Appendix B: market outcomes

Introduction

1.   This appendix presents data on market outcomes. We first present data on

outcomes relating to mobile devices and operating systems including shares of supply and the prices of mobile devices. We then set out outcomes relating to app distribution. Finally, we present data on outcomes relating to mobile browsers.

Mobile devices and operating systems outcomes

2.   In this section we present an analysis of:

- shares of supply in mobile devices;

- the prices of mobile devices including how they have changed over time and differ between mobile devices using different operating systems; and

- shares of supply in mobile operating systems.

Mobile device shares of supply

Source of data

3.   The data underlying this analysis comes from market participants, the International Data Corporation (IDC), and Statcounter. We first explain the nature of the data from market participants and then from Statcounter. We discuss the nature of the IDC data further below (see the "Mobile device pricing" section).[1]

4.   We received yearly data on the volume of sales of mobile devices from Amazon, Apple, Google, Huawei and Samsung. Each party's description of the data provided is listed below:

- **Google**: provided, in response to a formal CMA request, the number of Android device activations. Google explained that it does not have internal data on the number of third-party Android devices sold and device activations are a reliable proxy for the number of Android devices sold.

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[1] As set out below, this data relates to the number of units shipped into the UK rather than the volume of units sold. We understand that IDC's data is widely used within the industry we are examining. For completeness, we note that the data available suggests that there is a difference between IDC volumes of devices shipped into the UK and the total number of new devices sold. However, this difference is less than 20% in relation to Android and iOS smartphones and tablets in each year from 2017 to 2021 and from 2019 to 2021, respectively.

Google also provided the number of Pixel smartphones that were activated in each year [✂].

- **Apple**: provided the number of devices sold net of the number of devices returned/traded-in.

- **Amazon**: provided the number of Fire OS tablets purchased in each year.

- **Huawei**: provided the number of devices purchased in each year.

- **Samsung**: provided the number of devices purchased in each year.[2]

5. While we only requested data from a limited number of manufacturers, the data provided covered the four main operating systems available on mobile devices in the UK. Namely, it included data from Apple on all iOS mobile devices, Google on all Android devices, data from Amazon on all its Fire OS tablets and data from Huawei on all its HMS devices.[3] As such we were able to estimate the total market size in terms of new sales using this data and then estimate shares of supply for the five manufacturers identified above.

6. We have also been able to source data from Statcounter. Statcounter is a web analytics service which uses tracking code to record page views to its 'member sites', numbering over two million websites globally. Using the data generated, Statcounter publishes its Global Stats. These include shares of supply for mobile devices based on active devices.[4]

7. We consider the possible limitations to Statcounter's methodology may include:

- The 'member sites' for which Statcounter records data may not be representative of the population of websites. Statcounter does not reweight its data to correct for any potential issues.

- It is possible that some consumers' adblockers and browser preferences may prevent data on consumers from being sent to Statcounter.

8. Statcounter does not currently produce material assessing the extent of measurement error in its data. Further, we have heard concerns from Apple

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[2] We have also received yearly data from the same market participants relating to active devices. However, we have not estimated volume shares based on active devices for manufacturers. This is because we were not able to obtain robust data on the number of active devices from **all** market participants. The same caveat does not apply to operating systems – see further below.

[3] Huawei's HMS devices are a version of Android that meets Google's compatibility requirements but uses Huawei Mobile Services instead of Google Mobile Services.

[4] For more detail see FAQ | Statcounter Global Stats, Mobile Vendor Market Share United Kingdom | Statcounter Global Stats and Tablet Vendor Market Share United Kingdom | Statcounter Global Stats.

that because shares are extrapolated from internet usage rather than being based on the actual number of active devices, this 'tends to overestimate Apple's mobile device share for a number of reasons, including that Apple users tend to interact with their devices more frequently than other users.'

9. Therefore, for the purpose of mobile devices we have primarily relied on the data provided by market participants and IDC (for 2021 figures), but use Statcounter data as a check for our data on active devices and also because its data is available over a longer period (in some cases as far as 2009) letting us look at historic trends.

Smartphones

10. In this section we set out:

- shares of supply by manufacturer based on new smartphones data provided by market participants;

- shares of supply by manufacturers based on IDC data on total value of devices shipped into the UK in 2021;

- shares of supply by manufacturers based on IDC data on total number of units of devices shipped into the UK in 2021; and

- shares of supply by manufacturer based on active smartphones data from Statcounter.

11. Figure B.1 shows the shares of supply based on data from market participants for Apple, Samsung, Huawei and Google in terms of new smartphones in the UK for the period 2015 to 2021. As can be seen:

- Between [40-50%] and [40-50%] of new smartphones sold in each year of this period have been Apple's iPhones.

- Between [20-30%] and [20-30%] of new smartphones sold in each year of this period have been Samsung phones such that Samsung has been the second largest manufacturer and the largest manufacturer of Android devices.

- Huawei was the second largest manufacturer of Android devices in 2018 and 2019 with its share peaking at [5-10]%. Huawei's sales have declined

since it moved to using Huawei Mobile Services (see Chapter 3) with a share of just [0-1]% in 2021.[5]

Figure B.1: Manufacturer shares of supply in the sale of new smartphones in the UK – market participants data (2015-2021)
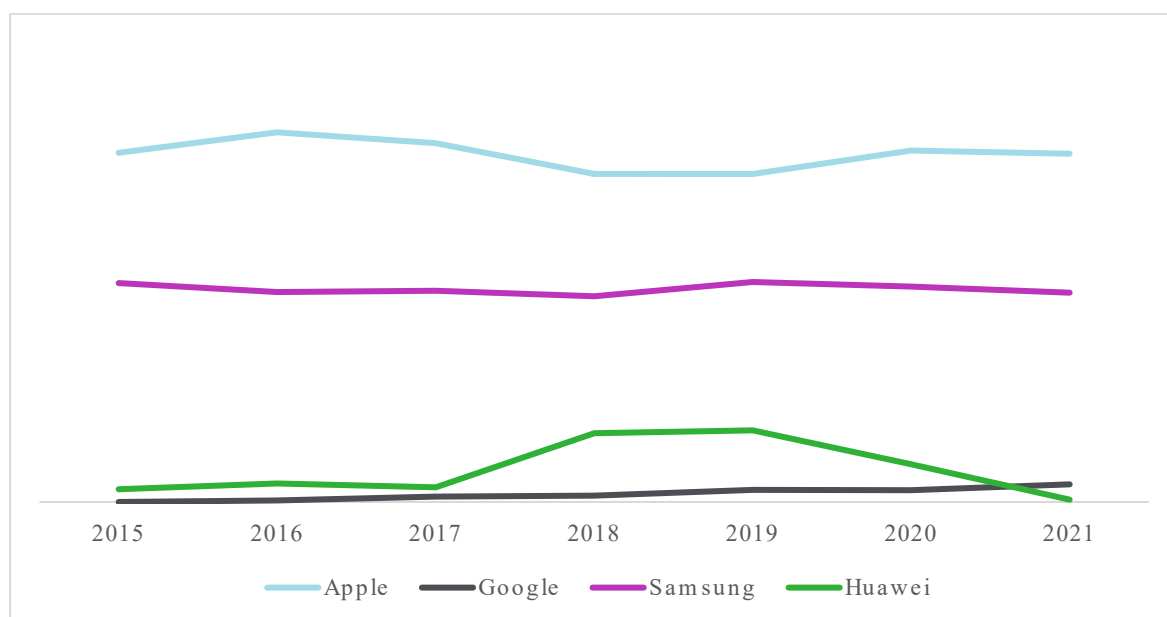
Source: CMA analysis of data from market participants.
Notes: We have only received data from a limited number of manufacturers, so shares do not sum to 100% as total volumes are based on operating systems data to calculate the total number of new sales.

12. Figure B.2 shows the shares of supply based on data from IDC for Apple, Samsung, Huawei and Google in terms of total value of devices shipped into the UK in 2021.[6] The same relative ranking (amongst these four manufacturers)[7] as described above applies when considering revenue-based shares of supply, with Apple having the largest share in 2021 (75.0%) followed by Samsung (15.5%). As expected, and consistent with the pricing analysis presented below, Apple's share of the total value of devices shipped into the UK (based on analysis of IDC's data) is higher than its shares of supply in the sale of new smartphones (based on our analysis of data from market participants).[8]

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[5] Huawei has explained that, in addition to the US May 2019 legislation discussed above, other factors that affected the reduction in Huawei shares include: Huawei not launching a smartphone model in 2021 in the UK, and Huawei changing its commercial strategy to focus more on products such as PCs, wearable devices and audio devices.
[6] As explained in detail below, Figures exclude VAT.
[7] As noted in Figure B.2, other manufacturers collectively had a share of 8% and some of these were larger than Google and Huawei in 2021.
[8] For completeness and given the differences between IDC volumes of smartphones shipped into the UK and the total number of new smartphones sold noted above, we also report 2019 value shares – see Figure B.3. This is because, for smartphones, the difference between shipped and sold devices is smaller in 2019 compared to 2021 (less than 2% in relation to Android and iOS smartphones in 2019). The 2019 analysis is in line with 2021 findings. In 2019, Apple was still the largest manufacturer, with market shares of 60.5% based on total value of devices shipped in the UK, followed by Samsung (22.3%) and Huawei (8.8%).

Figure B.2: Manufacturer shares of supply based on total value of smartphones shipped into the UK – IDC data (2021)
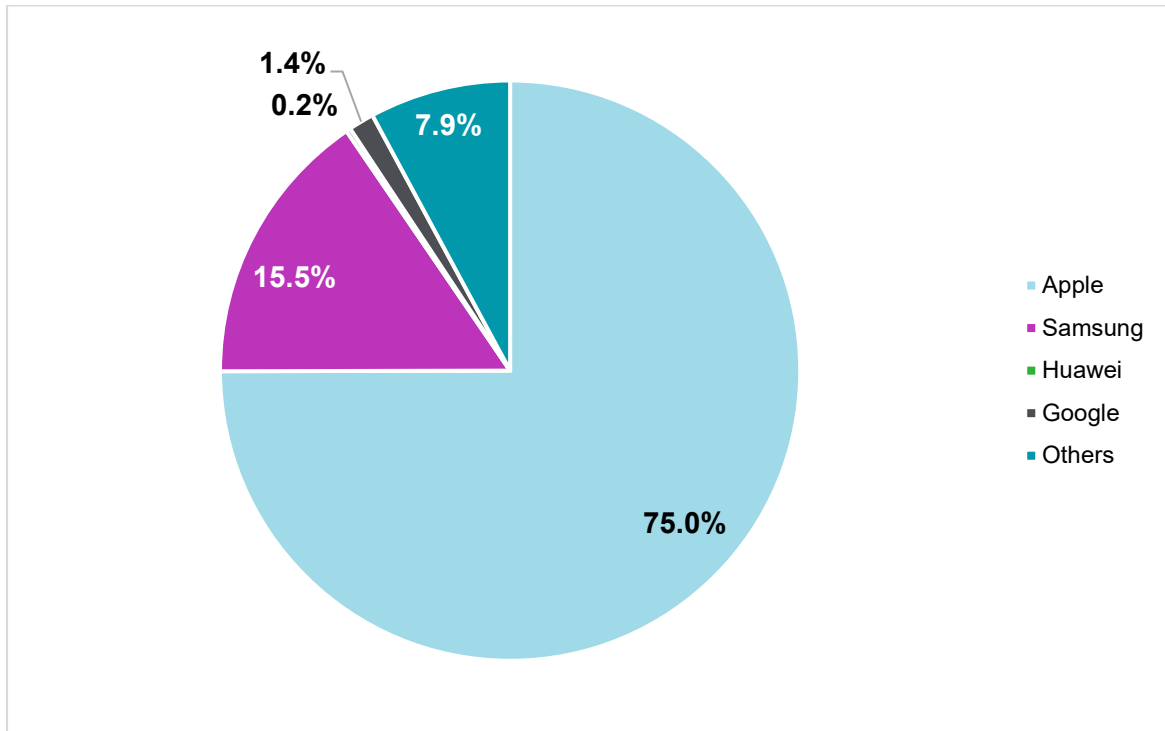
Figure B.3: Manufacturer shares of supply based on total value of smartphones shipped into the UK – IDC data (2019)
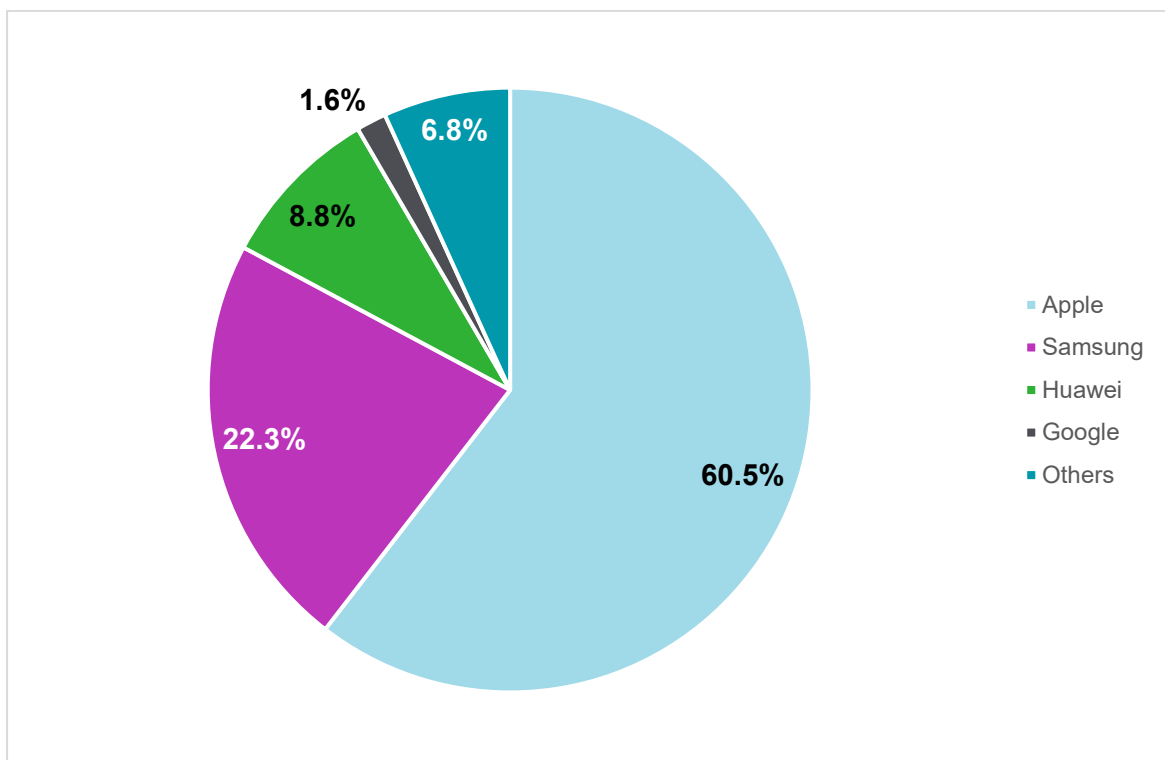
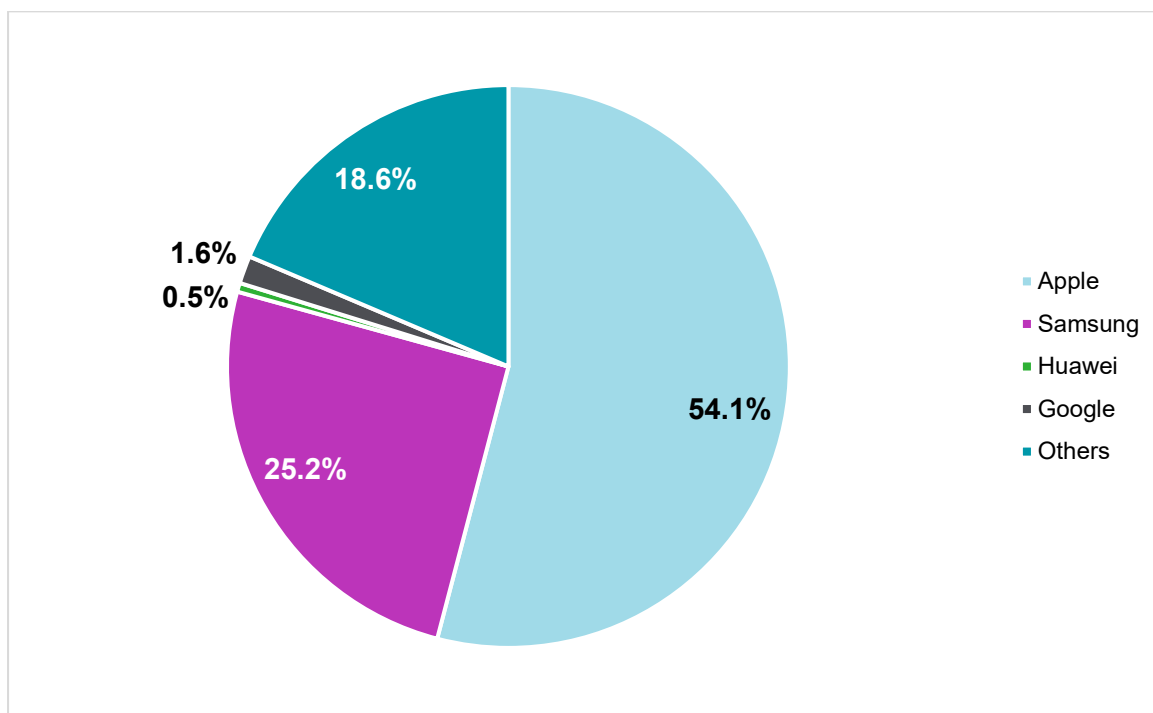13. Figure B.4 shows the shares of supply based on data from IDC for Apple, Samsung, Huawei and Google in terms of total number of units of

smartphones shipped into the UK in 2021. Shares of supply calculated on this basis are in line with volume shares of supply based on data from market participants – see Figure B.1 above. Apple is the largest player, with a share of supply greater than 50% in 2021, followed by Samsung, currently the second largest manufacturer and the largest manufacturer of Android devices.

Figure B.4: Manufacturer shares of supply based on total number of units of smartphones shipped into the UK – IDC data (2021)


Source: CMA analysis of IDC data from "IDC Mobile Phone Tracker_FinalHistoricalPivot_2021Q4_CMA"

14.   Figure B.5 shows the shares of supply based on data from Statcounter for Apple, Samsung, Huawei, Google and other manufacturers who have had at least a 5% share in one year since 2010. This shows that:

- Apple has consistently been the largest manufacturer over the last decade;

- while Samsung has been the second largest manufacturer for much of the last decade, it has grown from a 1% share in 2010; and

- the last manufacturer that appeared to have a comparable share in active smartphones to Apple was RIM (widely known as Blackberry) with a share that peaked at 41% in 2011 before rapidly declining.

Figure B.5: Manufacturer shares of supply in active smartphones in the UK – Statcounter data (2010-2021)
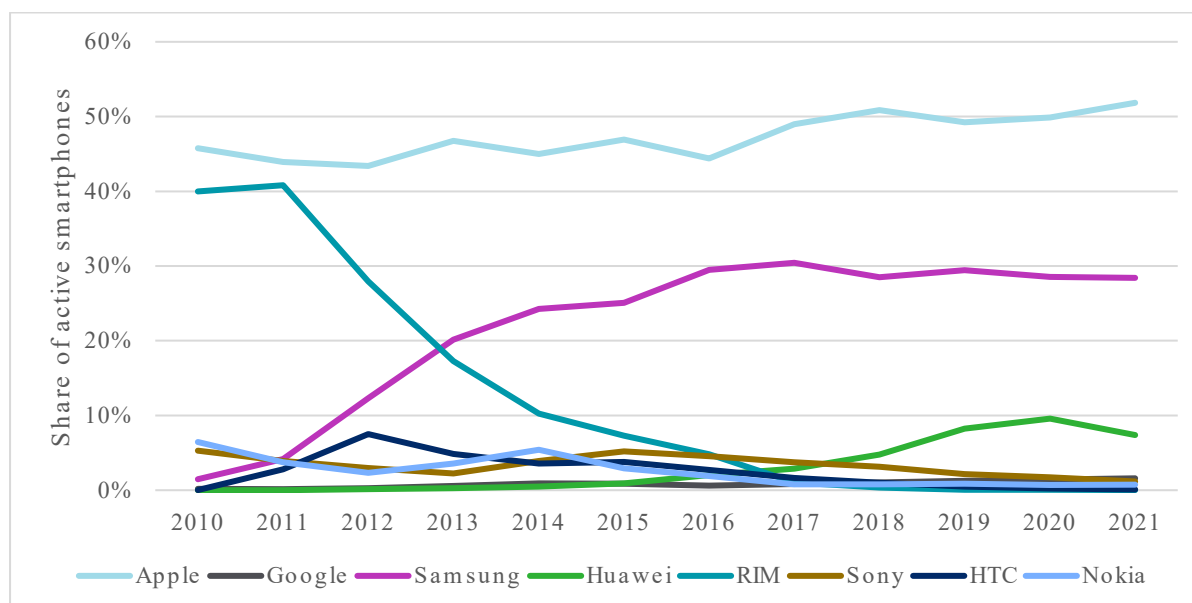
Source: Mobile Vendor Market Share United Kingdom | Statcounter Global Stats.
Notes: Apart from Google which was included for consistency only manufacturers with a share of 5 percentage points or more in any one year have been included.

Tablets

15. In this section we set out:

   - shares of supply by manufacturer based on new tablets data provided by market participants;

   - shares of supply by manufacturer based on IDC data on total value of tablets shipped into the UK in 2021;

   - shares of supply by manufacturer based on IDC data on total number of units of tablets shipped into the UK in 2021; and

   - shares of supply by manufacturer based on active tablets data from Statcounter.

16. Figure B.6 shows the shares of supply based on data from market participants for Apple, Amazon, Samsung, Huawei and Google in terms of new tablets in the UK for the period 2015 to 2021. As can be seen:

   - Apple has consistently been the largest tablet manufacturer although Apple's share has fluctuated starting at [40-50%] in 2015, before falling to [30-40%] in 2017 and then rising again to [40-50%] in 2021.

   - Amazon's Fire OS is only available on its own Fire tablets, so Amazon's share of tablets mirrors its share of tablet operating systems. It has been

the second largest tablet manufacturer for most of the period considered with Amazon's share of new tablets growing materially from [10-20%] in 2015 to [30-40%] in 2017 before declining to [20-30%] in 2021.

- Samsung has consistently been the largest manufacturer of Android tablets and the third largest tablet manufacturer for most of the period considered. Samsung's share of new tablets has been fairly consistent ranging between [10-20%] and [10-20%] of new tablets.

Figure B.6: Manufacturer shares of supply in the sale of new tablets in the UK – market participants data (2015-2021)
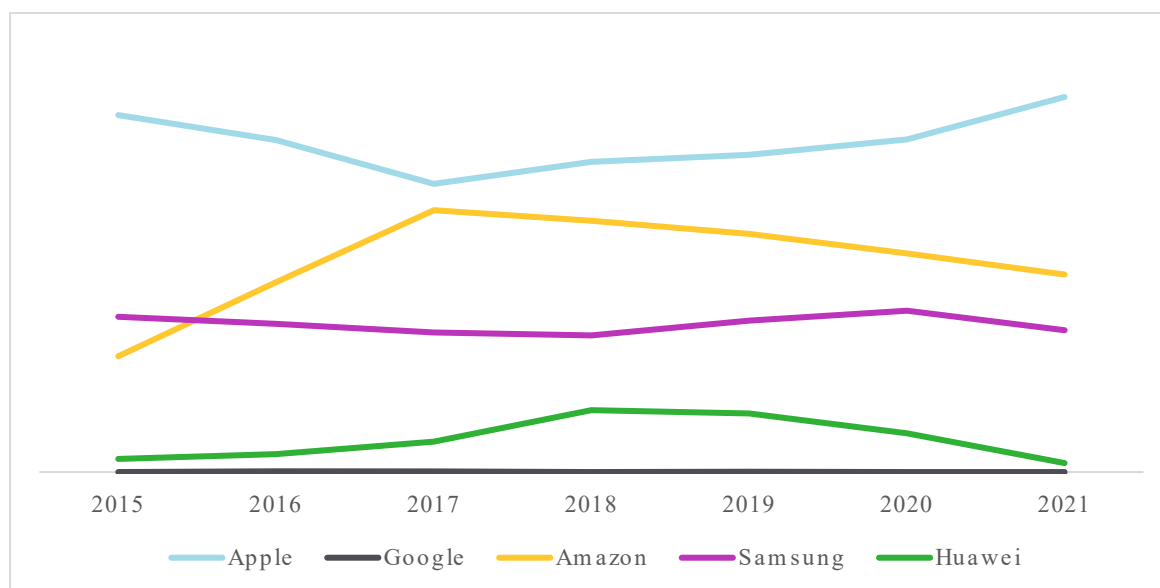
Source: CMA analysis of data from market participants.
Notes: We have only received data from a limited number of manufacturers, so shares do not sum to 100% as total volumes are based on operating systems data to calculate the total number of new sales.
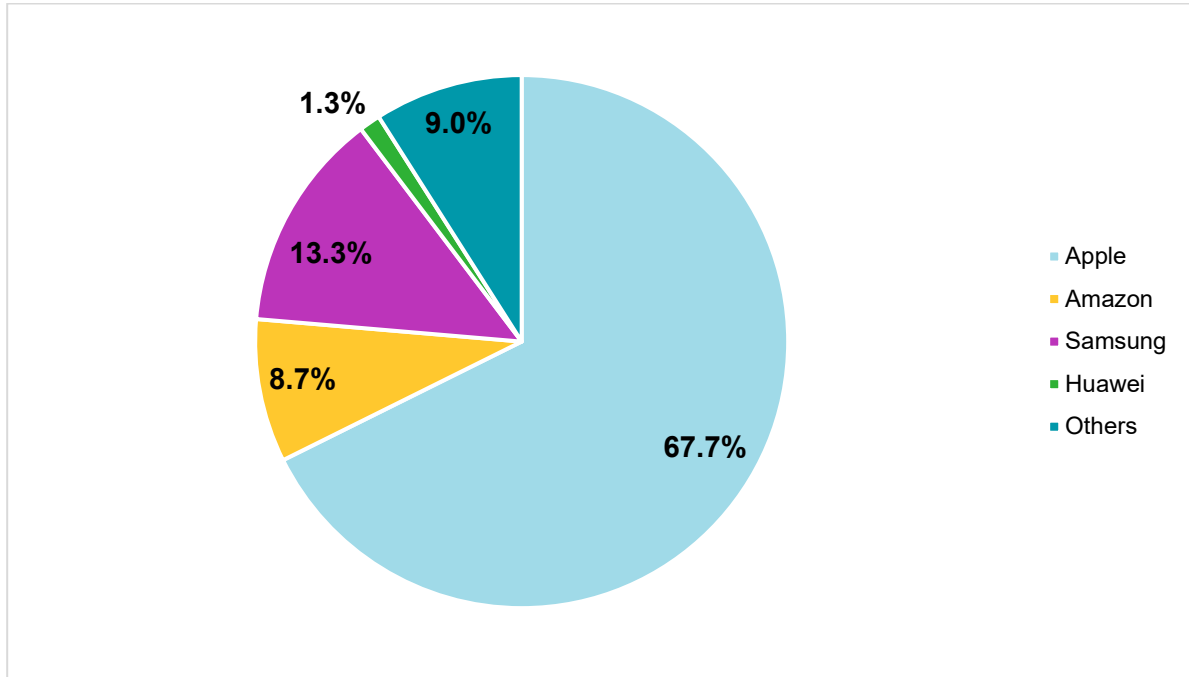
17. Figure B.7 shows the shares of supply based on data from IDC for Apple, Samsung, Amazon and Huawei in terms of total value of iOS, Android[9] and Fire OS tablets shipped into the UK in 2021.[10] As expected, and consistent with the pricing analysis presented below, Apple's share of supply based on the total value of tablets shipped into the UK (based on analysis of IDC's data) is higher than its share of supply based on the sale of new tablets in the UK (based on our analysis of data from market participants). When considering revenues-based shares of supply, Samsung is the second largest player (instead of the third – see Figure B.5) and Amazon the third largest (instead of the second).

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[9] For the purpose of our analysis of IDC data on tablets we have not split out Huawei's HMS devices from Android devices.
[10] As explained in detail below, figures exclude VAT. In addition, and consistent with shares estimates based on data from market participants, market shares estimates based on IDC data exclude Windows and Chrome tablets. No tablets were reported for Google in the IDC shipment data.

Figure B.7: Manufacturer shares of supply based on total value of tablets shipped into the UK – IDC data (2021)
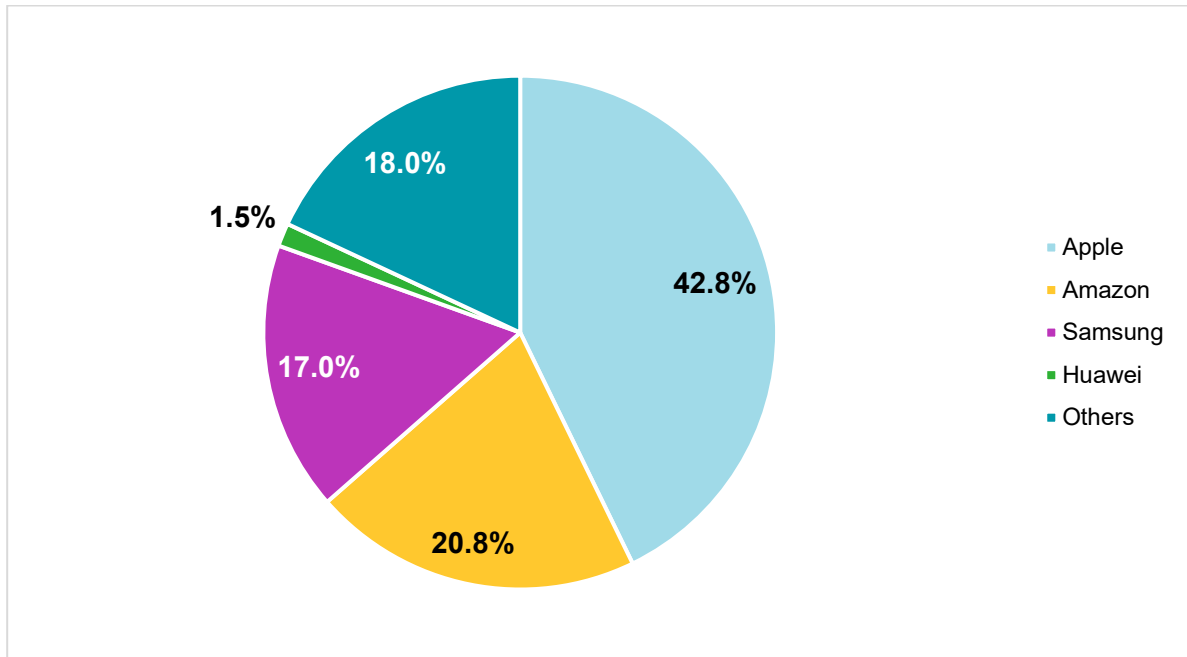

Source: CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA"

18.   Figure B.8 shows the shares of supply based on data from IDC for Apple, Samsung, Huawei and Amazon in terms of total number of units of iOS, Android[11] and Fire OS tablets shipped into the UK in 2021. Shares of supply calculated on this basis are in line with volume shares of supply based on data from market participants – see Figure B.5 above. Apple is the largest player, with a share of supply of 42.8% in 2021, followed by Amazon, currently the second largest manufacturer by volume of sales, and Samsung.

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[11] For the purpose of our analysis of IDC data on tablets we have not split out Huawei's HMS devices from Android devices.

Figure B.8: Manufacturer shares of supply based on total number of units of tablets shipped into the UK – IDC data (2021)


Source: CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA"

19.   Figure B.9 shows the shares of supply based on data from Statcounter for Apple, Amazon, Samsung and Huawei since 2012. This shows that:

- Apple has consistently been the largest manufacturer over the last decade, although over time its share has declined;

- based on Statcounter, Samsung has the second largest number of active tablets at around 10% for most of the period, increasing in the last few years to 19%; and

- based on Statcounter, Amazon has the third largest number of active tablets, peaking at 10% in 2021.

Figure B.9: Manufacturer shares of supply in active tablets in the UK – Statcounter data (2012-2021)
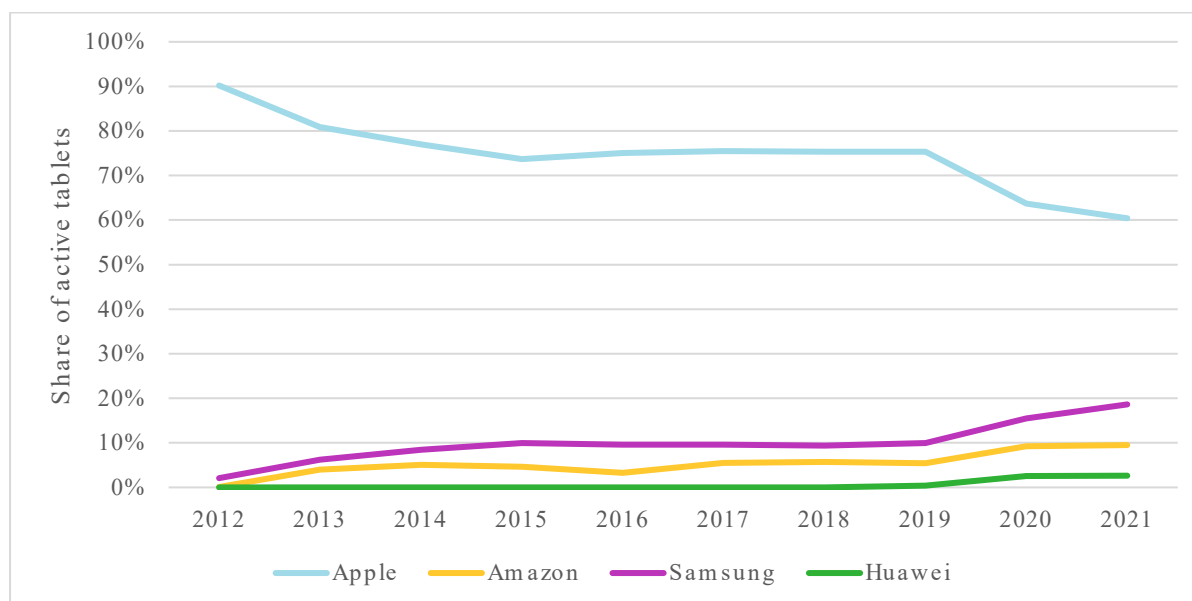
Source: Tablet Vendor Market Share United Kingdom | Statcounter Global Stats.
Notes: Apart from Huawei which was included for consistency only manufacturers with a share of 5 percentage points or more in any one year have been included.

Mobile device pricing

Source of data

20.   The data underlying this analysis comes from IDC, a market intelligence firm identified by several market participants.[12]

21.   We use data from IDC's:

- Worldwide Quarterly Mobile Phone Tracker[13] and Worldwide Quarterly Personal Computing Device Tracker.[14] This data covered (i) smartphones and featurephones[15] in the UK for the period 2015 to 2021, and (ii) tablets in the UK for the period 2015 to 2021. It included the following for each model:

    - Information on the model name, the brand name under which the phone/tablet was sold, the vendor or company who owns and produces the device.

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[12] This is the same underlying data used to construct shares of supply in Figures B.2, B.3, B.4, B.7, B.8 above and Figures B.23 and B.19 below.
[13] Worldwide Quarterly Mobile Phone Tracker (idc.com).
[14] Worldwide Quarterly Personal Computing Device Tracker (idc.com).
[15] Featurephones are mobile phones that have reduced features and functionality compared to a smartphone, they may come with a small non-touch screen and press buttons.

- Information on the operating system used on that model.

- Information on whether it was a smartphone or featurephone and information on whether it was a slate tablet or a detachable tablet.

- The units of that model shipped into the UK.

- The value of those units based on UK selling prices collected from channel and supply sources across the business to business (B2B) and business to consumer (B2C) markets.

- The price band for each model shipped into the UK.[16]

22. IDC volume data is based on Unit shipments. Unit shipments are a measure of the number of new mobile phones or tablets (branded or unbranded) shipped by a vendor to all distribution channels or directly to end users. Units are counted as the title (ie ownership) is transferred from the vendor to a channel or customer and in doing so IDC seeks to address any potential double counting. A 'shipment' corresponds to the sale of a complete system[17] into the channel within the country of final use, or directly to an end user in a given period. Products sold through a channel in one country, but for final use in another country, are only counted in the country of final use.

23. IDC's tracking methodology is based on a combined sell-in and sell-out approach which may lead to some differences when comparing to sell-out data only on a monthly or quarterly basis due to the time gap and inventory management.[18]

24. By comparing IDC data with data from market participants, we note that there are some differences across the two. However, the differences in volumes for smartphones appear to be more limited for the period 2017 to 2021 and this is therefore the period in which we have focused our analysis for smartphones.[19] In relation to tablets we restricted our analysis to just 2019 and 2021.[20] Differences between market data sources can be related to several factors – definitions, segmentation, data sources, geography and time capture at supplier or channel level which can lead to differences on volume or revenue

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[16] IDC classifies smartphones into 41 price bands. From £0 to £700, these are multiples of £25; from £700 to £1,000, multiples of £50; and from £1,000 to £1,600, multiples of £100. All devices which are more expensive than £1,600 are captured in the £1,600+ band. IDC classifies tablets into 31 price bands. From £0 to £700, these are multiples of £50; from £700 to £2,000, multiples of £100; and from £2,000 to £3,000, multiples of £500. All devices which are more expensive than £3,000 are captured either in the £3,000-5,000 band or in the £5,000+ band.
[17] A complete system refers to having a product that is fully equipped to function. That is, not missing parts such as the operating system, keyboard when sold together, etc.
[18] This only relates to indirect sales, as direct sales to customers are sell-out.
[19] In these years the difference was less than 20% in relation to Android and iOS smartphones.
[20] In these years the difference was less than 20% in relation to Android and iOS tablets.

measurement in a given market segment, geography and period. Such differences are only likely to bias the results of the analysis set out below if there is a systematic difference between how this affects iOS devices and Android devices.

25.   IDC pricing data reflects the end-user price level, and the value calculations are the result of unit shipments multiplied by the average selling price (ASPs). The ASP is the average end-user (street) price paid for a typically configured mobile phone or tablet and based on the product specifications. The ASP includes all freight, insurance, and other shipping and handling fees, such as taxes (import/export) and tariffs, that are included in vendor or channel pricing. Point-of-sale taxes (eg value-added tax (VAT) or sales tax) are generally excluded. Subsidies offered by mobile operators are also not factored into this price. Pricing is collected across several direct and indirect channels, and while specific purchasing conditions or channel rebates are not taken into account, volume purchases by a retailer or large businesses buying in larger volumes will weigh into the average selling prices of devices.

26.   Despite these potential limitations with the data, we understand that IDC's data is widely used within the industry we are examining, and that IDC itself conducts and provides to clients an analysis based on price bands that is similar to the one we have conducted.

27.   As noted above, the IDC's data on mobile phones covered both smartphones and featurephones. For the purposes of our analysis of IDC data in this study we have only included data on smartphones.

Smartphones

28.   In this section we set out:[21]

   •   The proportion of smartphones shipped into the UK by £100 price bands for iOS smartphones and Android smartphones respectively.

   •   The proportion of smartphones shipped into the UK by £100 price bands for iOS smartphones (iPhones) and Samsung smartphones respectively.

   •   iOS and Android shares of supply for devices sold for £300 or less and for devices sold for more than £300.

29.   In order to assess the proportion of smartphones shipped into the UK by £100 price bands for iOS smartphones and Android smartphones the average

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[21] For the purposes of this analysis we have not split out Huawei's HMS devices from Android devices.

selling price for each model and specification was calculated. Based on this, the volumes of each model and specification were allocated to a price band, for example, a £150 model would be in the £100-£200 price band which included all devices that cost more than £100, but £200 or less.
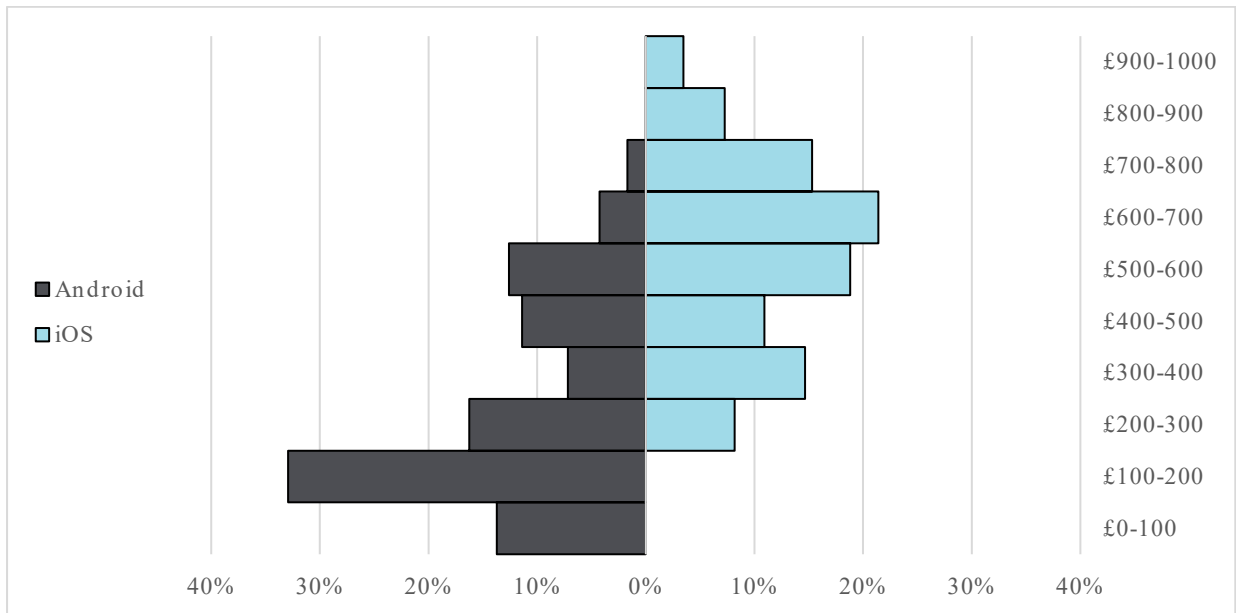
30. The total number of smartphones shipped in each price band for iOS smartphones and Android smartphones was then calculated and based on this the proportion in each price band was calculated. This was done separately for iOS smartphones and Android smartphones.

31. This was done separately for 2017 and 2021 and the results are provided in Figures B.10 and Figure B.11 below. As can be seen, IDC's data indicates that there is a price gap between the price at which most iOS smartphones are sold and the price at which most Android smartphones are sold. In particular, IDC's data indicates that:

- **Apple's iOS devices dominate the sale of higher-priced smartphones**. In 2017, 66% of iOS smartphones were sold for more than £500 compared to just 19% of Android smartphones. By 2021 this gap had expanded with 91% of iOS smartphones being sold for more than £500 compared to just 19% of Android smartphones.[22]

- **Devices using Google's Android dominate the sale of lower-priced smartphones**. In 2017, only 8% of iOS smartphones were sold for £300 or less compared to 63% of Android smartphones. By 2021 this gap had expanded with no iOS smartphones being sold for £300 or less compared to 65% of Android smartphones.[23]

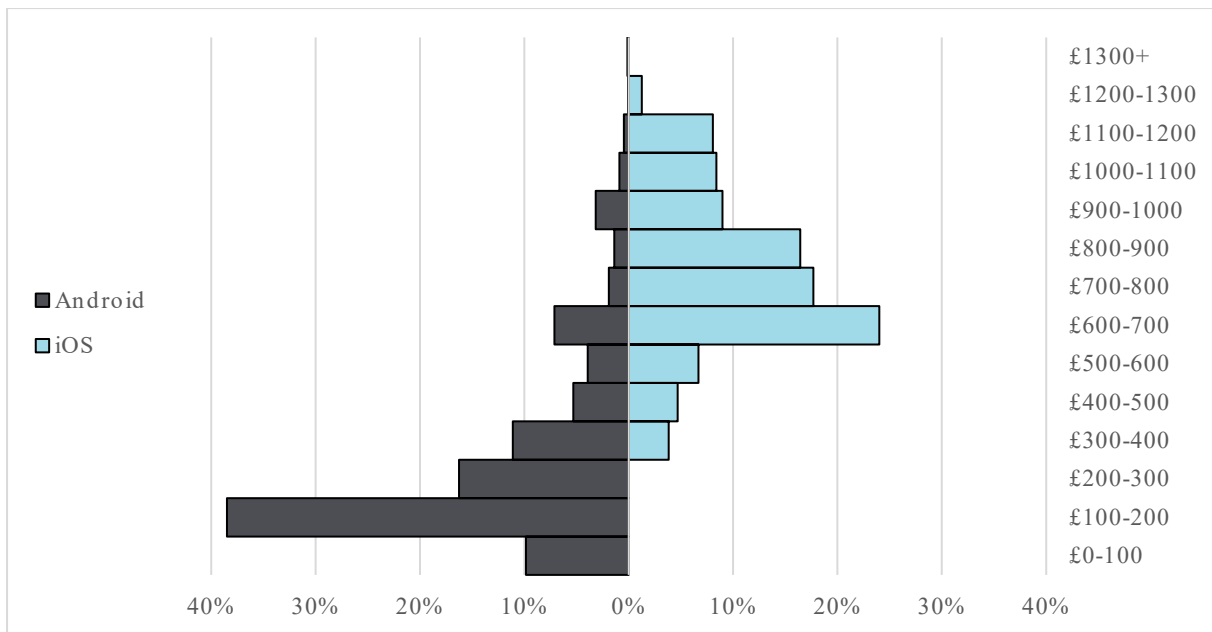[22] CMA analysis of IDC data from "IDC Mobile Phone Tracker_FinalHistoricalPivot_2021Q4_CMA".
[23] CMA analysis of IDC data from "IDC Mobile Phone Tracker_FinalHistoricalPivot_2021Q4_CMA".

Figure B.10: Proportion of smartphones shipped into the UK by £100 price bracket (2017)

Figure B.11: Proportion of smartphones shipped into the UK by £100 price bracket (2021)

32.   These findings are consistent when considering iOS smartphone devices (iPhone) and Samsung smartphones. Figure B.12 below shows that there is a price gap between the price at which most iOS smartphones (iPhone) are sold and the price at which most Samsung smartphones are sold. In 2021, 91% of iOS (iPhone) devices were sold for more than £500 compared to just 24% of

Samsung devices. [24] No iOS device being sold for £300 or less compared to 63% of Samsung devices.[25]

Figure B.12: Proportion of smartphones shipped into the UK by £100 price bracket (2021, iOS and Samsung comparison)
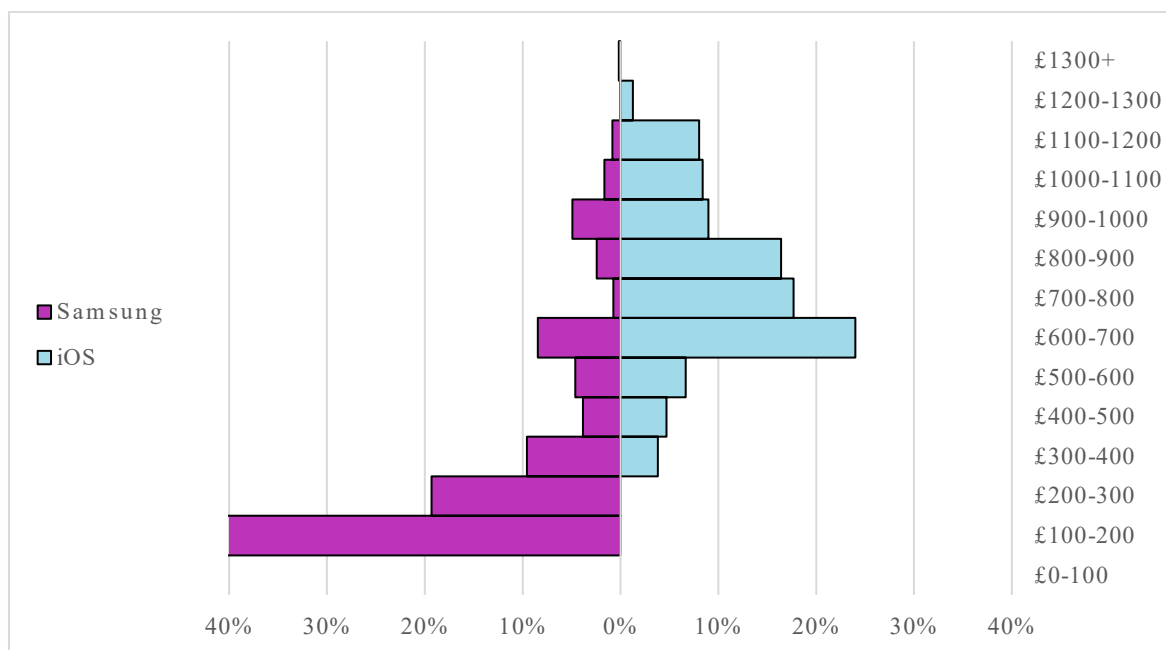

Source: CMA analysis of IDC data from "IDC Mobile Phone Tracker_FinalHistoricalPivot_2021Q4_CMA"
Notes: For details on how the number of units shipped and average selling price data were consolidated, see above.

33. We also use this data to calculate iOS and Android shares of supply for devices sold for £300 or less and for devices sold for more than £300. As illustrated in Figure B.13, the evidence is consistent with Apple's iOS devices dominating the sale of higher-priced smartphones and devices using Google's Android the sale of lower-priced devices. In particular, the IDC data indicates that:

- In 2021, Android's share of devices sold for £300 or less was 100%.[26]

- In 2021, iOS's share of devices sold for more than £300 was higher than 75% (and thus Android's less than 25%).[27] This picture has been fairly consistent since 2017.

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[24] CMA analysis of IDC data from "IDC Mobile Phone Tracker_FinalHistoricalPivot_2021Q4_CMA".
[25] CMA analysis of IDC data from "IDC Mobile Phone Tracker_FinalHistoricalPivot_2021Q4_CMA".
[26] CMA analysis of IDC data from "IDC Mobile Phone Tracker_FinalHistoricalPivot_2021Q4_CMA".
[27] CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA".

Figure B.13: Operating system shares of supply based on total volume of smartphones shipped into the UK (2021) for devices sold for £300 or less and devices sold for more than £300[28]
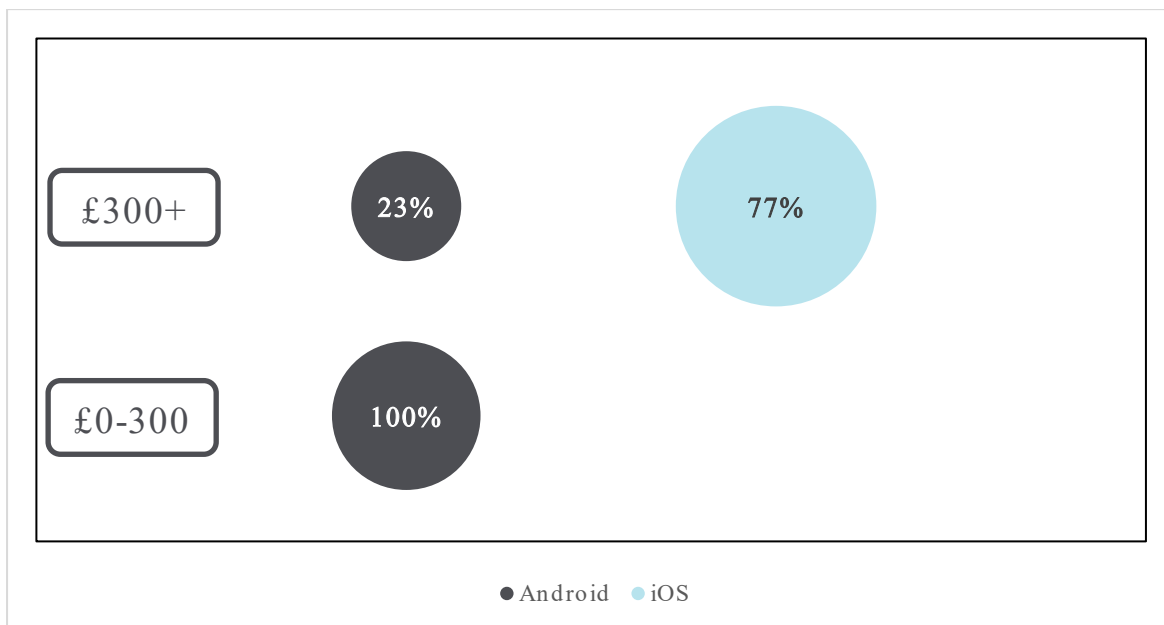
Source: CMA analysis of IDC data from "IDC Mobile Phone Tracker_FinalHistoricalPivot_2021Q4_CMA"
Notes: For details on how the number of units shipped and average selling price data were consolidated, see above. The size of the bubble indicates the total number of Android/iOS smartphone devices shipped to the UK in 2021.

Tablets

34.   In this section we set out:[29]

- The volume of tablets shipped into the UK by £100 price bands for iOS tablets, Android tablets (excluding Fire OS tablets), Fire OS tablets, and Windows devices which could be categorised as tablets[30] respectively.

- The average price, excluding VAT, of tablets shipped into the UK for iOS tablets, Android tablets (excluding Fire OS tablets), Fire OS tablets and Windows devices which could be categorised as tablets respectively.

- iOS, Android and Fire OS shares of supply for tablets sold for £300 or less and for devices sold for more than £300.

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[28] The picture does not change materially if we apply a different cut-off. For example, looking at smartphone devices sold for £600 or less, we find that, in 2021, Android shares of supply for such devices was 83%, while iOS shares of supply was 17%. Considering instead devices sold for more than £600, Android shares of supply was 13% in 2021 and iOS 87%.
[29] For the purposes of this analysis we have not split out Huawei's HMS devices.
[30] The majority of these devices identified as those with a Windows operating system are those produced by Microsoft, see CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA". Microsoft explained that it offers Surface devices that run Windows but does not offer any tablets running a mobile operating system. However, Microsoft also explained that certain devices such as its Surface laptop face competition from Apple's high-end iPad Pro.

35.   In order to assess the volume of tablets shipped into the UK by £100 price bands for each operating system the average selling price for each model and specification was calculated. Based on this, the volumes of each model and specification were allocated to a price brand, for example, a £150 model would be in the £100-£200 price band which included all devices that cost more than £100, but £200 or less.

36.   The total number of tablets shipped in each price band by operating system was then calculated.

37.   This was done separately for 2019 and 2021 and the results are provided in Figures B.14 and Figure B.15 below. As can be seen, IDC's data indicates that there is a price gap between the price at which most iOS tablets are sold and the price at which most other tablets are sold. For example, IDC's data indicates that, in 2021:

- Apple's iOS tablets dominate the sales of higher-priced devices and tablets using Google's Android and Amazon's Fire OS tablets the sale of lower-priced devices. In 2021, the majority of Android tablets (83%) were sold for £200 or less. Similarly, the vast majority of Fire OS tablets (97%) were sold for £200 or less, whereas the data indicates that no iOS tablets were sold for £200 or less in 2021.[31]

- all iOS tablets were sold for £200 or more, while only 21% of rival devices were sold at that price range;[32] and

- the majority of Windows devices in the data were sold for more than £700 and Apple's tablets in the same price bracket only account for 7% of its sales.[33]
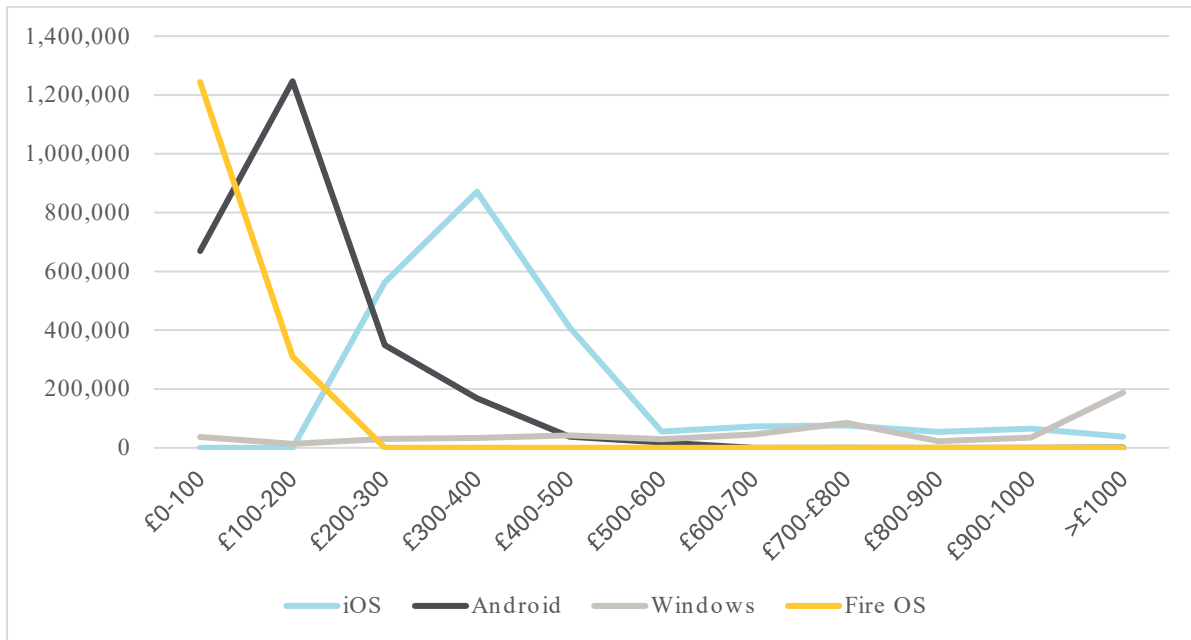
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[31] CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA".
[32] This includes both Windows devices, Android devices and Fire OS tablets. CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA".
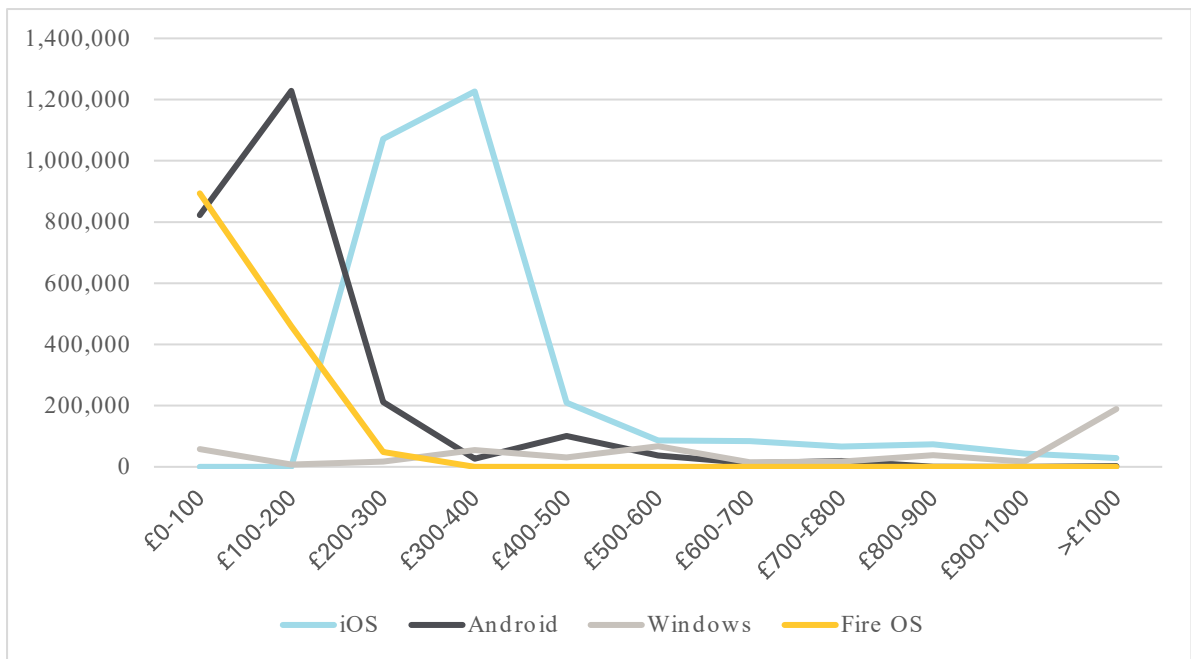[33] CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA".

Figure B.14: Volume of tablets shipped into the UK by £100 price bracket (2019)

Notes: For details on how the number of units shipped and average selling price data were consolidated, see above.

Figure B.15: Volume of tablets shipped into the UK by £100 price bracket (2021)

Notes: For details on how the number of units shipped and average selling price data were consolidated, see above.

38.   We also used this data to calculate the average price, excluding VAT, of devices shipped separately for iOS smartphones and Android smartphones. As can be seen in Table B.1, IDC's data indicates that iOS tablets are

materially more expensive than Android tablets and, while closer in price, Android tablets were more expensive than Amazon's Fire OS tablets.[34]

Table B.1: Average price, excluding VAT, of tablets based on operating system (not adjusted for inflation)

Operating system	2019	2020	2021
iOS	£430	£441	£393
Android (exc. Fire OS)	£160	£179	£161
Fire OS	£74	£78	£104
Windows	£862	£813	£812

Source: CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA".
Notes: For details on how the number of units shipped and average selling price data were consolidated, see above.

39.   Finally, we also use this data to calculate iOS, Android (excluding Fire OS) and Fire OS shares of supply for tablets sold for £300 or less and for tablets sold for more than £300. As illustrated in Figure B.16, the evidence is consistent with iOS dominating the sales of higher-price tablets and Google and Amazon together the sales of lower-price devices. In particular, the IDC data indicates that:

- In 2021, Android and Fire OS combined share of supply for tablets sold for £300 or less was 78%.[35]

- In 2021, iOS's share of supply for tablets sold for more than £300 was 90%. There were no Fire OS tablets sold for more than £300 in 2021 and Android shares of supply for such tablets was 10%.[36]

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[34] CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA".
[35] CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA".
[36] CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA".

Figure B.16: Operating system shares of supply based on total volume of tablets shipped into the UK (2021) for devices sold for £300 or less and devices sold for more than £300
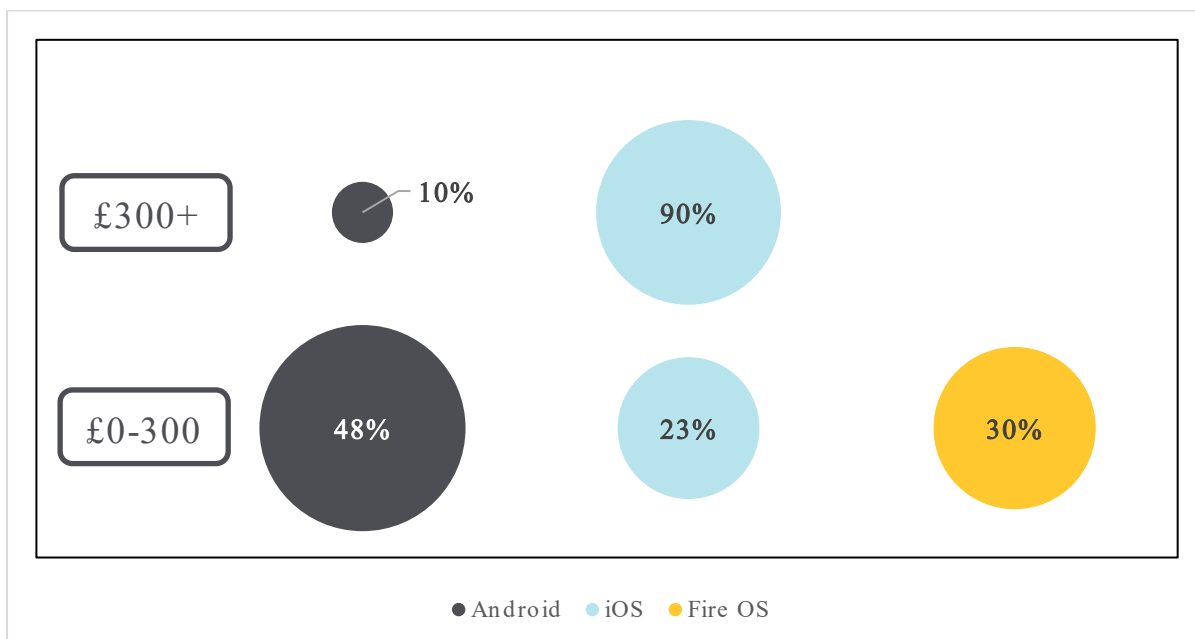
Source: CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA"
Notes: For details on how the number of units shipped and average selling price data were consolidated, see above. The size of the bubble indicates the total number of Android, iOS and Fire OS tablets shipped to the UK in 2021.

Mobile operating system shares of supply

Source of data

40.   The data underlying this analysis on the volume of new sales is the same as that used for the mobile device shares of supply provided above.

41.   In addition, we received yearly data from Google, Apple, Huawei, and Amazon relating to active devices. Each party's description of the data provided is listed below:

- **Google**: provided, in response to a formal CMA request, separately the number of active Android smartphones,[37] the number of active Android tablets and the number of active Pixel smartphones for the UK in each year. [✂].

- **Apple**: provided the number of transacting accounts. Apple defined this as an account that performed a purchase (free or paid app, paid in-app, subscription) on a particular device/platform across all Apple services

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[37] The term 'active devices' differs from 'devices activated'. This is because the number of active devices covers all devices being used by users in that year which includes devices that may have been activated by users in previous years.

during the relevant period. The variable only includes transacting accounts as performed on the relevant device.

- **Amazon**: provided the number of active Fire OS tablets in each year.

- **Huawei**: provided the number of active devices in each year. Huawei's data covers all of its devices that use a version of Android that relies on its Huawei Mobile Services (HMS devices).

42. Due to the limitations outlined above in relation to the data from Statcounter, for the purpose of mobile operating systems, we have primarily relied on the data provided by market participants and use Statcounter data as a check for our data on active devices. Statcounter's data is also available over a longer period as set out above, which lets us look at historic trends.

Smartphones

43. In this section we set out:

- shares of supply by operating system based on new smartphones data provided by market participants;

- shares of supply by operating system based on active smartphones data provided by market participants;

- shares of supply by operating system based on IDC data on total number of units of devices shipped into the UK in 2021;[38] and

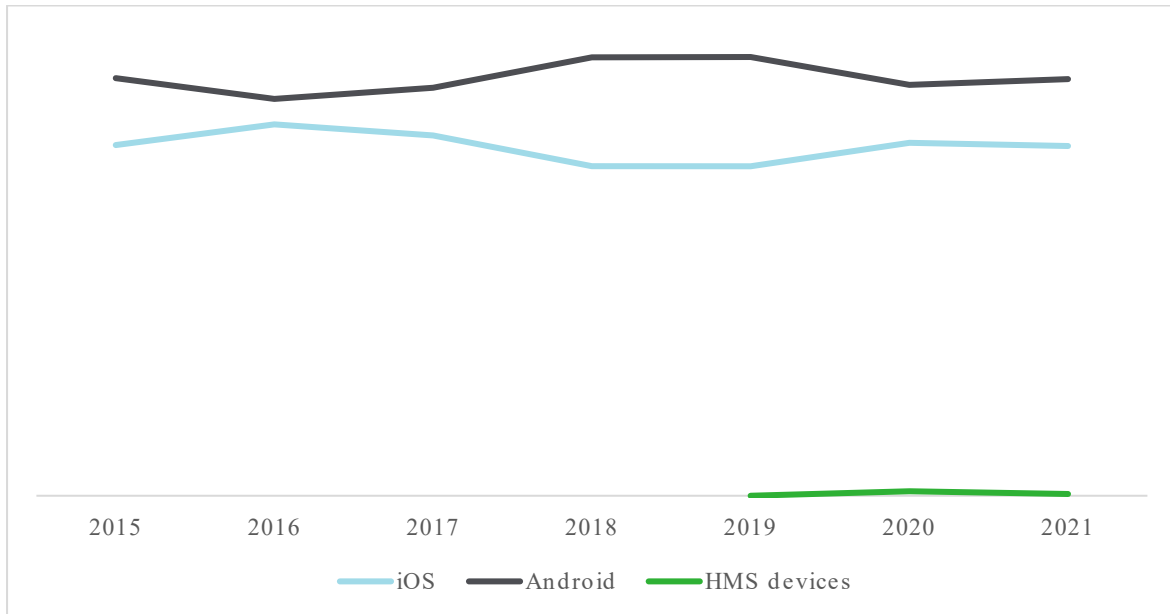- shares of supply by operating system based on active smartphones data from Statcounter.

44. Figure B.17 shows the shares of supply based on data from market participants for iOS, Android and Huawei's HMS devices in terms of new smartphones in the UK for the period 2015 to 2021. As can be seen:

- between [40-50%] of new smartphones in each year of this period have been Apple's iOS devices;

- between [50-60%] and [50-60%] of new smartphones in each year of this period have been Android devices.

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[38] We have not estimated operating system value shares based on IDC data. This is because, whilst Apple operates a vertically integrated business model, Google licences the Android operating system to manufacturers. Given Google's business model, while IDC data captures the value of devices to these manufacturers, this is not equivalent to the value of Android devices to Google.

Figure B.17: Operating system shares of supply in the sale of new smartphones in the UK – market participants data (2015-2021)
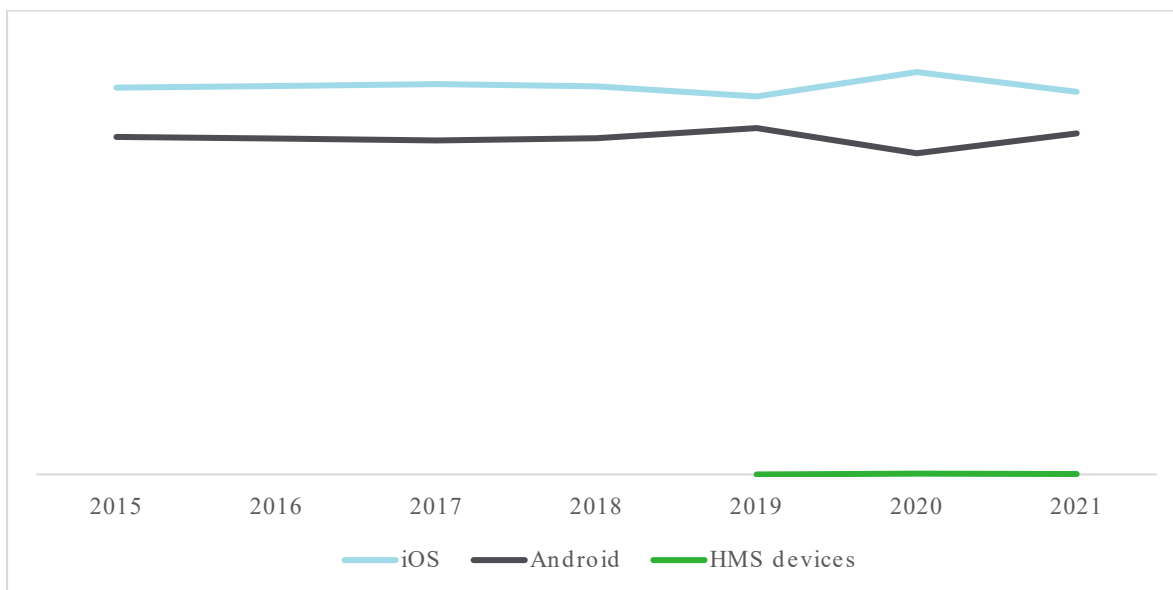

Source: CMA analysis of data from market participants.

45.   Figure B.18 shows the shares of supply based on data from market participants for iOS, Android and Huawei's HMS devices in terms of active smartphones in the UK for the period 2015 to 2021. As can be seen:

- between [50-60%] of active smartphones in each year of this period have been Apple's iOS devices (ie half or more of active smartphones in the UK have been iPhones);

- between [40-50%] of active smartphones in each year of this period have been Android devices.

Figure B.18: Operating system shares of supply in active smartphones in the UK – market participants data (2015-2021)


Source: CMA analysis of data from market participants.
Notes: Apple provided data on "Transacting accounts". Transacting accounts correspond to the number of accounts that performed a transaction (download, purchase etc.) on the device. A transacting account could be linked to more than one smartphone, and one smartphone could be linked to more than one transacting account. This means that the number of transacting accounts may over- or underestimate the number of active smartphones.

46.   Figure B.19 shows the shares of supply based on data from IDC for iOS, Android and other operating systems in terms of total number of units of smartphones shipped into the UK in 2021. Shares of supply calculated on this basis differ slightly to those based on data from market participants (Figure B.17 above) – based on shipments iOS has a higher share (54.1%) than Android (45.9%).

Figure B.19: OS shares of supply based on total number of units of smartphones shipped into the UK – IDC data (2021)
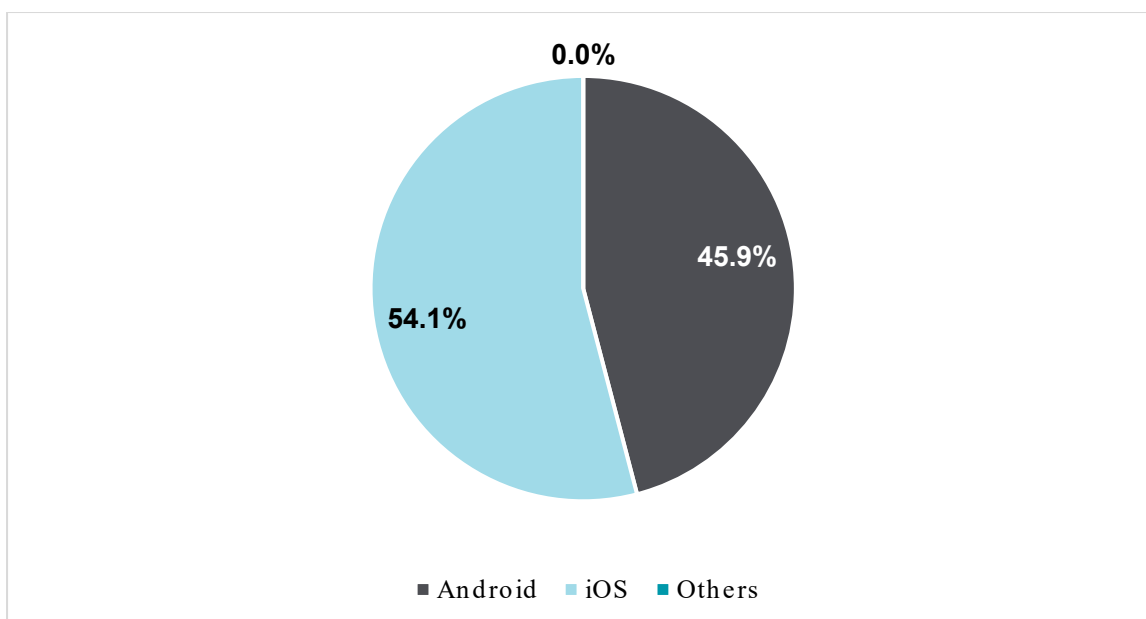
Source: CMA analysis of IDC data from "IDC Mobile Phone Tracker_FinalHistoricalPivot_2021Q4_CMA"
Notes: For the purposes of this analysis we have not split out Huawei's HMS devices from Android devices.

47. Figure B.20 shows the shares of supply based on data from Statcounter for iOS, Android, Blackberry OS, Windows and Symbian OS since 2009. This shows that:

- Apple's iOS devices have had a share of supply of between 40% and 52% throughout the last decade and it has been the largest provider of operating systems for active smartphones in every year except 2016 and 2019.

- Google's Android was actually the fourth largest provider of operating systems with just 2% in 2009, but its share grew rapidly to 25% in 2012 and has been over 40% since 2015, reaching a peak of 50% in 2019 and 2020.

- In contrast Blackberry OS (17%) and Symbian OS (16%) were the second and third largest providers of operating systems in 2009. During this period Symbian OS was owned by Nokia and its share of supply was already in decline in 2009, Blackberry OS (owned by RIM which became Blackberry) initially increased its share of supply, peaking at 37% in 2011, before declining swiftly as Google increased its share. These rivals, and Microsoft's Windows, whose share peaked at 3% in 2015, are essentially no longer active.[39]

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[39] Blackberry announced that it will stop supporting mobile devices using its operating systems from 4 January 2022. See BlackBerry 10 and BlackBerry OS Services FAQ - End of Life. Nokia announced it would stop using Symbian as its main mobile operating system in 2011 and the last mobile device using the Symbian operating system was released by Nokia in 2012. See From birth to death: why Nokia's Symbian was the future of mobile tech | TechRadar, Nokia and Microsoft seal Windows Phone alliance | ZDNet and 'Android before Android': The long, strange history of Symbian and why it matters for Nokia's future | ZDNet. Microsoft announced that there would be no further updates to its last mobile operating system (Windows 10 Mobile) in 2017 and that it would no longer support that operating system in 2019. See Saying goodbye to Windows 10 Mobile: Microsoft ends support for its mobile OS - GSMArena.com news and Windows Phone was a glorious failure - The Verge.

Figure B.20: Operating system shares of supply in active smartphones in the UK – Statcounter data (2009-2021)
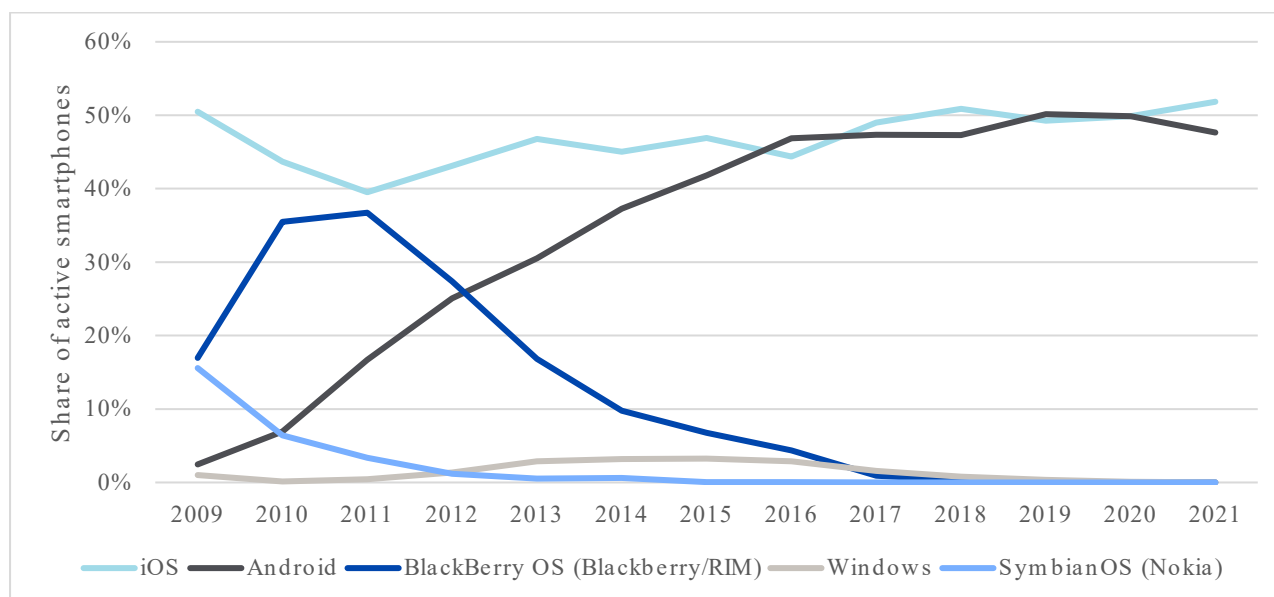
Source: Mobile Operating System Market Share United Kingdom | Statcounter Global Stats
Notes: Only operating systems with a share of 5 percentage points or more in any one year have been included except Microsoft's Windows which is included for illustrative purposes. Because it uses a version of Android, Huawei's HMS devices are likely to be included within Android. In addition, Fire OS is likely to be included within Android as it is an Android Fork, however, we understand that Fire OS was only used in Amazon's Fire Phone which was launched in the UK in September 2014 and discontinued in 2015.[40]

Tablets

48.   In this section we set out:

- shares of supply by operating system based on new tablets data provided by market participants;

- shares of supply by operating system based on active tablets data provided by market participants;

- shares of supply by manufacturer based on IDC data on total number of units of tablets shipped into the UK in 2021; and

- shares of supply by operating system based on active tablets data from Statcounter.

49.   Figure B.21 shows the shares of supply based on data from market participants for iOS, Android, Amazon's Fire OS and Huawei's HMS devices in terms of new tablets in the UK for the period 2015 to 2021. As can be seen:

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[40] See Amazon Fire Phone UK Release: Handset launches today | Trusted Reviews and Amazon stops selling Fire smartphone - BBC News.

- between [30-40%] and [40-50%] of new tablets in each year since 2015 have been Apple's iOS devices (ie iPads) – its share has increased slightly since 2017;

- Google's Android has been the second largest operating system in terms of new tablets, but its share of new tablets has decreased from [40-50%] in 2015 to [30-40%] in 2021; and

- Amazon's Fire OS has been the third most adopted operating system in terms of new tablets with its share of new tablets increasing from 2015 to 2017 and then decreasing slightly to [20-30%] in 2021.

Figure B.21: Operating system shares of supply in the sale of new tablets in the UK – market participants data (2015-2021)
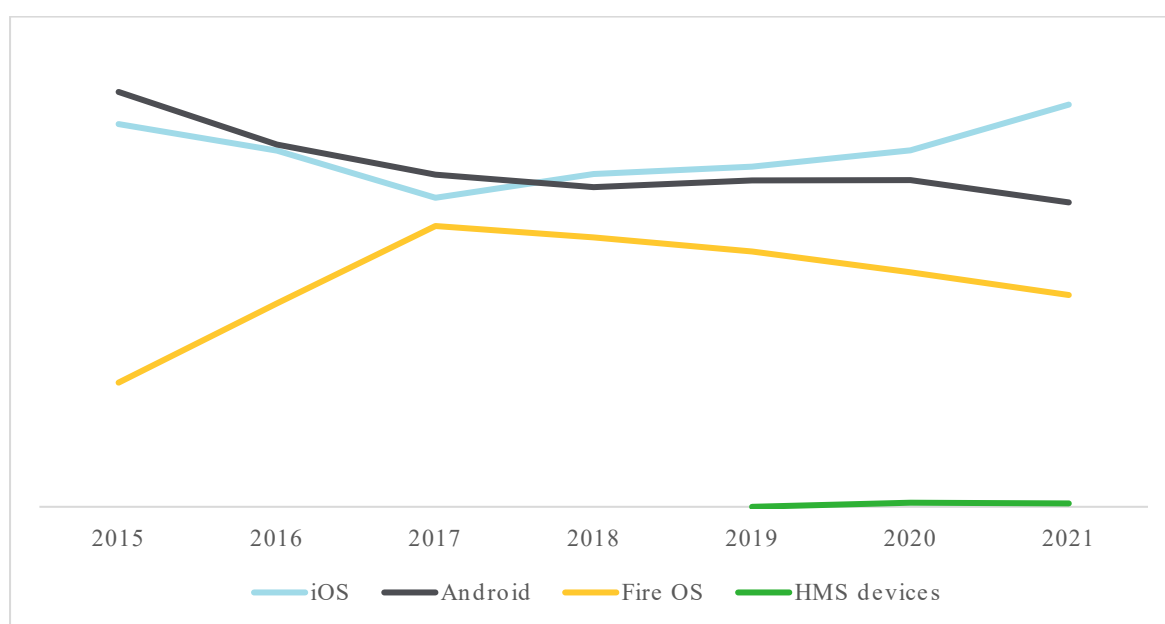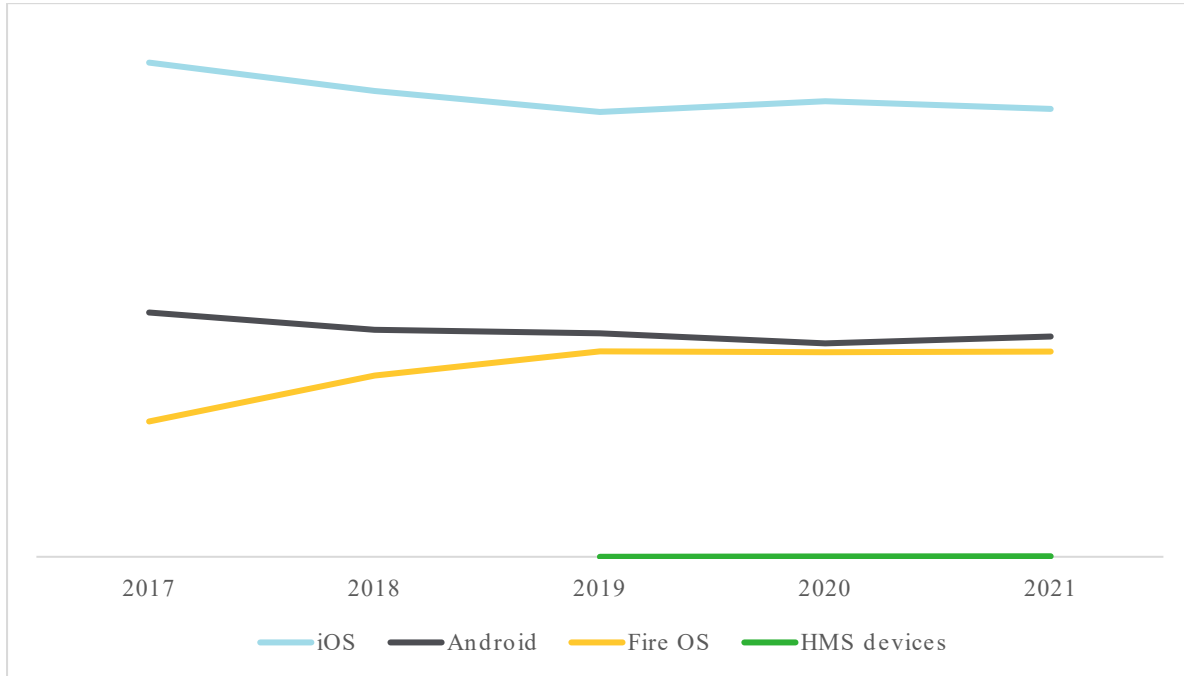

Source: CMA analysis of data from market participants.

50. Figure B.22 shows the shares of supply based on data from market participants for iOS, Android, Amazon's Fire OS and Huawei's HMS devices in terms of active tablets in the UK for the period 2017 to 2021 (data from all relevant market participants was not available before 2017). As can be seen:

- between [50-60%] and [50-60%] of active tablets in each year since 2017 have been Apple's iOS devices (ie iPads) – its share has declined slightly over time;

- Google's Android has been the second largest operating system in terms of active tablets, but its share of active tablets has decreased from [20-30%] in 2017 to [20-30%] in 2021; and

- Amazon's Fire OS has been the third largest operating system in terms of active tablets with the proportion of active tablets running on Fire OS increasing from [10-20%] in 2017 to [20-30%] in 2021.

Figure B.22: Operating system shares of supply in active tablets in the UK – market participants data (2017-2021)



Source: CMA analysis of data from market participants.
Notes: Huawei's HMS devices have only been available since 2019 as set out in Chapter 3. Apple provided data on "Transacting accounts". Transacting accounts correspond to the number of accounts that performed a transaction (download, purchase etc.) on the device. A transacting account could be linked to more than one tablet, and one tablet could be linked to more than one transacting account. This means that the number of transacting accounts may over- or underestimate the number of active tablets.

51.   Figure B.23 shows the shares of supply based on data from IDC for iOS, Android and Fire OS in terms of total number of units of iOS, Android[41] and Fire OS tablets shipped into the UK in 2021.[42] Shares on supply calculated on this basis are in line with volume shares of supply based on data from market participants – see Figure B.20 above. Apple is the largest player, with a share of supply of 42.8% in 2021, followed by Android tablets and Fire OS tablets.

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[41] For the purpose of our analysis of IDC data on tablets we have not split out Huawei's HMS devices from Android devices.
[42] Consistent with shares estimates based on data from market participants, market shares estimates based on IDC data exclude Windows and Chrome tablets.

Figure B.23: OS shares of supply based on total number of units of tablets shipped into the UK – IDC data (2021)
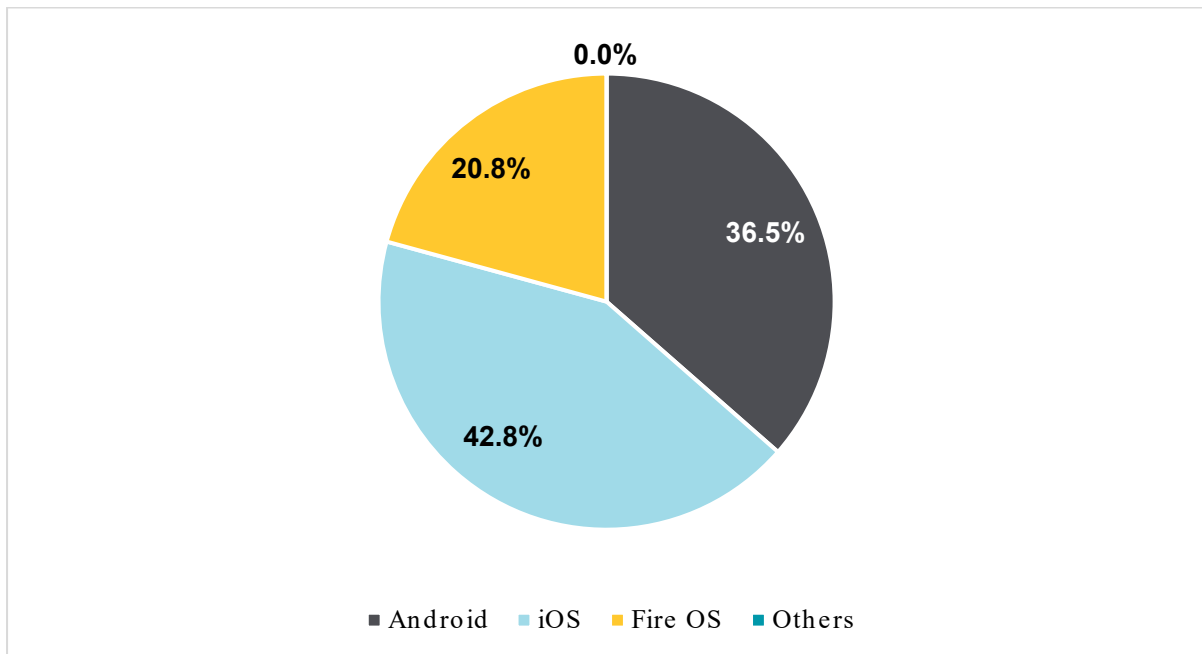

Source: CMA analysis of IDC data from "IDC PCD Tracker (Tablet)_FinalHistoricalPivot_2021Q4_CMA"
Notes: For the purposes of this analysis we have not split out Huawei's HMS devices from Android devices.

52.   Figure B.24 shows the shares of supply based on data from Statcounter for iOS, Android and Amazon's Fire OS since 2012. This shows that:

- essentially all active tablets have either been iOS devices, Android devices or Fire OS devices; and

- that Apple's share of supply was historically as high as 90% and, while it has declined over time, it is still 60% of active tablets with Android being the second largest, peaking at 30% in 2021.

Figure B.24: Operating system shares of supply in active tablets in the UK – Statcounter data (2012-2021)
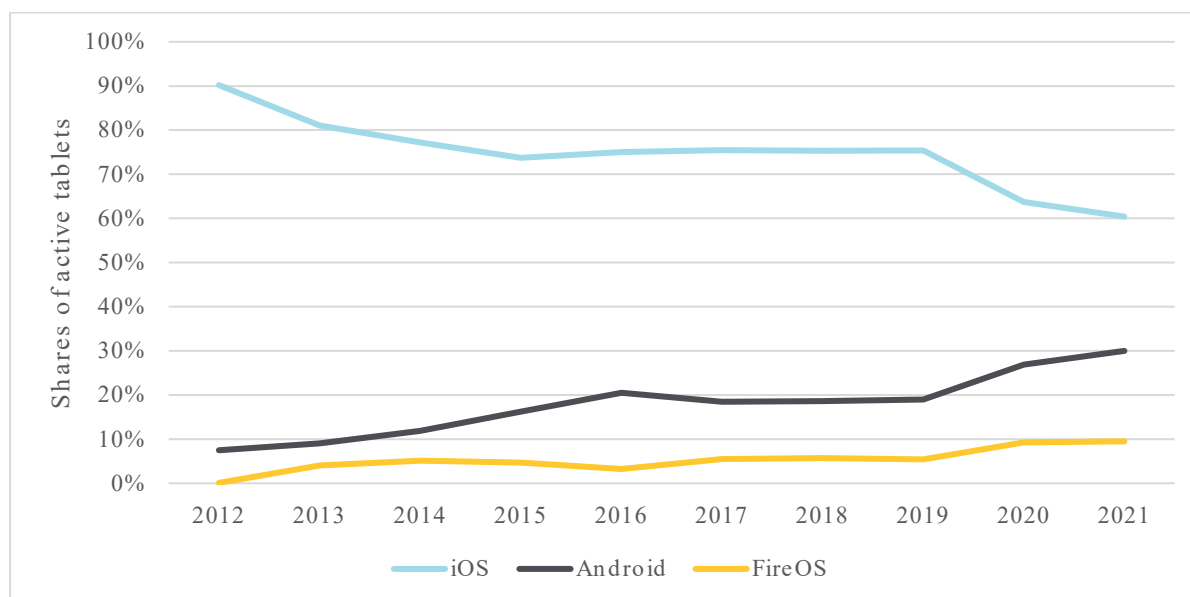
Source: CMA analysis of Tablet Operating System Market Share United Kingdom | Statcounter Global Stats and Tablet Vendor Market Share United Kingdom | Statcounter Global Stats.
Notes: Our understanding is that Fire OS is identified as Android within the Statcounter data so we have used Amazon's share as a manufacturer to calculate the share of Fire OS and adjust the share of Android. This is possible because Fire OS is only used in Amazon's own devices. Only operating systems with a share of 5 percentage points or more in any one year have been included. As they use a version of Android, Huawei's HMS devices are likely to be included within Android.

App distribution outcomes

53.   In this section we first explain summary data collected from the App Store, the Play Store, and a number of alternative app stores which informed the analysis comparing these app stores in the Market Outcomes section of Chapter 4. We then present our more detailed analysis of App Store and Play Store statistics and our analysis of consumers routes to app downloads on the App Store and Play Store.

Comparative volume and revenue figures across the App Store, Play Store and other selected app stores

54.   We received monthly category-level data for the UK on the number of apps, number of app developers, number of downloads, and number of active users (measured by the number of users that downloaded at least one app) from Amazon, Apple, Google, Huawei, and Samsung. We also received monthly category-level data for the UK on customer billings from in-app purchase systems and revenue from in-app purchase systems from Apple and Google. For Amazon, Huawei and Samsung we received data on customer billings from in-app purchase systems and revenue from in-app purchase systems on a yearly basis where available. All data includes first-party apps.

- **Amazon**: provided us with data for the Amazon Appstore on Fire Phones, Fire Tablets, and non-Amazon Android devices separately except in relation to its in-app purchase system. When analysing the number of downloads and the number of active users, we summed the figures from these app stores together. [✄]. In addition, we received data from Amazon for the customer billings processed through its in-app purchase system and Amazon's revenue from its in-app purchase systems from 2019 to 2021.

- **Apple**: due to limitations in the datasets held by Apple, Apple provided us with data for June 2019 to December 2021 for the number of apps and number of app developers. For all the other metrics, they provided us with data for the period from June 2010 to the end of 2021.

- **Google**: for the number of apps and number of app developers, in response to a formal CMA request, Google provided us with data for the UK from March 2013 and June 2017, respectively, until December 2021. For the number of app downloads, Google provided us with data from July 2016 to December 2021. For the number of active users, it provided us daily data covering [a short period in 2021] and [a short period in 2022]. For customer billings and revenue from its in-app purchase system they provided us with data from January 2012 to December 2021.

- **Huawei**: the metrics Huawei provided us with cover the period from May 2018 (Huawei's app store, AppGallery, launched in the UK in 2018) until December 2021. The exceptions were the total customer billings from its in-app purchase system where it provided data for 2019, 2020 and 2021 and its revenue from its in-app purchase system which only covered 2021.

- **Samsung**: For the number of apps and number of developers, Samsung provided us with yearly data from 2009 until 2021. For the number of downloads, it provided us with monthly data from January 2014 until December 2021. For the number of active users, data was only available on a consistent basis from January 2014 until December 2020. Finally, Samsung provided the total customer billings from its in-app purchase system for 2019, 2020 and 2021, but was not able to provide its revenue from its in-app purchase system.

55. Our analysis of these datasets is set out in Chapter 4.

App Store and Play Store statistics

56. We received data on monthly app-level consumer spend, revenue and first-time downloads from Google and Apple. Spend and revenue were split between billings from:

- in-app purchases, excluding subscriptions;

- subscriptions; and

- payments to download apps.

57. A description of the data provided by each party is listed below:

- **Google**: provided, in response to a formal CMA request, monthly data on the level of consumer spend and Google revenue for apps (including Play pass) in the UK Play Store between January 2016 and December 2021. In addition to the above, Google also provided, in response to a formal CMA request, a dataset of all apps available in the UK Play Store during 2021. It includes basic information about each app and its payment settings (ie whether it has a purchase price, whether in-app purchases are enabled and whether subscriptions are enabled). In response to a further CMA request, Google provided a complete summary of first-time downloads to the Play Store for the UK in 2021.

- **Apple**: provided monthly data on the level of consumer spend, amounts retained by Apple and first-time downloads for apps in the UK App Store between January 2016 and December 2021. Apple does not maintain data on the number of active users.

58. The CMA received detailed data on the source of individual first-time downloads for the Google Play Store and Apple App Store, in response to a formal CMA request. The source includes whether the download originated from search, browse or referral as well as details of specific referrers, browse pages etc. We requested that this data cover the full year period to 31 December 2021. A description of the data provided by each party is listed below:

- **Google**: provided details of the source of all first-time downloads from the UK Play Store for the full year to 31 December 2021.

- **Apple**: provided details of the source of all first-time downloads from the UK App Store covering the period to 31 August 2021.

59.   The following tables provide key metrics for the App Store and Play Store in 2021.

Table B.2: Summary of Google Play Store in 2021 in the UK

| Summary metric	Google Play Store
Total consumer spend on apps (including Play pass)	£[✂]
Total Google revenue on apps (including Play pass)	£[200-400] million
Total first-time downloads	[2-2.5] billion
Number of unique apps downloaded	[1.5-2] million
Proportion of apps that make revenue	[0-10]%
Proportion of apps that make up 90% of revenue (of apps with non-zero consumer spend)	[0-10]%

Source: CMA analysis of Google's data

Table B.3: Summary of Apple App Store in 2021 in the UK

Summary metric	Apple App Store
Total consumer spend	£[✂]
Total Apple retained amount	£[400-600] million
Total first-time downloads	[1-1.5] billion
Number of unique apps downloaded	[1-1.5] million
Proportion of apps that make revenue	[10-20]%
Proportion of apps that make up 90% of revenue (of apps with non-zero consumer spend)	[0-10]%

Source: CMA analysis of Apple's data

60.   The figures below show how Apple and Google's revenues from different types of payments made through their app stores (payments for app downloads, for in-app purchases and for subscriptions) have evolved over time.

Figure B.25: Google revenues on apps (including Play pass) from the Play Store in the UK, by revenue type, 2016 to 2021
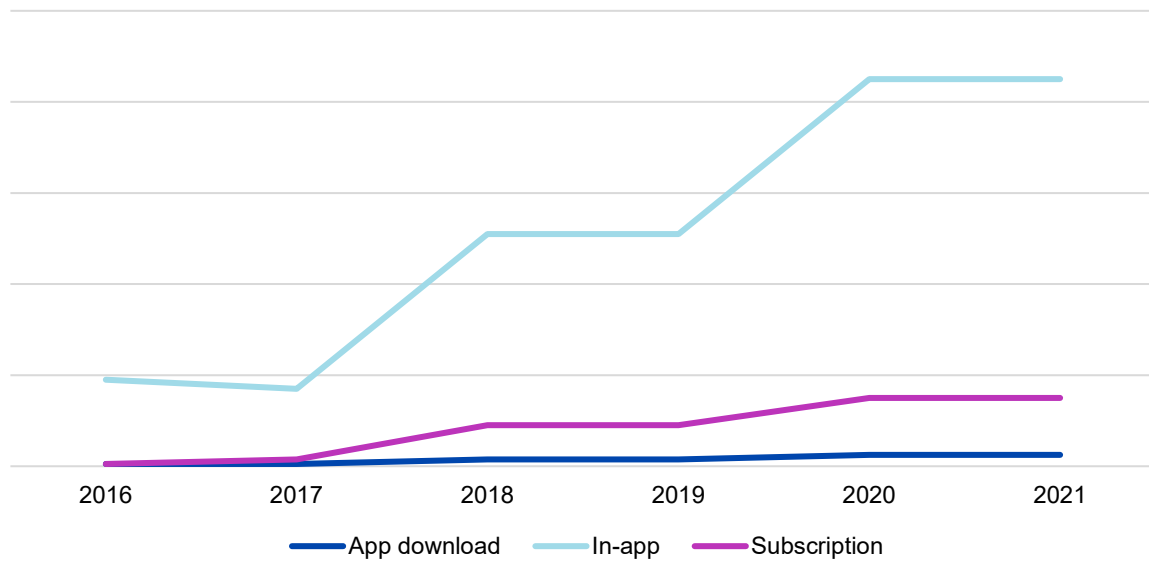
61.   The overwhelming majority of Google's revenues for Play Store apps for the UK come from in-app purchases. Subscription payments make a modest contribution to overall app revenues and app downloads provide only a small contribution. Since 2016, Google revenues from in-app purchases and subscriptions have increased rapidly whilst revenues from app downloads have been stable.

Figure B.26: Apple retained amounts from the App Store, by transaction type, 2016 to 2021 in the UK
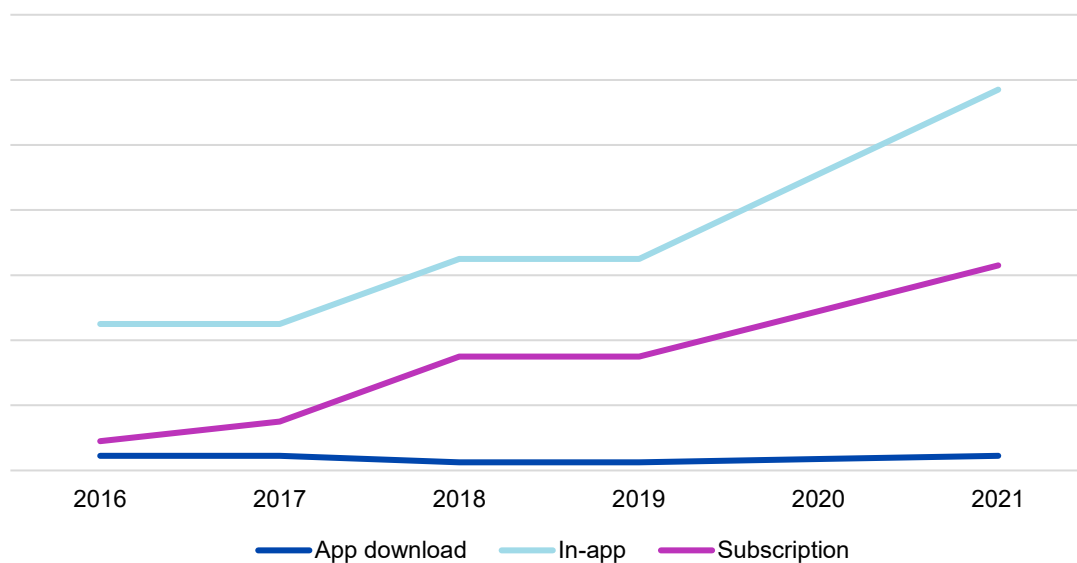
62.   Most of Apple's App Store revenues for the UK have come from in-app purchases since 2016. However, revenues from subscriptions have increased rapidly since 2016 and are now also a significant contributor to overall app revenues. Revenues from app downloads make up a small proportion of total revenue and have been stable since 2016.

63.   The figures below show how both revenues and downloads from Apple and Google's app stores are distributed between categories of apps.

Figure B.27: Share of Google Play Store revenues between app categories in 2021 in the UK
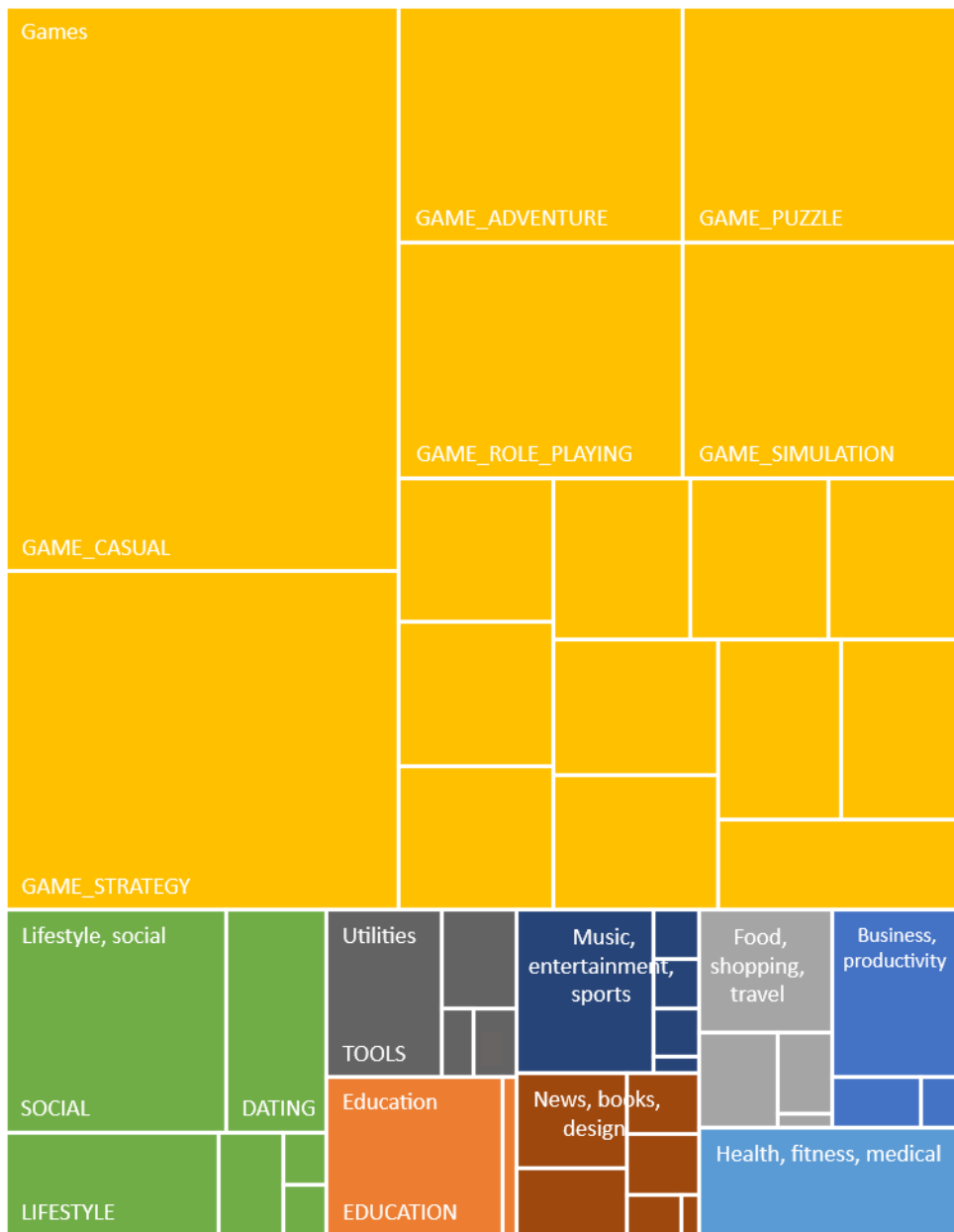
Source: CMA analysis of Google's data. Higher level groupings of categories by the CMA for illustrative purposes. The chart was constructed using standard % ranges to maintain confidentiality as follows: i) calculating the proportions of revenue from each category and subcategory, ii) applying our standard ranges to each category and subcategory and using the midpoint of that range, iii) scaling each subcategory mid-point value by its parent category mid-point value before plotting.

Figure B.28: Share of Google Play Store downloads between app categories in 2021 in the UK
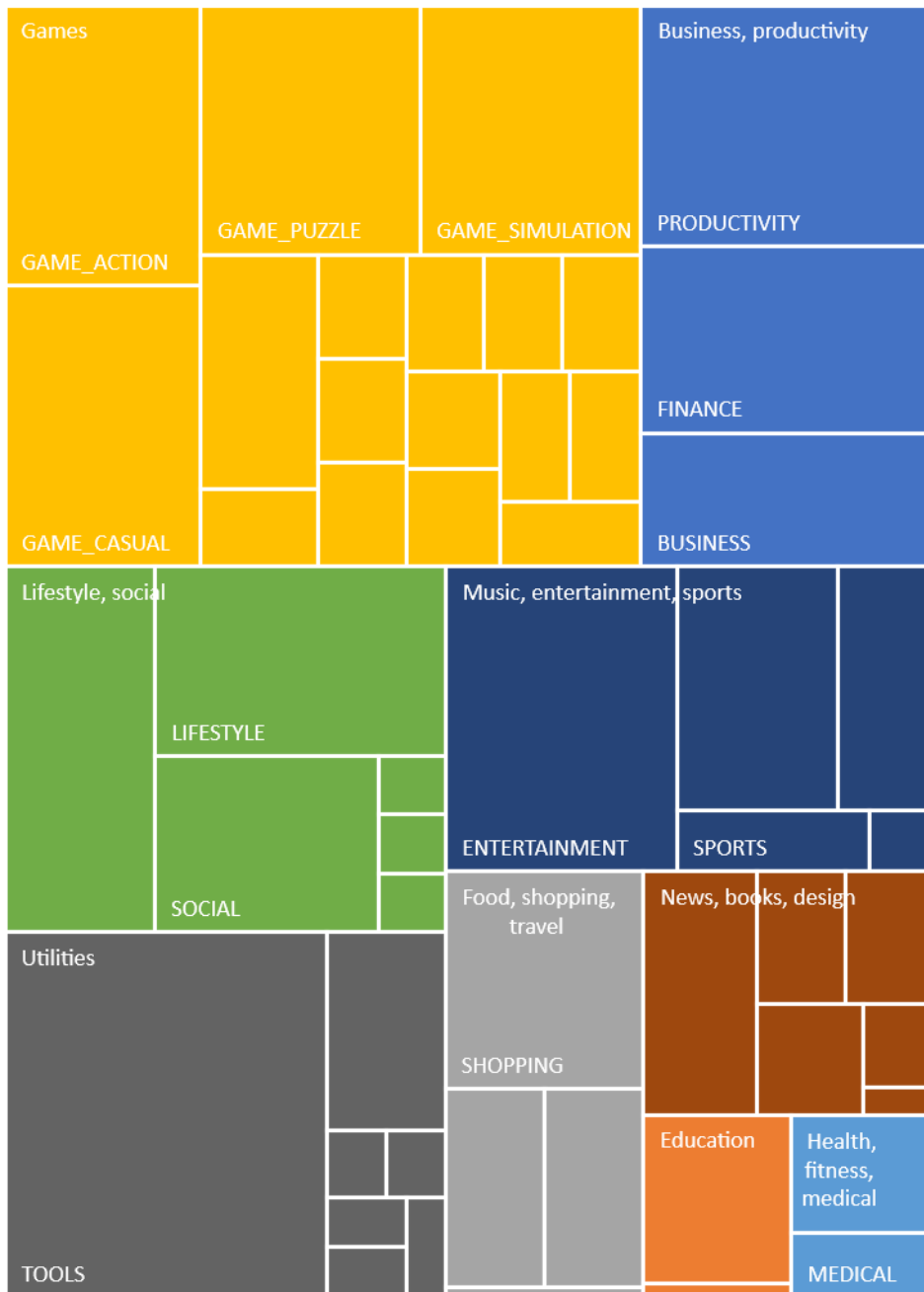
Source: CMA analysis of Google's data. Higher level groupings of categories by the CMA for illustrative purposes. The chart was constructed using standard % ranges to maintain confidentiality as follows: i) calculating the proportions of downloads from each category and subcategory, ii) applying our standard ranges to each category and subcategory and using the midpoint of that range, iii) scaling each subcategory mid-point value by its parent category mid-point value before plotting.

Figure B.29: Share of Apple App Store retained amounts between app categories in 2021 in the UK
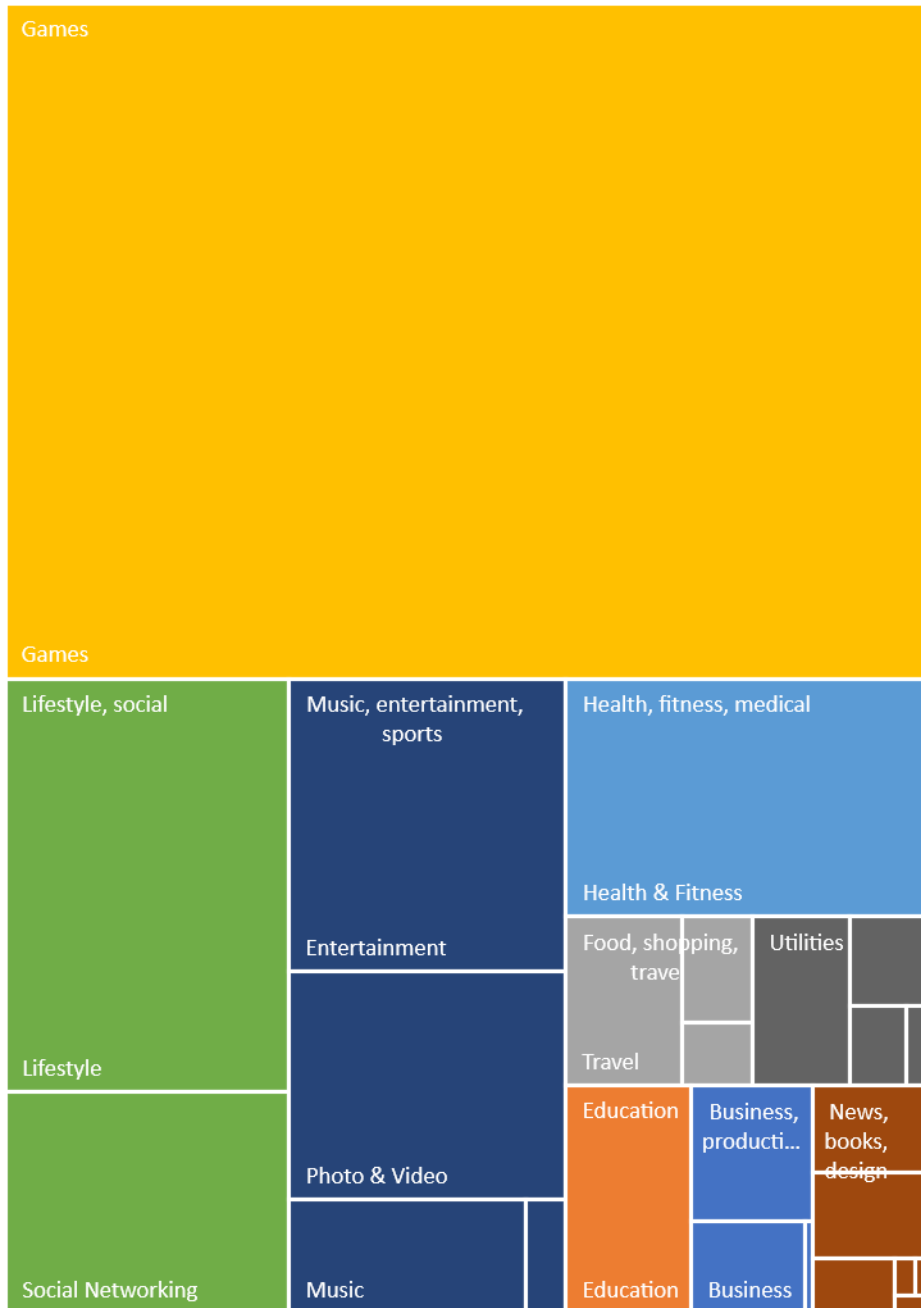

Source: CMA analysis of Apple's data. Higher level groupings of categories were done by the CMA for illustrative purposes. The chart was constructed using standard % ranges to maintain confidentiality as follows: i) calculating the proportions of retained amounts from each category and subcategory, ii) applying our standard ranges to each category and subcategory and using the midpoint of that range, iii) scaling each subcategory mid-point value by its parent category mid-point value before plotting.

Figure B.30: Share of Apple App Store downloads between app categories in 2021 in the UK

Source: CMA analysis of Apple's data. Higher level groupings of categories were done by the CMA for illustrative purposes. The chart was constructed using standard % ranges to maintain confidentiality as follows: i) calculating the proportions of downloads from each category and subcategory, ii) applying our standard ranges to each category and subcategory and using the midpoint of that range, iii) scaling each subcategory mid-point value by its parent category mid-point value before plotting.

64.   The "games" category is the most important category for both Apple and Google in terms of app revenues and downloads for the UK. However, the games category's dominance is even greater for the Google Play Store.

65.   The figures below show how Apple and Google's revenues from apps categorised as games have evolved over time relative to revenues from other categories of app.

Figure B.31: Google Play Store revenues from apps (including Play pass) in "Games" categories versus other categories for the UK, 2016 to 2021
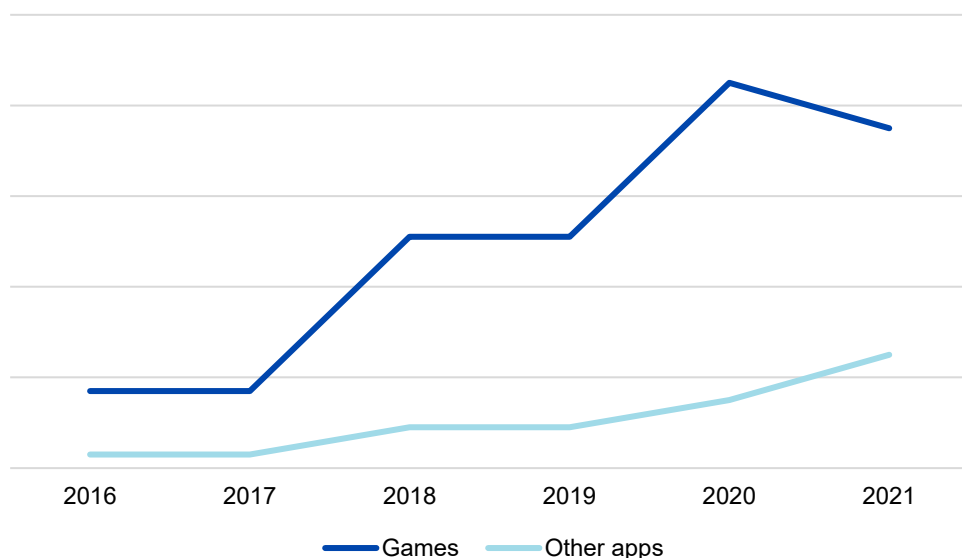
Source: CMA analysis of Google's data. The y-axis has been redacted on confidentiality grounds. The chart was constructed using standard % ranges to maintain confidentiality as follows: i) calculating the share of revenue from each category, ii) applying our standard ranges to these percentage shares and using the midpoint of that range, iii) scaling each mid-point value by the mid-point value of £100m ranges for total revenue in that year. This ranging approach means the lines may not be an accurate guide to revenue changes over time.
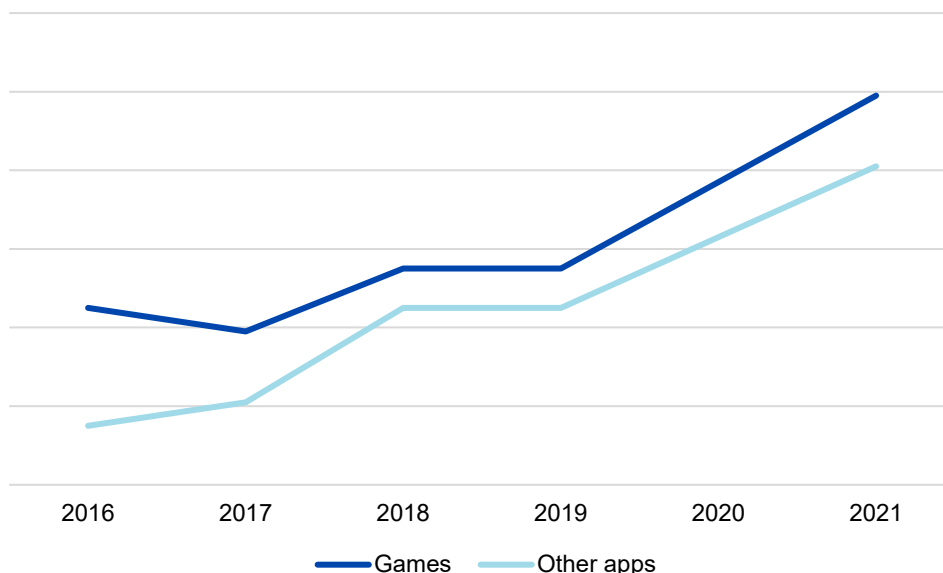
Figure B.32: Apple retained amounts from apps in "Games" categories versus other categories, 2016 to 2021 in the UK

Source: CMA analysis of Apple's data. The y-axis has been redacted on confidentiality grounds. The chart was constructed using standard % ranges to maintain confidentiality as follows: i) calculating the share of the retained amount from each category, ii) applying our standard ranges to these percentage shares and using the midpoint of that range, iii) scaling each mid-point value by the mid-point value of £100m ranges for total revenue in that year. This ranging approach means the lines may not be an accurate guide to revenue changes over time.

66.   Both Apple and Google generate more revenue in the UK from apps
        categorised as games than from all other categories combined. In recent
        years, Apple have significantly increased revenues from other app categories
        relative to games. For Google, revenues from games have remained
        dominant.

Consumer route to app downloads – acquisition

67.   The figures below show the distribution of acquisition sources for first-time
        installations on both the Google Play Store and Apple App Store for the UK.
        First time installations can be broadly divided between those coming from
        search, referral or browse. The data from the Apple App Store covers the full
        year to 31 August 2021, as Apple were unable to provide data for the last 4
        months of the year. The Google Play Store data covers the full year to 31
        December 2021. The Google Play Store data does not distinguish between
        organic search acquisitions and search adverts. Navigational search
        acquisitions are defined as search acquisitions from search queries that
        intended to navigate directly to the app downloaded, ie by mentioning a
        specific app in the query. Categorical search acquisitions are search
        acquisitions from search terms that were generic and/or categorical, rather
        than targeting a specific app. This split was estimated by the CMA using the
        approach outlined in paragraphs below.

Table B.4: Acquisition sources for first time installations on the UK Google Play Store during 2021.

Acquisition source	Share of first-time installations
Search - navigational	[30-40%]
Search - categorical	[10-20%]
Third party referrals	[20-30%]
Play Explore	[10-20%]

Source: CMA analysis of Google's data. Google was unable to provide a split between acquisitions from organic search and search adverts. As discussed further below, Google's internal calculations indicate that a lower share of searches were navigational than found by the CMA's analysis. This results in Google estimating a [20-30]% share for each of 'Search – navigational' and 'Search – categorical'.

68.   The distribution of acquisition sources for the UK Play Store are broadly the
        same across app categories, with the notable exception of games. Games
        have a significantly lower share of acquisitions from search, with a relatively
        higher reliance on Play Explore and third-party referrals for acquisitions.

Table B.5: Acquisition sources for first time installations on the UK Apple App Store, between 1 September 2020 and 31 August 2021

Acquisition source	Share of first-time installations
Organic search – navigational	[40-50%]
Organic search - categorical	[10-20%]
App referral	[20-30%]
Web referral	[10-20%]
Search ads	[0-5%]
App Store browse	[0-5%]

Source: CMA analysis of Apple's data.

69. The distribution of acquisition sources for the Apple App Store are broadly the same across app categories, with some notable exceptions. Apps in the "games" category have a significantly lower share of acquisitions from search, with a relatively higher reliance on browse and especially app referrals. App categories under "Food, shopping and travel" have a materially higher dependence on web referrals for acquisitions, compared with other categories.

Categorical and navigational searches

70. App acquisitions via search can be divided into broadly two categories:

- navigational search: search queries that were intended to reach a specific app, for example by searching for the name of a specific app.

- categorical search: search queries that were intended to find a category of apps or type of app.

71. The CMA have analysed samples of search query data provided by Apple and Google for their respective app stores to determine how acquisitions via search are split between navigational and categorical search. The basic approach to this analysis was to define a series of rules that could each "vote" on whether a given search query was navigational. For example, one simple rule used was "does the search query contain the name of the app downloaded? If yes, then classify as navigational". The various votes from each rule were then combined and weighted algorithmically. The resulting model can classify search terms as either navigational or categorical. The model is not perfectly accurate at classifying search queries but the CMA is confident that, at the aggregate level, it provides a reasonable estimate for the split between navigational and categorical search.

72. The most common search terms in each sample were labelled by hand such that around 40% of the Apple search terms and 25% of the Google search

terms (weighted by downloads) were manually classified. It should be noted that even hand-labelled queries are subjective, as it is not always possible to interpret the user's intention from the data.

73.   Using this method, the CMA estimates that, in the Google UK Play Store, **70-80%** of search acquisitions during the year to 31 December 2021 were navigational. One important caveat with this result is that the data provided by Google had a significant proportion of the search terms removed due to GDPR. These removed search terms made up 20-30% of the total downloads. It is expected that this missing data would lead to the CMA's estimate being a slight overstatement of the share of navigational search for Google. This also applies to subsequent figures for Google in this section.[43] The CMA also estimates that in the Apple UK App Store, **60-70%** of the search acquisitions during the year to 31 August 2021 were navigational.

74.   On both stores, apps in the "games" categories tended to have a lower proportion of navigational search than other categories – 50-60% on the App Store and 60-70%[44] on the Play Store. Conversely, apps in the "food, shopping, travel" categories tended to have a higher proportion of navigational search – 80-90% on the App Store and 90-100%[45] on the Play Store.

Table B.6: Estimated share of navigational search on Google Play Store UK during 2021, for a sample of apps, based on CMA analysis

Group of apps	Estimated share of navigational search, from all search acquisitions
Most popular - top 100 apps by downloads	80-90%[46]
Least popular - bottom 100,000 apps by downloads	90-100%
The middle - other apps	70-80%

Source: CMA analysis of Google's data

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[43] Google's internal calculations of the proportion of navigational queries gives lower figure of 50-60%. As previously stated, the CMA understand from Google that the dataset they provided excludes certain observations for GDPR considerations, and that these observations are more likely to be categorical search queries. Therefore Google, based on internal pre-redacted data, calculates a lower proportion of navigational queries compared to the CMA analysis. However, Google agrees that the CMA's model for classifying queries as navigational or categorical is reasonable, although its internal approach to categorising individual queries as navigational is not identical to the one adopted by the CMA.
[44] Google internal figure: 50-60%.
[45] Google internal figure: 70-80%.
[46] Google internal figures: 80-90% for the top 100 apps by downloads. Google were unable to replicate the other figures in the table.

Table B.7: Estimated share of navigational search on Apple App Store UK over the year to 31 August 2021, for a sample of apps, based on CMA analysis

Group of apps	Estimated share of navigational search, from all search acquisitions
Most popular - top 100 apps by downloads	70-80%
Least popular - bottom 100,000 apps by downloads	90-100%
The middle - other apps	60-70%

Source: CMA analysis of Google's data

75.   On both stores, both the most popular and least popular set of apps (by downloads) tend to have a relatively higher share of navigational search, relative to categorical.

Figure B.33: Estimated share of navigational search for apps with in-app purchasing enabled versus apps without in-app purchasing enabled, on the Google Play Store UK for the year to 31 December 2021 and the Apple App Store UK for the year to 31 August 2021
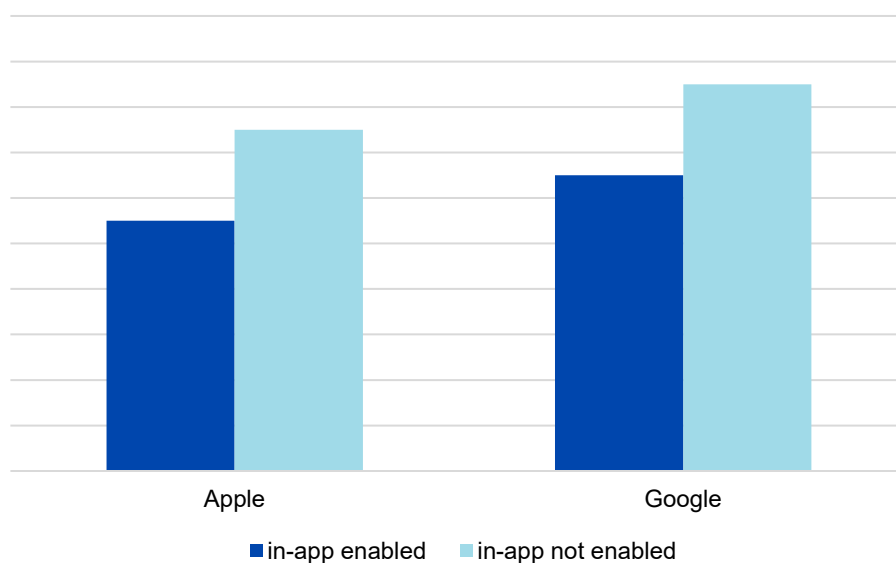
Source: CMA analysis of Apple / Google data. The y-axis has been redacted on confidentiality grounds. The points plotted are the mid-point of standard percentage ranges.

76.   On both stores, apps with in-app purchasing enabled tend to have a slightly lower share of navigational search, relative to categorical. However, apps with in-app purchasing enabled were still found more often with navigational searches than with categorical searches.

App usage and pre-installation

Sources of data

77. The data underlying this analysis comes from Apple, Google and Sensor Tower.

78. For apps pre-installed on iOS and Android devices, we have used data on monthly active users (MAUs), ie users who used a particular app at least once a month, provided by Apple and Google.

79. Apple has provided data on MAUs for the following app categories: Apple Books, Apple Music, Apple News, Apple Podcasts and Apple TV:

- Apple Books: MAUs cover [✄].

- Apple Music: MAUs cover [✄].

- Apple News: MAUs cover [✄].

- Apple Podcasts: MAUs cover [✄].

- Apple TV: MAUs cover [✄].

80. Google has provided annual average MAUs figures for 2021 for the following Google Mobile Services (GMS) apps: Google Drive, Google Maps, Google Duo, Gmail, Google Search, Google Play Music, Google Chrome, YouTube, Google Play Movies, Google Photos and Google Play Store. The data is based on logged-in users who have consented to 'Supplemental Web & App Activity' and includes smartphone and tablet users. These users represented around [60-70]% of all Android smartphones and mobile tablets active in the UK in 2021 and will therefore underestimate the actual usage of pre-installed Google's first-party apps.

81. For apps which do not come pre-installed on Apple or Google devices, we have used Sensor Tower estimates for MAUs, which have been derived from a series of panel-based apps that are purpose-built from the ground up to provide the most accurate metrics possible.[47]

82. Some third-party app developers who have entered into agreements with original equipment manufacturers (OEMs) can also have their apps pre-

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[47] Usage Intelligence Methodology (sensortower.com).

installed on some Android devices. Where this was the case, the usage of these pre-installed third-party apps have not been included in our analysis.

83. Different OEMs may also have their own first-party apps pre-installed on their Android devices, for which we do not have any usage figures.

Analysis

84. Using this data, we have compared usage of certain popular apps in the following categories between iOS and Android devices: cloud storage apps, ebook readers, music streaming apps, email apps, navigation apps, news apps, podcasts apps, video calling apps and video streaming apps. We have identified the list of apps to compare using Apple's and Google's submissions on which apps they viewed as competing apps as well as other popular apps in the above listed categories in the UK.

85. The figures below show average MAUs throughout 2021 for apps in the above listed app categories.

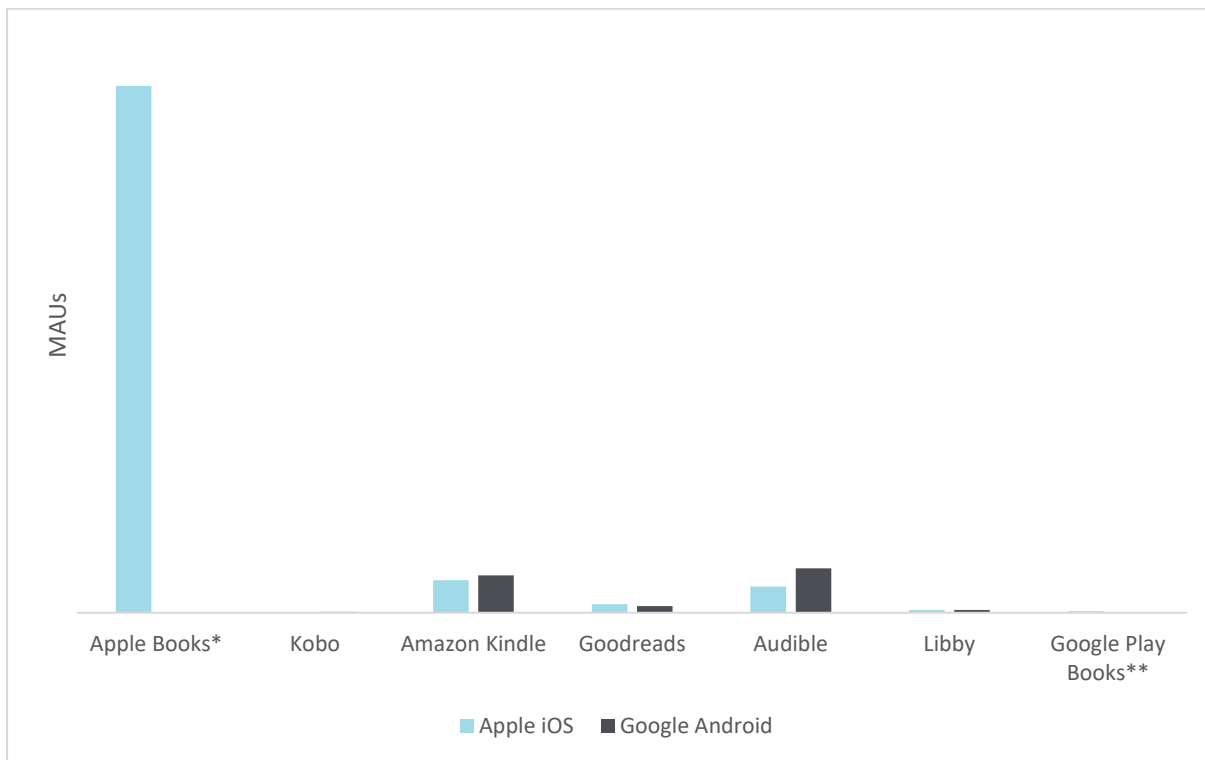**Figure B.34: Average MAU of cloud storage apps (2021)**
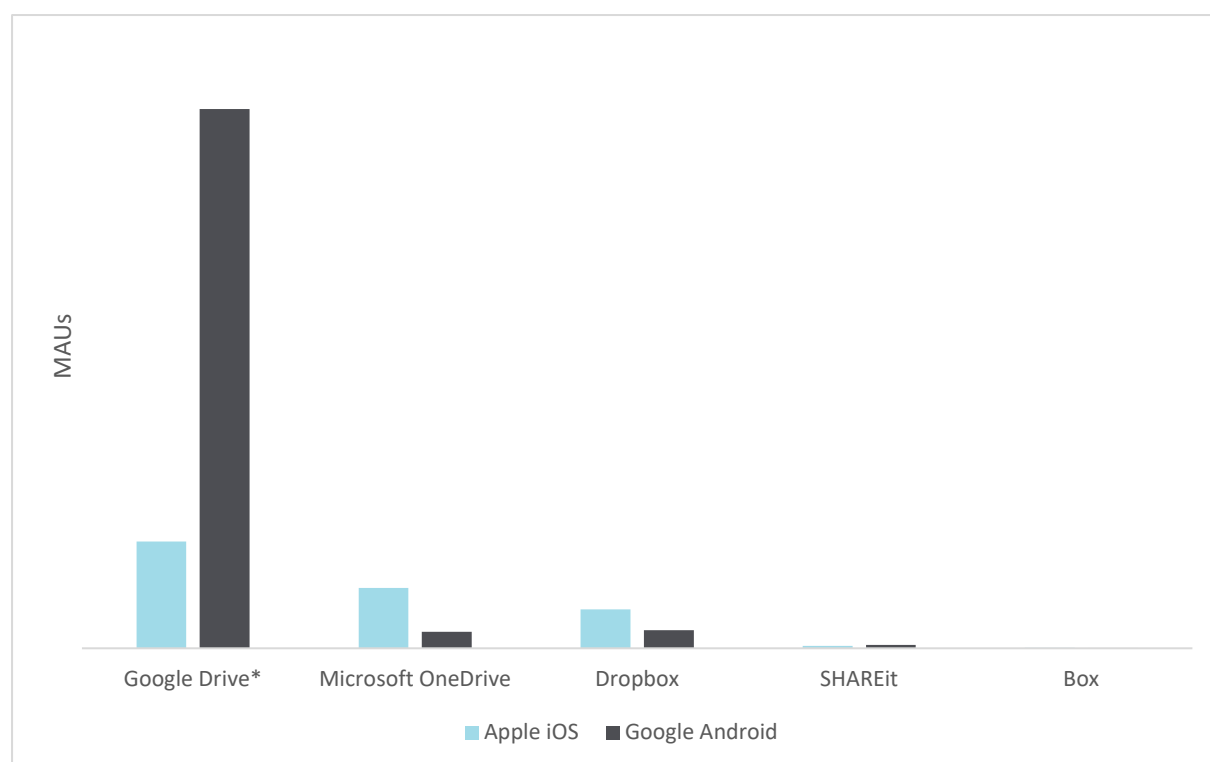
Source: CMA analysis of Google and Sensor Tower data. The y-axis has been redacted on confidentiality grounds.
* Google Drive comes pre-installed on Android devices. To maintain confidentiality, we used ranges of 1 million MAUs and took the midpoint of the range into which the true usage figure falls.
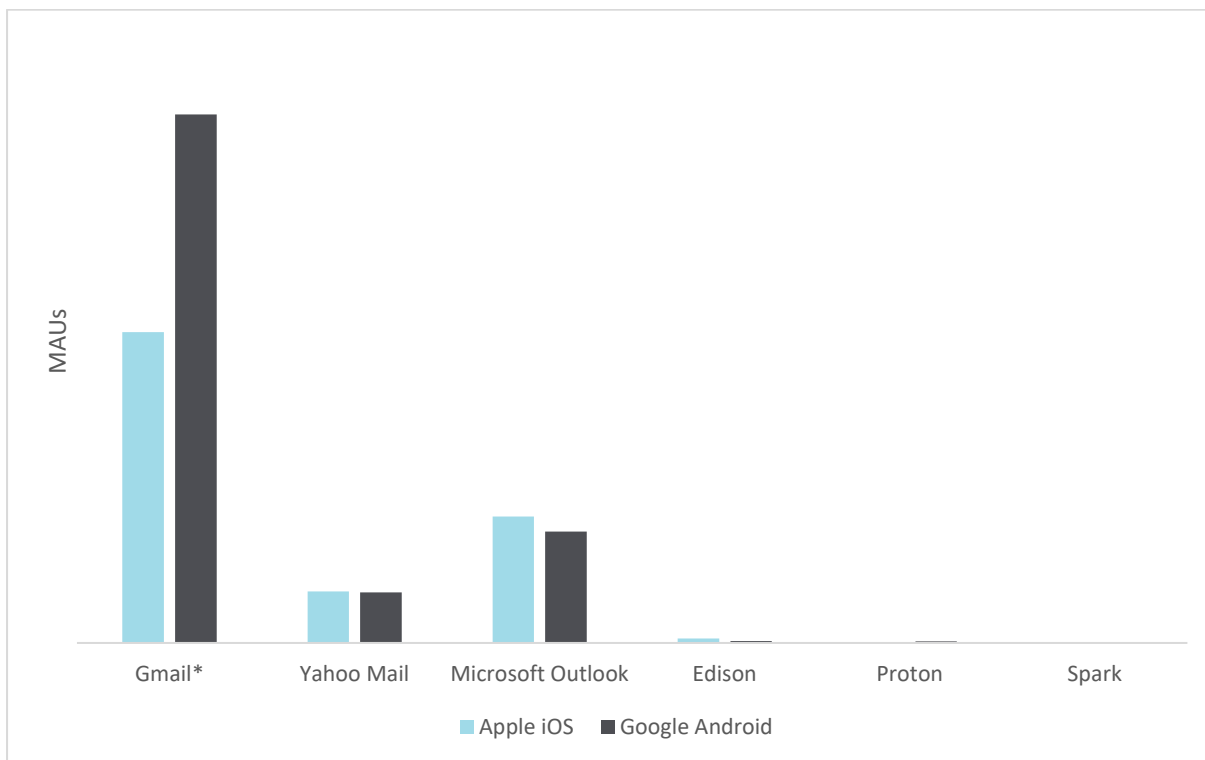Notes:
    (1)   Data for Apple iCloud was unavailable.

Figure B.35: Average MAU of ebook reader apps (January – August 2021)

Source: CMA analysis of Apple and Sensor Tower data. The y-axis has been redacted on confidentiality grounds.
* Apple Books comes pre-installed on iOS devices. Apple Books usage figures include usage on iOS and macOS devices. To maintain confidentiality, we used ranges of 1 million MAUs and took the midpoint of the range into which the true usage figure falls.
** Usage data on Android devices unavailable.
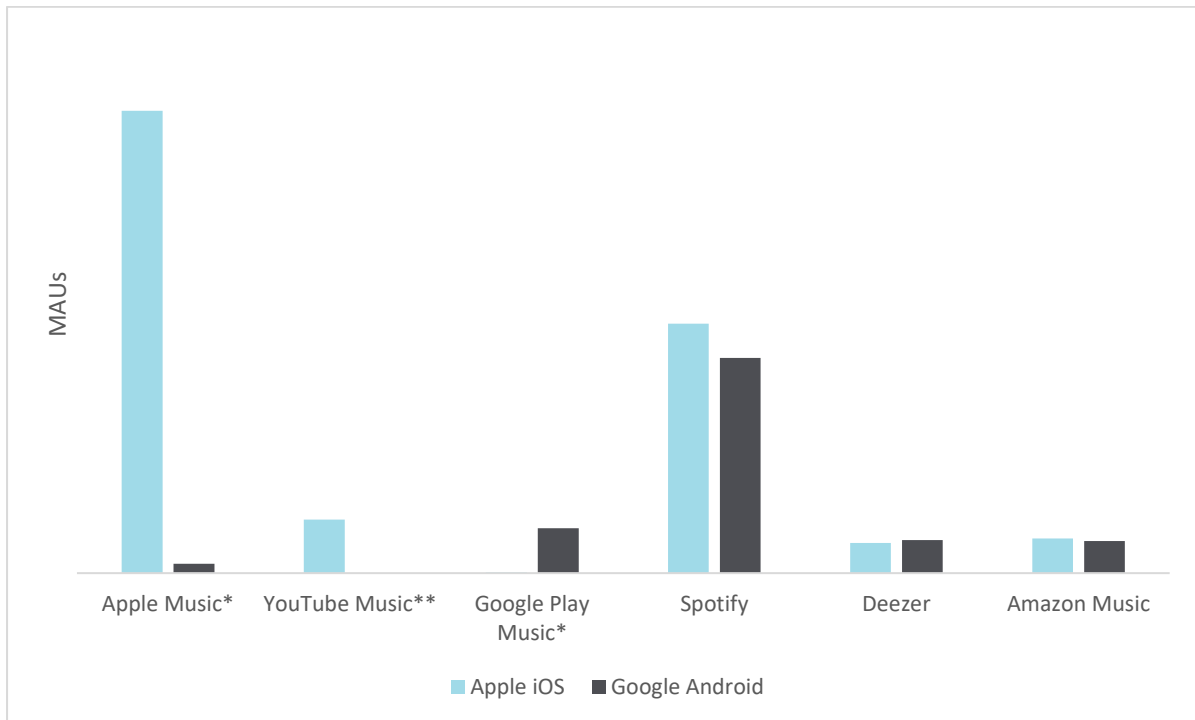
Figure B.36: Average MAU of email apps (2021)

Source: CMA analysis of Google and Sensor Tower data. The y-axis has been redacted on confidentiality grounds.
* Gmail comes preinstalled on Android devices. To maintain confidentiality, we used ranges of 1 million MAUs and took the midpoint of the range into which the true usage figure falls.
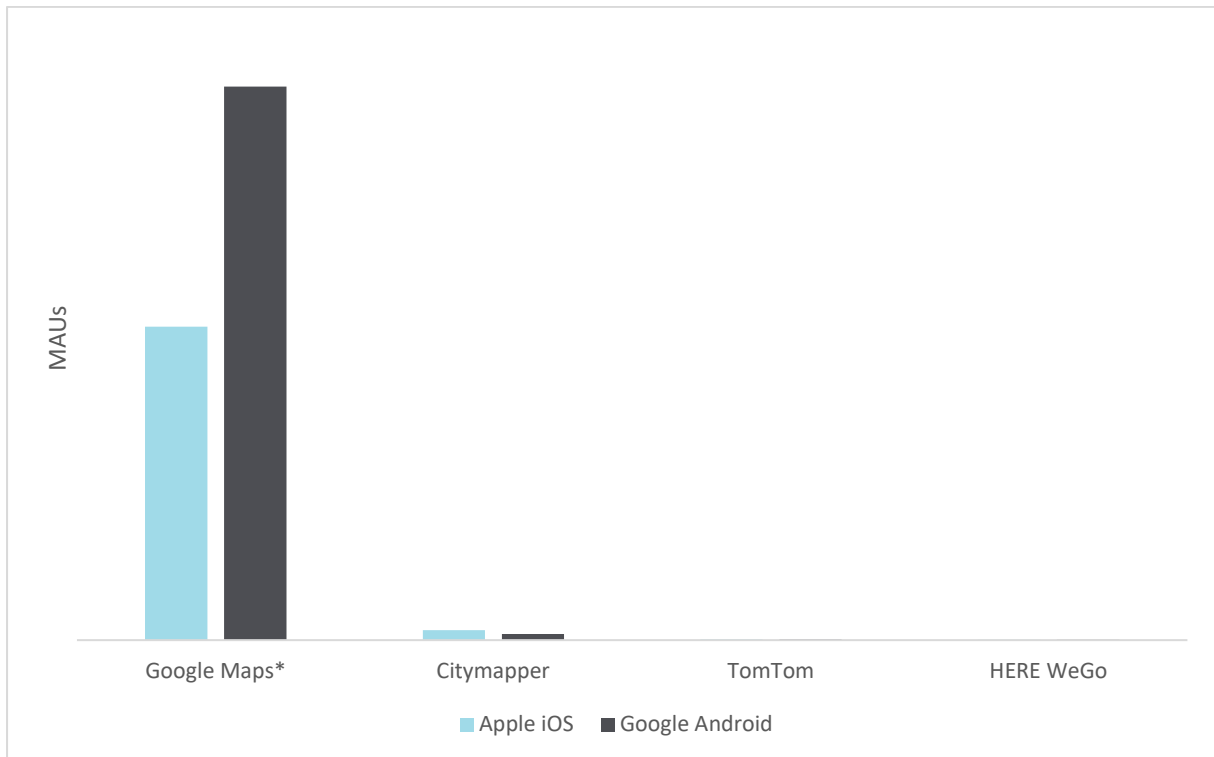Notes:
    (1)   Data for Apple Mail was unavailable.

Figure B.37: Average MAU of music streaming apps (2021)

Source: CMA analysis of Apple, Google and Sensor Tower data. The y-axis has been redacted on confidentiality grounds.
* Apple Music comes pre-installed on iOS devices and Google Play Music comes pre-installed on Android devices. To maintain confidentiality, we used ranges of 1 million MAUs and took the midpoint of the range into which the true usage figure falls.
** YouTube Music has recently replaced Google Play Music on iOS devices but Google has not provided usage figures for pre-installed Google Play Music apps.

Figure B.38: Average MAU of navigation apps (2021)

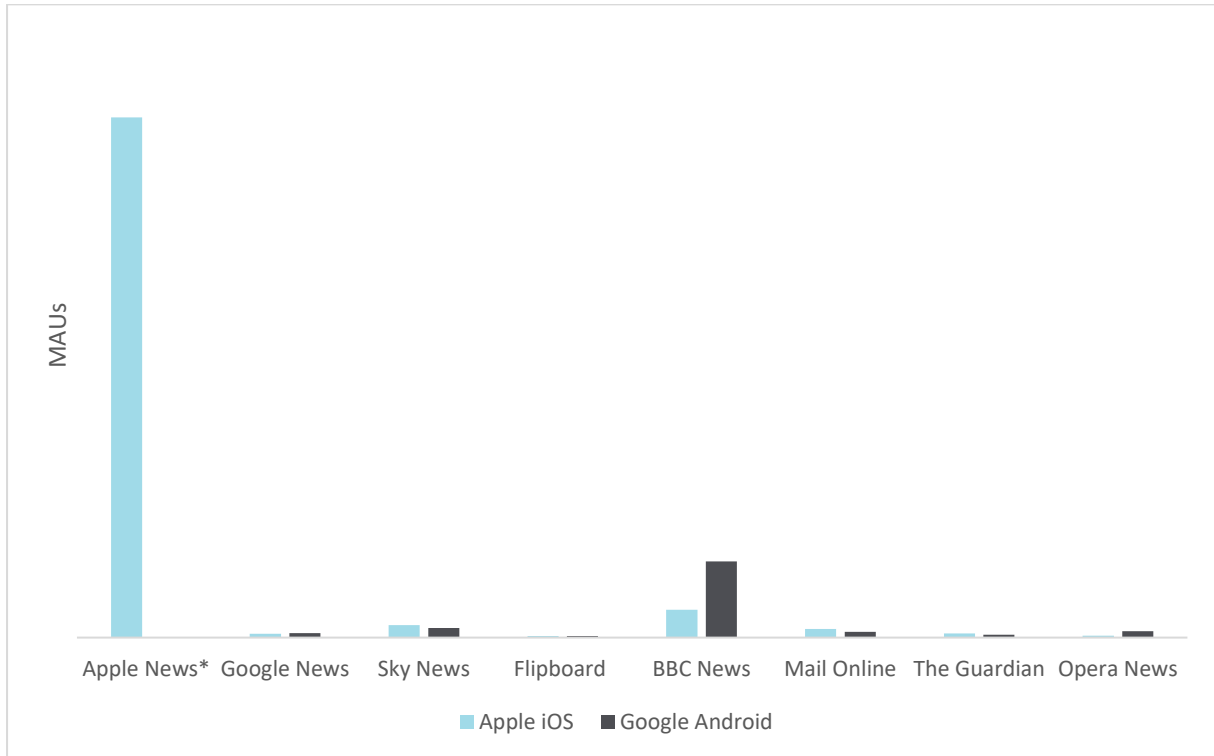Source: CMA analysis of Google and Sensor Tower data. The y-axis has been redacted on confidentiality grounds.
* Google Maps comes pre-installed on Android devices. To maintain confidentiality, we used ranges of 1 million MAUs and took the midpoint of the range into which the true usage figure falls.
Notes:
   (1)   Data for Apple Maps was unavailable.
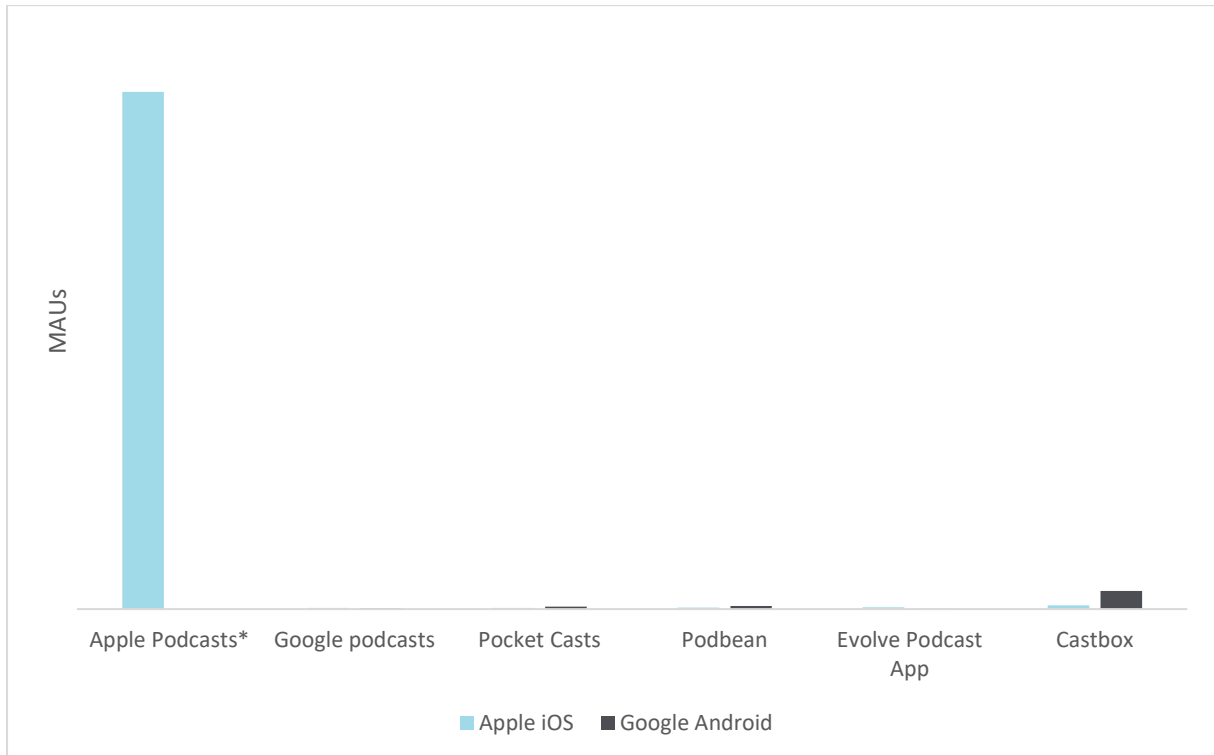   (2)   Data for Waze and RoadWarrior was unavailable.

Figure B.39: Average MAU of news apps (2021)

Source: CMA analysis of Apple and Sensor Tower data. The y-axis has been redacted on confidentiality grounds.
* Apple News comes pre-installed on iOS devices. Apple News usage figures include usage on iOS and macOS devices. To maintain confidentiality, we used ranges of 1 million MAUs and took the midpoint of the range into which the true usage figure falls.

Figure B.40: Average MAU of podcasts apps (May – December 2021)

Source: CMA analysis of Apple and Sensor Tower data. The y-axis has been redacted on confidentiality grounds.
* Apple Podcasts comes pre-installed on iOS devices. To maintain confidentiality, we used ranges of 1 million MAUs and took the midpoint of the range into which the true usage figure falls.

Figure B.41: Average MAU of video calling apps (2021)

Source: CMA analysis of Google and Sensor Tower data. The y-axis has been redacted on confidentiality grounds.
* Google Duo comes pre-installed on Android devices. To maintain confidentiality, we used ranges of 1 million MAUs and took the midpoint of the range into which the true usage figure falls.
Notes:
    (1)   Data for Apple FaceTime was unavailable.
    (2)   Data for Facebook Messenger and Whatsapp was unavailable.

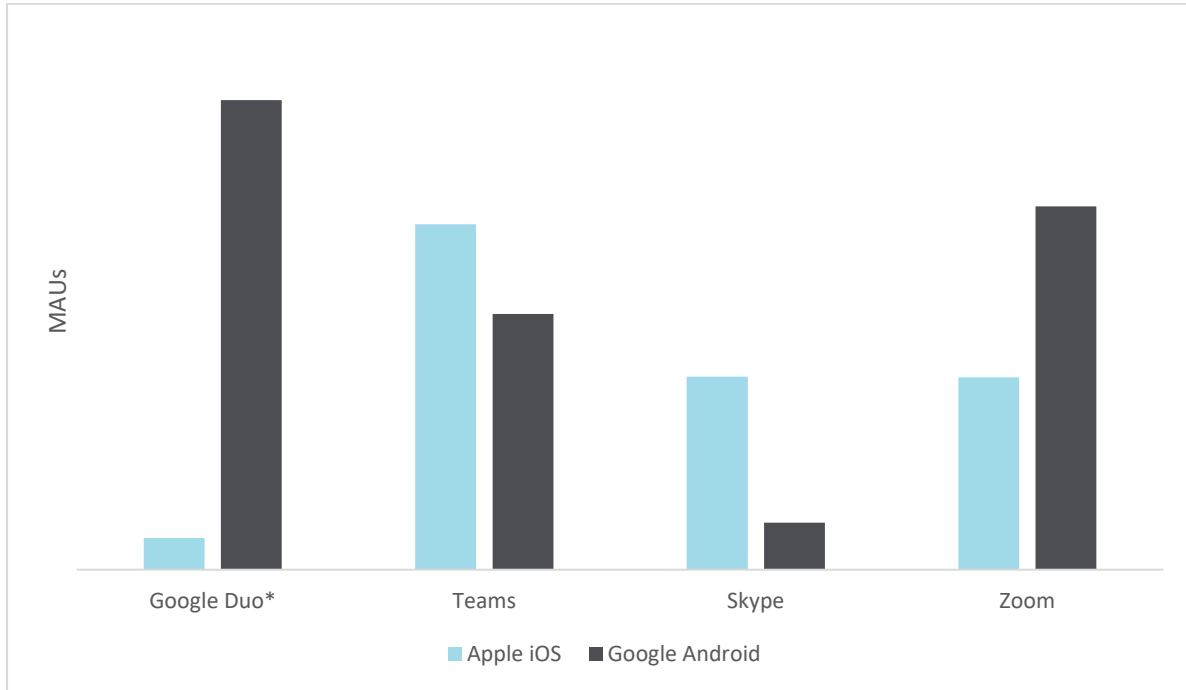**Figure B.42: Average MAU of video streaming apps (2021)**

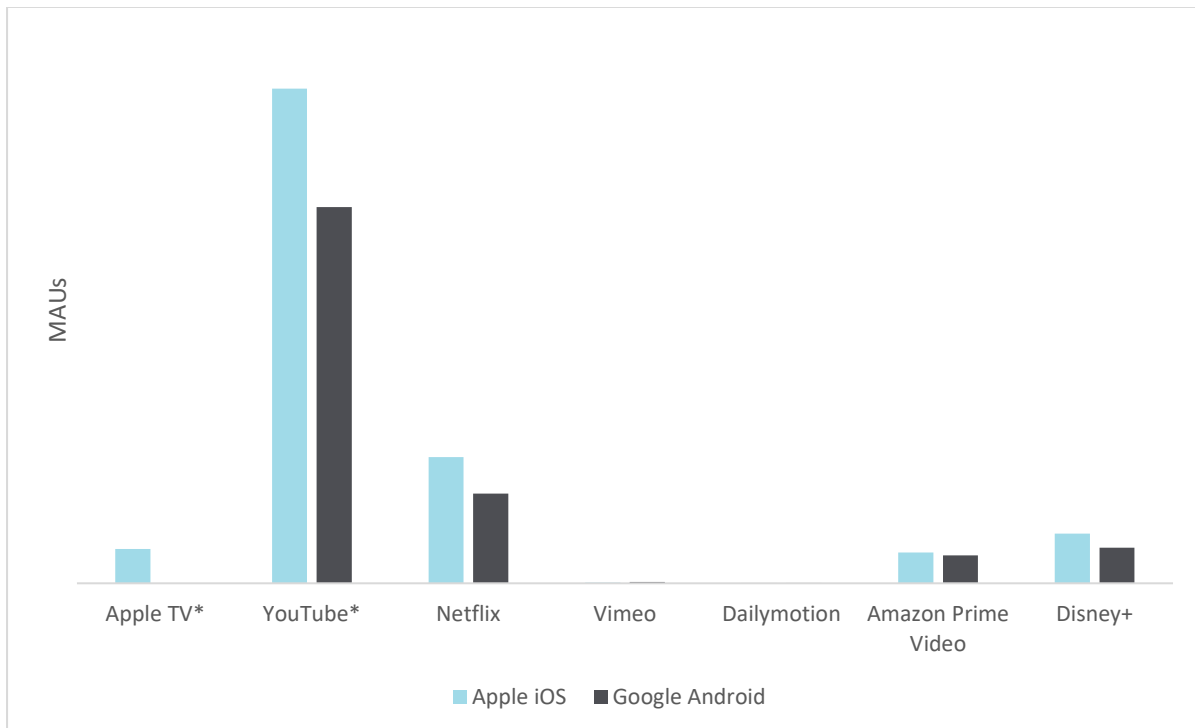Source: CMA analysis of Apple, Google and Sensor Tower data. The y-axis has been redacted on confidentiality grounds.
* Apple TV comes pre-installed on iOS devices and YouTube comes pre-installed on Android devices. To maintain confidentiality, we used ranges of 1 million MAUs and took the midpoint of the range into which the true usage figure falls.
Notes:
    (1)   Data for Twitch was unavailable.

86. The purpose of this analysis is to assess how pre-installation may affect which apps are used by consumers. All else being equal, we consider the following evidence to be consistent with pre-installation leading to a greater usage of pre-installed apps. Firstly, where the same first-party app is pre-installed on some devices but not on others, evidence of higher app usage on devices where that app is pre-installed will be indicative of pre-installation having a positive effect. For instance:

- As seen from figure B.37 above, in 2021 Apple Music had [40-50] times more average MAUs on iOS devices, on which it comes pre-installed, than on Android devices. Similarly, Google Play Music had [60-70] times more average MAUs on Android devices, on which it came pre-installed, than on iOS devices.[48]

- Google Drive had [5-10] times more average MAUs on Android devices on which it comes pre-installed than on iOS devices (see Figure B.34 above).

- Gmail and Google Maps, despite their popularity, both had [0-5] times as many MAUs on Android devices, on which it come pre-installed, than on iOS devices (see Figures B.36 and B.38 above).

- As seen from Figure B.41 above, Google Duo, a considerably less popular app, had [10-20] times more MAUs on Android than on iOS devices.

87. Positive effects of pre-installation can also manifest themselves in pre-installed apps having higher usage than other third-party apps in the same category. For instance:

- We have seen that on Android devices, Google Drive had [30-40] times more average MAUs in 2021 than its closest alternative Dropbox (see Figure B.34 above), Google Maps had [80-90] times more MAUs than Citymapper (see Figure B.38)[49], Gmail had [5-10] times more MAUs than Microsoft Outlook (see Figure B.36) and YouTube had [0-5] times more MAUs than Netflix (see Figure B.42).[50]

- Similarly, on iOS devices, Apple News had [10-20] times more average MAUs in 2021 than BBC News (see Figure B.39 above), Apple Books had

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[48] Google Play Music has now been replaced by YouTube Music, but we do not have data on the usage of pre-installed YouTube Music apps to make a similar comparison.
[49] Usage data for some alternative apps, such as Waze, was unavailable.
[50] Microsoft Outlook and Netflix also come pre-installed on some Android devices. The usage of pre-installed apps is not captured in the MAU figures reported.

[10-20] times more MAUs than Amazon Kindle (see Figure B.35), Apple Podcasts had [100-150] times more MAUs than another podcast platform Castbox (see Figure B.40) and Apple Music had [0-5] times as many MAUs as Spotify (see Figure B.37).[51]

88.   Finally, we have looked at the categories where only Apple but not Google has first-party apps pre-installed (ie ebook reader, news and podcasts apps). In these instances, higher usage of third-party apps on Android than on iOS devices would also be consistent with pre-installation having a negative effect on the usage of competing third-party apps, as more iOS users regularly use pre-installed Apple's first-party apps.[52] We have seen that this was generally the case across all three categories mentioned above, where third-party apps generally had more MAUs on Android than iOS devices.

89.   While we consider that the evidence described above is indicative of pre-installation having a positive effect on app usage, we note that some of these differences in app usage are also likely to be due to other factors, such as app popularity and brand loyalty (eg iOS and Android users being more loyal to Apple and Google products, respectively). However, while the above-mentioned effects differed across app categories and between more and less popular apps, we could still see at least some indications, although of a different scale, of positive effects of pre-installation in all app categories in our assessment. There are some indicators that this relationship may be weaker for video streaming apps, although, notably, this may partially be explained by Apple TV and Google YouTube being less directly substitutable with other video streaming apps.

90.   Unlike Android users, iOS users can only change default apps for the following two app categories – internet browsers and email clients.[53] It is therefore expected that the app usage figures on iOS devices also capture the positive effect of setting these apps as default apps without users' ability to change them.

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[51] Average MAUs for Apple Books and Apple News also include usage on macOS devices, overestimating usage on iOS devices. However, given the very large differences between the usage of pre-installed Apple apps and third-party apps in these categories, we consider that these differences in MAUs are still indicative of a positive effect of pre-installation on app usage.
[52] We have not been able to scale usage figures on iOS and Android devices based on the number of users on each operating system. However, given there are more iOS than Android users in the UK (see section on Mobile devices and operating systems outcomes above) we would expect average MAUs figures for third-party apps throughout the year to be slightly higher on iOS than on Android devices, all else being equal.
[53] Internet browsers are assessed separately in Chapter 5.

Mobile browser outcomes

Sources of data

91.   Statcounter and App Annie are the key data sources which we used to calculate shares of supply in browser markets.[54]

92.   Statcounter is an important public source for shares of supply in browser markets.[55] Statcounter provides shares on the basis of page views, which is a request to load or reload a single web page of an internet site.[56] This request usually results from a user who clicks on a link that points to the web page. We did not receive any specific concerns about Statcounter data for browser shares,[57] although we note the possible limitations to Statcounter's methodology, discussed above, regarding representativeness of the population of websites and consumers' adblockers and browser preferences.

93.   App Annie is a data source Google referred to for shares of supply in browser markets. App Annie measures shares according to usage in minutes.[58] An advantage of App Annie's data is that it provides shares of supply per mobile operating system, and not in an aggregated form as is the case with Statcounter.

Mobile browsers: shares of supply

94.   Both globally and at the UK level, Apple's Safari and Google's Chrome browser are the largest browsers on mobile devices.[59]

95.   Figure B.43 below shows the evolution of shares of supply for browsers on mobile devices in the UK from 2012 until 2022.[60] In particular:

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[54] In addition to these data sources, stakeholders also commented on the following sources: Google said that it has Google-only data on the number of installations of the Chrome browser and the number of page loads using Chrome. Mozilla provided Firefox-only mobile monthly active users data from the UK in the last four years. Microsoft said that Comscore is another source of browser usage information, however, it does not make its data available publicly.

[55] Statcounter was mentioned as a source for shares of supply by Apple, Microsoft, and Opera.

[56] Statcounter, FAQ.

[57] Opera told us that Statcounter is not entirely accurate.

[58] Although Google told us that it does not verify or endorse the accuracy of App Annie data.

[59] We have assessed shares of supply using two different metrics: (i) page views (ie the total number of pages loaded or reloaded in a browser); and (ii) usage, measured in minutes.

[60] Statcounter, Mobile browser share of supply UK 2012-2022. Share of supply calculated based on usage minutes data submitted by Google confirm that Chrome and Safari have been holding a joint share of supply of over 80% in the last few years, and that Samsung Internet is the largest competitor in the mobile browser market. App Annie browser usage data.

- Currently, Safari and Chrome are the largest browsers. In 2021, their combined share of supply amounted to almost 90%, with Safari accounting for 49% and Chrome for 40%.

- Over time Safari's share of supply has been relatively stable, although it has decreased slightly since 2012. In contrast, Chrome's share of supply increased substantially, from 2% in 2012 to 40% in 2022.

- Samsung Internet is the only other browser with a share above 5%. It gained share significantly in 2016 and has remained at around 6% to 8% since.

Figure B.43: UK mobile browser share of supply
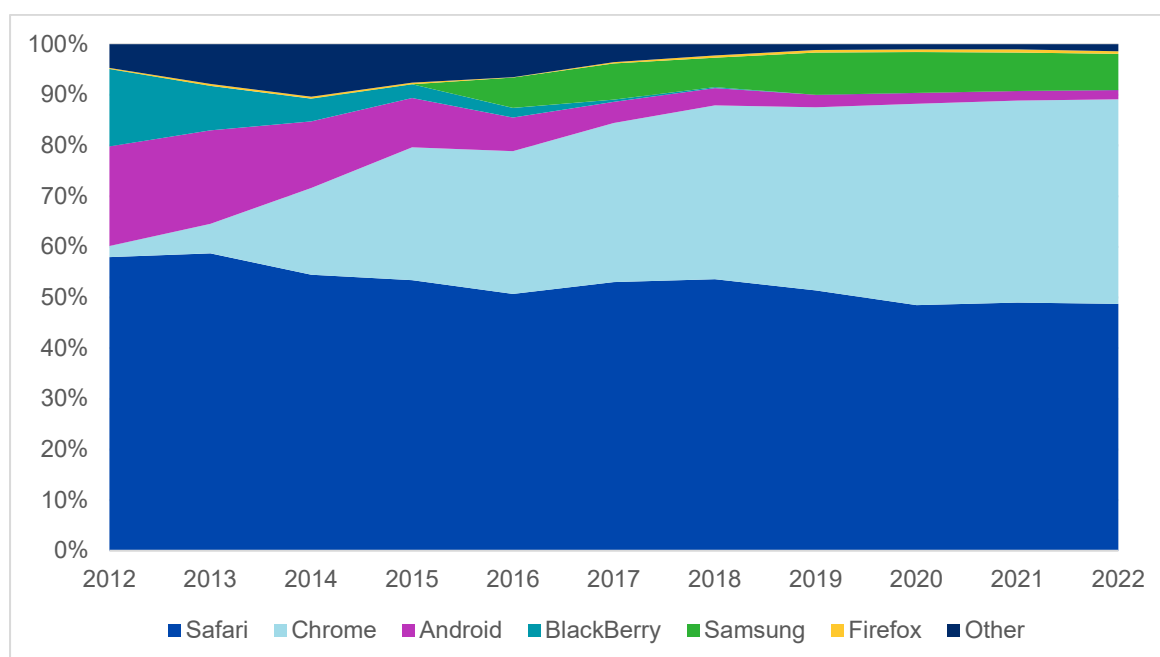
Source: Statcounter, Mobile browser share of supply UK 2012-2022, (retrieved 7 April 2022).
Note: Mobile refers to smartphones and tablets. The figure was calculated based on page views data from Statcounter. Android refers to AOSP-based browsers developed on top of the web browser apps made available through the Android Open Source Project. European Commission, Google Android decision, footnote 1034.

Browser engines: shares of supply

96. Apple and Google also have the largest browser engines. Their browser engines had a combined share of almost 100% on mobile devices in the UK, with WebKit accounting for just over 50% and Blink just under 50%.[61]

97. As set out in Chapter 5, each browser has an underlying browser engine. However, since the browser engine can differ by operating system, we have assessed shares of supply for browsers and browser engines by operating

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[61] See Table B.8. WebKit's share is calculated based on the share of iOS in 2021. Blink's share is calculated based on the share of Android in 2021 but excluding Gecko and the other/unknown category on Android. Statcounter, Mobile operating system share of supply UK 2021, Table 5.2.

system. Given that Apple and Google hold a de facto duopoly over mobile operating systems (as set out in Chapter 3), we limit our assessment to iOS and Android.

98.   For iOS, Table B.8 below shows the following:

*   Safari is the main mobile browser on iOS in the UK, with a share of supply of 90% in 2021. The only other sizable browser is Chrome, with 9%.

*   Given that Apple imposes the restriction that browsers on iOS have to use Apple's WebKit browser engine, WebKit on iOS has a share of supply of 100%.

Table B.8: 2021 UK mobile browser engine share of supply by operating system

					%
iOS			**Android**		
Browser	*Browser Engine*	*Mobile*	*Browser*	*Browser Engine*	*Mobile*
Safari	WebKit	89.9	Chrome	Blink	73.8
Chrome	WebKit	8.9	Samsung Internet	Blink	15.4
Other	WebKit	1.3	Firefox	Gecko	3.5
			Smaller browsers	Blink	6.4
			Other	Other/unknown	0.9

Source: App Annie browser usage data provided by a browser vendor.
Note: Calculated based on usage minutes data from App Annie. DuckDuckGo's browser engine (OS's WebView) is counted as Blink (2%). iOS data was only available for the first three quarters of 2021.

99.   For Android, Table B.8 shows the following:

*   Chrome is the main browser on Android in the UK. With a share of supply of 74% in 2021, its position is very strong, although less strong than Apple's position on iOS. Samsung Internet is the largest competitor to Chrome on Android, with a share of 15%, while the next largest competitor, Firefox, has a share below 5%.

*   While browsers on Android are free to choose their browser engine, almost all browsers use Google's Blink browser engine, resulting in Blink holding a share of at least 95%. The key exception is Firefox, which uses Mozilla's Gecko browser engine.