.1793	-1.6796	1.1434
Transportation	0.5754	0.6278	-0.4738	1.1374	-1.0493	1.0841
Travel and tourism	-0.2882	0.7621	0.2427	0.9214	0.5309	0.9188
Video	-0.0187	0.6225	-0.3438	0.7485	-0.3251	0.7066
Constant	0.1681	0.1280	-0.6985 ***	0.1623	-0.8666 ***	0.1578

Number of observations = 1204 Wald chi2(78) = 111 Pseudo R-square = 0.0443 Log pseudolikelihood = -1194

Table 8. Propensities to be associated with particular platform arrangements, Japan.

Business Category	iOS v. Both		Android v. Both		Android v. iOS	
	Coeff.	St. Err.	Coeff.	St. Err.	Coeff.	St. Err.
Administrative services	16.5278	7373.6	-1.2467	9711.5	-17.7746	6320.0
Advertising	0.4515	1.0790	-1.6346	1.5066	-2.0861	1.6485
Apps	-0.7611 *	0.4274	-1.5526 ***	0.4462	-0.7915 *	0.4160
Artificial intelligence	16.3694	7826.9	-0.4486	6131.9	-16.8180	4864.3
Clothing and apparel	17.8395	7182.3	31.9314	7730.4	14.0919	2859.1
Commerce and shopping	0.6987	1.3466	1.0813	1.3130	0.3827	1.0221
Community and lifestyle	-17.2575	4172.2	-50.5360	6050.1	-33.2786	4381.3
Consumer electronics	0.3678	0.9530	-0.1384	0.8853	-0.5061	0.8047
Consumer goods	-20.0032	21172	-18.3144	23455	1.6889	25338
Content and publishing	16.1702	3961.9	18.0008	3961.9	1.8305	1.4355
Data and analytics	-0.9923	1.5963	-0.4029	1.2742	0.5894	1.3157
Design	-2.2007 **	1.0286	-0.4992	0.7240	1.7015 *	0.9924
Education	0.7913	1.2516	-0.0032	1.5348	-0.7945	1.2426
Energy	-1.0374	13207	17.7341	10092	18.7715	8519.2
Events	-0.7345	13349	-1.3904	17204	-0.6559	10852
Financial services	-18.7366	5209.9	-1.3203	1.3935	17.4163	5209.9
Food and beverage	-3.5032	14925	29.5399	14807	33.0431	6365.7
Gaming	-0.0419	0.6535	0.1413	0.6427	0.1832	0.5744
Hardware	-0.4638	0.8080	0.4222	0.7298	0.8860	0.6745
Healthcare	18.3215	7194.6	0.3988	9420.1	-17.9227	6080.8
Information technology	0.7253	0.6015	0.8187	0.5958	0.0935	0.5175
Internet Services	-0.4774	0.5540	-0.2910	0.5288	0.1864	0.4997
Lending and investments	-0.8942	12042	-18.3337	10933	-17.4395	16265
Manufacturing	16.6943	2619.6	16.3087	2619.6	-0.3856	1.1007
Media and entertainmen	1.5956 *	0.8714	0.9117	0.9185	-0.6839	0.6124
Messaging and telecoms	15.8349	4162.7	15.4318	4162.7	-0.4030	1.5535
Music and audio	16.4495	7698.0	-0.9113	9861.8	-17.3607	6164.1
Navigation and mapping	-15.3206	17789	17.3851	16198	32.7057	9543.7
Other	-0.3584	1.3035	-18.0321	2185.2	-17.6737	2185.2
Payments	18.1136	5209.9	0.7839	2.8392	-17.3297	5209.9
Professional services	1.0933	1.0058	0.5007	1.1038	-0.5925	0.9780
Real estate	0.4122	1.2132	-1.3440	1.4472	-1.7562	1.4808
Sales and marketing	-0.9878	1.3458	0.7530	0.9560	1.7408	1.1875
Science and engineering	-0.3200	7200.8	17.5899	5309.5	17.2699	4864.3
Sports	18.0511	10906	-0.4499	14097	-18.5010	8931.5
Travel and tourism	1.7328	12623	-14.4113	13335	-16.1441	4301.8
Video	-0.7198	2.1300	0.3292	2.0115	1.0490	1.4385
Constant	0.5851	0.4017	0.7082	0.3885	0.1232	0.3484

Number of observations = 222 Wald chi2(74) =108 Pseudo R-square = 0.2236 Log pseudolikelihood = -187

Figure 1. Histograms of number of categories per firm

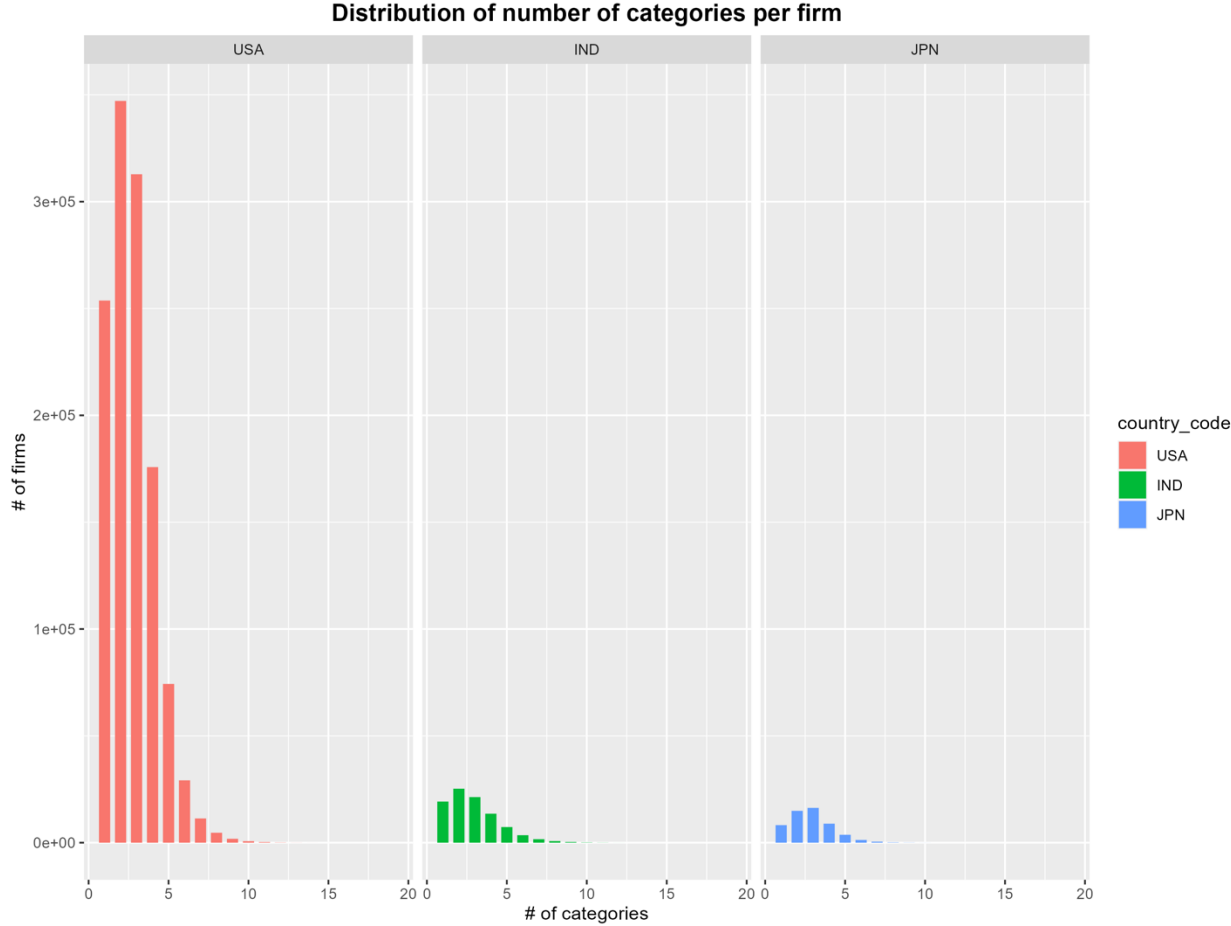


Figure 2. Platform preferences for business categories that have statistically significant preferences for the U.S.

		...to this platform arrangement			
		iOS only	On both platforms	Android only	
Prefers this platform arrangement...	iOS only		Clothing and apparel + <i>Commerce & shopping</i> + <i>Consumer electronics</i> + <i>Content and publishing</i> Music and audio -	Video +	
				Healthcare - Information technology - Navigation and mapping +	
					Events † Food and beverage ++ <i>Gaming</i> ++
	On both platforms		<i>Professional Services</i> - Real Estate - <i>Sales and marketing</i> +		Energy -†
		Apps + Other -			Apps +
	Android only			Privacy and security - Manufacturing -† Messaging and telecoms +	

Notes:

All categories mentioned are statistically significant at least at the 10% level in the multinomial analyses. “+” indicates categories that are positive and statistically significant in the logit model. “-” denotes categories that have a negative and statistically significant relationship preference against using mobile platforms in the logit model. **Bold** indicates that the category is in the top half and *italics* indicates that the category is in the next 25 percent of the most frequently listed categories by the businesses that indicate a mobile presence. “†” indicates categories whose coefficients we consider to be economically significant, meaning that their coefficients in the multinomial analyses are greater than one in at least one instance.

Figure 3. Platform preferences for business categories that have statistically significant preferences for India.

		...to this platform arrangement		
		iOS only	On both platforms	Android only
Prefers this platform arrangement...	iOS only		Administrative services † Consumer electronics *	
			<i>Advertising</i> † † Gaming Internet services	
	On both platforms	Apps † <i>Hardware</i> - Real estate † <i>Sales and marketing</i>		
	Android only	Music and audio † Other Privacy and security † <i>Sales and marketing</i>		
Messaging and telecoms †				

Notes:

All categories mentioned are statistically significant at least at the 10% level in the multinomial analyses. “+” indicates categories that are positive and statistically significant in the logit model. “-” denotes categories that have a negative and statistically significant relationship preference against using mobile platforms in the logit model. **Bold** indicates that the category is in the top half and *italics* indicates that the category is in the next 25 percent of the most frequently listed categories by the businesses that indicate a mobile presence. “†” indicates categories whose coefficients we consider to be economically significant, meaning that their coefficients in the multinomial analyses are greater than one in at least one instance.

Figure 4. Platform preferences for business categories that have statistically significant preferences for Japan.

		...to this platform arrangement		
		iOS only	On both platforms	Android only
Prefers this platform arrangement...	iOS only		Media and entertainment[†]	Apps⁺⁺
	On both platforms	Apps⁺⁺ <i>Design[†]</i>		Apps⁺⁺
	Android only	<i>Design[†]</i>		

Notes:

All categories mentioned are statistically significant at least at the 10% level in the multinomial analyses. “+” indicates categories that are positive and statistically significant in the logit model. “-” denotes categories that have a negative and statistically significant relationship preference against using mobile platforms in the logit model. **Bold** indicates that the category is in the top half and *italics* indicates that the category is in the next 25 percent of the most frequently listed categories by the businesses that indicate a mobile presence. “†” indicates categories whose coefficients we consider to be economically significant, meaning that their coefficients in the multinomial analyses are greater than one in at least one instance.

Appendix

Appendix Table 1. Crunchbase Business Categories, 2020

Industry Group	Industries
Administrative Services	Archiving Service, Call Center, Collection Agency, College Recruiting, Courier Service, Debt Collections, Delivery, Document Preparation, Employee Benefits, Extermination Service, Facilities Support Services, Housekeeping Service, Human Resources, Knowledge Management, Office Administration, Packaging Services, Physical Security, Project Management, Staffing Agency, Trade Shows, Virtual Workforce
Advertising	Ad Exchange, Ad Network, Ad Retargeting, Ad Server, Ad Targeting, Advertising, Advertising Platforms, Affiliate Marketing, Local Advertising, Mobile Advertising, Outdoor Advertising, SEM, Social Media Advertising, Video Advertising
Agriculture and Farming	Agriculture, AgTech, Animal Feed, Aquaculture, Equestrian, Farming, Forestry, Horticulture, Hydroponics, Livestock
Apps	App Discovery, Apps, Consumer Applications, Enterprise Applications, Mobile Apps, Reading Apps, Web Apps
Artificial Intelligence	Artificial Intelligence, Intelligent Systems, Machine Learning, Natural Language Processing, Predictive Analytics
Biotechnology	Bioinformatics, Biometrics, Biopharma, Biotechnology, Genetics, Life Science, Neuroscience, Quantified Self
Clothing and Apparel	Fashion, Laundry and Dry-cleaning, Lingerie, Shoes
Commerce and Shopping	Auctions, Classifieds, Collectibles, Consumer Reviews, Coupons, E-Commerce, E-Commerce Platforms, Flash Sale, Gift, Gift Card, Gift Exchange, Gift Registry, Group Buying, Local Shopping, Made to Order, Marketplace, Online Auctions, Personalization, Point of Sale, Price Comparison, Rental, Retail, Retail Technology, Shopping, Shopping Mall, Social Shopping, Sporting Goods, Vending and Concessions, Virtual Goods, Wholesale

Source: Crunchbase <https://support.crunchbase.com/hc/en-us/articles/360043146954-What-Industries-are-included-in-Crunchbase->

Appendix Table 1. Crunchbase Business Categories (cont.)

Community and Lifestyle	Adult, Baby, Cannabis, Children, Communities, Dating, Elderly, Family, Funerals, Humanitarian, Leisure, LGBT, Lifestyle, Men's, Online Forums, Parenting, Pet, Private Social Networking, Professional Networking, Q&A, Religion, Retirement, Sex Industry, Sex Tech, Social, Social Entrepreneurship, Teenagers, Virtual World, Wedding, Women's, Young Adults
Consumer Electronics	Computer, Consumer Electronics, Drones, Electronics, Google Glass, Mobile Devices, Nintendo, Playstation, Roku, Smart Home, Wearables, Windows Phone, Xbox
Consumer Goods	Beauty, Comics, Consumer Goods, Cosmetics, DIY, Drones, Eyewear, Fast-Moving Consumer Goods, Flowers, Furniture, Green Consumer Goods, Handmade, Jewelry, Lingerie, Shoes, Tobacco, Toys
Content and Publishing	Blogging Platforms, Content Delivery Network, Content Discovery, Content Syndication, Creative Agency, DRM, EBooks, Journalism, News, Photo Editing, Photo Sharing, Photography, Printing, Publishing, Social Bookmarking, Video Editing, Video Streaming
Data and Analytics	A/B Testing, Analytics, Application Performance Management, Artificial Intelligence, Big Data, Bioinformatics, Biometrics, Business Intelligence, Consumer Research, Data Integration, Data Mining, Data Visualization, Database, Facial Recognition, Geospatial, Image Recognition, Intelligent Systems, Location Based Services, Machine Learning, Market Research, Natural Language Processing, Predictive Analytics, Product Research, Quantified Self, Speech Recognition, Test and Measurement, Text Analytics, Usability Testing
Design	CAD, Consumer Research, Data Visualization, Fashion, Graphic Design, Human Computer Interaction, Industrial Design, Interior Design, Market Research, Mechanical Design, Product Design, Product Research, Usability Testing, UX Design, Web Design
Education	Alumni, Charter Schools, College Recruiting, Continuing Education, Corporate Training, E-Learning, EdTech, Education, Edutainment, Higher Education, Language Learning, MOOC, Music Education, Personal Development, Primary Education, Secondary Education, Skill Assessment, STEM Education, Textbook, Training, Tutoring, Vocational Education

Appendix Table 1. Crunchbase Business Categories (cont.)

Energy	Battery, Biofuel, Biomass Energy, Clean Energy, Electrical Distribution, Energy, Energy Efficiency, Energy Management, Energy Storage, Fossil Fuels, Fuel, Fuel Cell, Oil and Gas, Power Grid, Renewable Energy, Solar, Wind Energy
Events	Concerts, Event Management, Event Promotion, Events, Nightclubs, Nightlife, Reservations, Ticketing, Wedding
Financial Services	Accounting, Angel Investment, Asset Management, Auto Insurance, Banking, Bitcoin, Commercial Insurance, Commercial Lending, Consumer Lending, Credit, Credit Bureau, Credit Cards, Crowdfunding, Cryptocurrency, Debit Cards, Debt Collections, Finance, Financial Exchanges, Financial Services, FinTech, Fraud Detection, Funding Platform, Gift Card, Health Insurance, Hedge Funds, Impact Investing, Incubators, Insurance, InsurTech, Leasing, Lending, Life Insurance, Micro Lending, Mobile Payments, Payments, Personal Finance, Prediction Markets, Property Insurance, Real Estate Investment, Stock Exchanges, Trading Platform, Transaction Processing, Venture Capital, Virtual Currency, Wealth Management
Food and Beverage	Bakery, Brewing, Cannabis, Catering, Coffee, Confectionery, Cooking, Craft Beer, Dietary Supplements, Distillery, Farmers Market, Food and Beverage, Food Delivery, Food Processing, Food Trucks, Fruit, Grocery, Nutrition, Organic Food, Recipes, Restaurants, Seafood, Snack Food, Tea, Tobacco, Wine And Spirits, Winery
Gaming	Casual Games, Console Games, Contests, Fantasy Sports, Gambling, Gamification, Gaming, MMO Games, Online Games, PC Games, Serious Games, Video Games
Government and Military	CivicTech, Government, GovTech, Law Enforcement, Military, National Security, Politics, Public Safety, Social Assistance

Appendix Table 1. Crunchbase Business Categories (cont.)

Hardware	3D Technology, Application Specific Integrated Circuit (ASIC), Augmented Reality, Cloud Infrastructure, Communication Hardware, Communications Infrastructure, Computer, Computer Vision, Consumer Electronics, Data Center, Data Center Automation, Data Storage, Drone Management, Drones, DSP, Electronic Design Automation (EDA), Electronics, Embedded Systems, Field-Programmable Gate Array (FPGA), Flash Storage, Google Glass, GPS, GPU, Hardware, Industrial Design, Laser, Lighting, Mechanical Design, Mobile Devices, Network Hardware, NFC, Nintendo, Optical Communication, Playstation, Private Cloud, Retail Technology, RFID, RISC, Robotics, Roku, Satellite Communication, Semiconductor, Sensor, Sex Tech, Telecommunications, Video Conferencing, Virtual Reality, Virtualization, Wearables, Windows Phone, Wireless, Xbox
Health Care	Alternative Medicine, Assisted Living, Assistive Technology, Biopharma, Cannabis, Child Care, Clinical Trials, Cosmetic Surgery, Dental, Diabetes, Dietary Supplements, Elder Care, Electronic Health Record (EHR), Emergency Medicine, Employee Benefits, Fertility, First Aid, Funerals, Genetics, Health Care, Health Diagnostics, Home Health Care, Hospital, Medical, Medical Device, mHealth, Nursing and Residential Care, Nutraceutical, Nutrition, Outpatient Care, Personal Health, Pharmaceutical, Psychology, Rehabilitation, Therapeutics, Veterinary, Wellness
Information Technology	Business Information Systems, CivicTech, Cloud Data Services, Cloud Management, Cloud Security, CMS, Contact Management, CRM, Cyber Security, Data Center, Data Center Automation, Data Integration, Data Mining, Data Visualization, Document Management, E-Signature, Email, GovTech, Identity Management, Information and Communications Technology (ICT), Information Services, Information Technology, Intrusion Detection, IT Infrastructure, IT Management, Management Information Systems, Messaging, Military, Network Security, Penetration Testing, Private Cloud, Reputation, Sales Automation, Scheduling, Social CRM, Spam Filtering, Technical Support, Unified Communications, Video Chat, Video Conferencing, Virtualization, VoIP

Appendix Table 1. Crunchbase Business Categories (cont.)

Internet Services	Cloud Computing, Cloud Data Services, Cloud Infrastructure, Cloud Management, Cloud Storage, Darknet, Domain Registrar, E-Commerce Platforms, Ediscovery, Email, Internet, Internet of Things, ISP, Location Based Services, Messaging, Music Streaming, Online Forums, Online Portals, Private Cloud, Product Search, Search Engine, SEM, Semantic Search, Semantic Web, SEO, SMS, Social Media, Social Media Management, Social Network, Unified Communications, Vertical Search, Video Chat, Video Conferencing, Visual Search, VoIP, Web Browsers, Web Hosting
Lending and Investments	Angel Investment, Banking, Commercial Lending, Consumer Lending, Credit, Credit Cards, Financial Exchanges, Funding Platform, Hedge Funds, Impact Investing, Incubators, Micro Lending, Stock Exchanges, Trading Platform, Venture Capital
Manufacturing	3D Printing, Advanced Materials, Foundries, Industrial, Industrial Automation, Industrial Engineering, Industrial Manufacturing, Machinery Manufacturing, Manufacturing, Paper Manufacturing, Plastics and Rubber Manufacturing, Textiles, Wood Processing
Media and Entertainment	Advice, Animation, Art, Audio, Audiobooks, Blogging Platforms, Broadcasting, Celebrity, Concerts, Content, Content Creators, Content Discovery, Content Syndication, Creative Agency, Digital Entertainment, Digital Media, DRM, EBooks, Edutainment, Event Management, Event Promotion, Events, Film, Film Distribution, Film Production, Guides, In-Flight Entertainment, Independent Music, Internet Radio, Journalism, Media and Entertainment, Motion Capture, Music, Music Education, Music Label, Music Streaming, Music Venues, Musical Instruments, News, Nightclubs, Nightlife, Performing Arts, Photo Editing, Photo Sharing, Photography, Podcast, Printing, Publishing, Reservations, Social Media, Social News, Theatre, Ticketing, TV, TV Production, Video, Video Editing, Video on Demand, Video Streaming, Virtual World
Messaging and Telecommunications	Email, Meeting Software, Messaging, SMS, Unified Communications, Video Chat, Video Conferencing, VoIP, Wired Telecommunications
Mobile	Android, Google Glass, iOS, mHealth, Mobile, Mobile Apps, Mobile Devices, Mobile Payments, Windows Phone, Wireless

Appendix Table 1. Crunchbase Business Categories (cont.)

Music and Audio	Audio, Audiobooks, Independent Music, Internet Radio, Music, Music Education, Music Label, Music Streaming, Musical Instruments, Podcast
Natural Resources	Biofuel, Biomass Energy, Fossil Fuels, Mineral, Mining, Mining Technology, Natural Resources, Oil and Gas, Precious Metals, Solar, Timber, Water, Wind Energy
Navigation and Mapping	Geospatial, GPS, Indoor Positioning, Location Based Services, Mapping Services, Navigation
Other	Alumni, Association, B2B, B2C, Blockchain, Charity, Collaboration, Collaborative Consumption, Commercial, Consumer, Crowdsourcing, Customer Service, Desktop Apps, Emerging Markets, Enterprise, Ethereum, Franchise, Freemium, Generation Y, Generation Z, Homeless Shelter, Infrastructure, Knowledge Management, LGBT Millennials, Non Profit, Peer to Peer, Professional Services, Project Management, Real Time, Retirement, Service Industry, Sharing Economy, Small and Medium Businesses, Social Bookmarking, Social Impact, Subscription Service, Technical Support, Underserved Children, Universities
Payments	Billing, Bitcoin, Credit Cards, Cryptocurrency, Debit Cards, Fraud Detection, Mobile Payments, Payments, Transaction Processing, Virtual Currency
Platforms	Android, Facebook, Google, Google Glass, iOS, Linux, macOS, Nintendo, Operating Systems, Playstation, Roku, Tizen, Twitter, WebOS, Windows, Windows Phone, Xbox
Privacy and Security	Cloud Security, Corrections Facilities, Cyber Security, DRM, E-Signature, Fraud Detection, Homeland Security, Identity Management, Intrusion Detection, Law Enforcement, Network Security, Penetration Testing, Physical Security, Privacy, Security
Professional Services	Accounting, Business Development, Career Planning, Compliance, Consulting, Customer Service, Employment, Environmental Consulting, Field Support, Freelance, Intellectual Property, Innovation Management, Legal, Legal Tech, Management Consulting, Outsourcing, Professional Networking, Quality Assurance, Recruiting, Risk Management, Social Recruiting, Translation Service
Real Estate	Architecture, Building Maintenance, Building Material, Commercial Real Estate, Construction, Coworking, Facility Management, Fast-Moving Consumer Goods, Green Building, Home and Garden, Home Decor, Home Improvement, Home Renovation, Home Services, Interior Design, Janitorial Service, Landscaping, Property Development, Property Management, Real Estate, Real Estate Investment, Rental Property, Residential, Self-Storage, Smart Building, Smart Cities, Smart Home, Timeshare, Vacation Rental

Appendix Table 1. Crunchbase Business Categories (cont.)

Sales and Marketing	Advertising, Affiliate Marketing, App Discovery, App Marketing, Brand Marketing, Cause Marketing, Content Marketing, CRM, Digital Marketing, Digital Signage, Direct Marketing, Direct Sales, Email Marketing, Lead Generation, Lead Management, Local, Local Advertising, Local Business, Loyalty Programs, Marketing, Marketing Automation, Mobile Advertising, Multi-level Marketing, Outdoor Advertising, Personal Branding, Public Relations, Sales, Sales Automation, SEM, SEO, Social CRM, Social Media Advertising, Social Media Management, Social Media Marketing, Sponsorship, Video Advertising
Science and Engineering	Advanced Materials, Aerospace, Artificial Intelligence, Bioinformatics, Biometrics, Biopharma, Biotechnology, Chemical, Chemical Engineering, Civil Engineering, Embedded Systems, Environmental Engineering, Human Computer Interaction, Industrial Automation, Industrial Engineering, Intelligent Systems, Laser, Life Science, Marine Technology, Mechanical Engineering, Nanotechnology, Neuroscience, Nuclear, Quantum Computing, Robotics, Semiconductor, Software Engineering, STEM Education
Software	3D Technology, Android, App Discovery, Application Performance Management, Apps, Artificial Intelligence, Augmented Reality, Billing, Bitcoin, Browser Extensions, CAD, Cloud Computing, Cloud Management, CMS, Computer Vision, Consumer Applications, Consumer Software, Contact Management, CRM, Cryptocurrency, Data Center Automation, Data Integration, Data Storage, Data Visualization, Database, Developer APIs, Developer Platform, Developer Tools, Document Management, Drone Management, E-Learning, EdTech, Electronic Design Automation (EDA), Embedded Software, Embedded Systems, Enterprise Applications, Enterprise Resource Planning (ERP), Enterprise Software, Facial Recognition, File Sharing, IaaS, Image Recognition, iOS, Linux, Machine Learning, macOS, Marketing Automation, Meeting Software, Mobile Apps, Mobile Payments, MOOC, Natural Language Processing, Open Source, Operating Systems, PaaS, Predictive Analytics, Presentation Software, Presentations, Private Cloud, Productivity Tools, QR Codes, Reading Apps, Retail Technology, Robotics, SaaS, Sales Automation, Scheduling, Sex Tech, Simulation, SNS, Social CRM, Software, Software Engineering, Speech Recognition, Task Management, Text Analytics, Transaction Processing, Video Conferencing, Virtual Assistant, Virtual Currency, Virtual Desktop, Virtual Goods, Virtual Reality, Virtual World, Virtualization, Web Apps, Web Browsers, Web Development

Appendix Table 1. Crunchbase Business Categories (cont.)

Sports	American Football, Baseball, Basketball, Boating, Cricket, Cycling, Diving, eSports, Fantasy Sports, Fitness, Golf, Hockey, Hunting, Outdoors, Racing, Recreation, Rugby, Sailing, Skiing, Soccer, Sporting Goods, Sports, Surfing, Swimming, Table Tennis, Tennis, Ultimate Frisbee, Volleyball
Sustainability	Biofuel, Biomass Energy, Clean Energy, CleanTech, Energy Efficiency, Environmental Engineering, Green Building, Green Consumer Goods, GreenTech, Natural Resources, Organic, Pollution Control, Recycling, Renewable Energy, Solar, Sustainability, Waste Management, Water Purification, Wind Energy
Transportation	Air Transportation, Automotive, Autonomous Vehicles, Car Sharing, Courier Service, Delivery Service, Electric Vehicle, Ferry Service, Fleet Management, Food Delivery, Freight Service, Last Mile Transportation, Limousine Service, Logistics, Marine Transportation, Parking, Ports and Harbors, Procurement, Public Transportation, Railroad, Recreational Vehicles, Ride Sharing, Same Day Delivery, Shipping, Shipping Broker, Space Travel, Supply Chain Management, Taxi Service, Transportation, Warehousing, Water Transportation
Travel and Tourism	Adventure Travel, Amusement Park and Arcade, Business Travel, Casino, Hospitality, Hotel, Museums and Historical Sites, Parks, Resorts, Timeshare, Tour Operator, Tourism, Travel, Travel Accommodations, Travel Agency, Vacation Rental
Video	Animation, Broadcasting, Film, Film Distribution, Film Production, Motion Capture, TV, TV Production, Video, Video Editing, Video on Demand, Video Streaming