Appendix F: Pricing

Overview

F.1 In this appendix, we analyse the data from Microsoft and Google to describe trends in prices for cloud services and products. Data submitted from AWS was not comparable, so we were not able to perform a similar analysis.

F.2 Overall, our results show that for Microsoft there is variety in the direction and size of real (ie after controlling for inflation) price changes for each of its top five services. While most of the products underlying each of these services decreased in price, a significant share of products increased and some more than doubled in price.

F.3 For Microsoft, the average price of products in [✂] and [✂] increased. This is driven by changes in the product mixes underlying these services.

F.4 For Google, most products experienced a small decrease in real price. A few products' real price either increased or did not change.

Microsoft

F.5 Microsoft provided data for list and effective (ie after discounts) prices at the billing meter (ie product) level, for all billing meters in the top 20 cloud services by revenue, covering the years 2018-2022.[1] We have used this data to assess the extent to which prices of Microsoft's cloud services have changed over time.

F.6 Below, we set out the methodology we have used to analyse this data and the results.

Methodology

F.7 Microsoft offers several cloud services, but customer spend varies significantly across them. We limited this analysis to the top five services by revenue in 2022 (so-called service level 2, or SL2), namely: [✂]. Together, these services represent [60-70%] of Azure's revenue.[2]

[1] Data was provided for 2023, but we excluded it because it did not cover the whole year. Microsoft's response to the CMA's information request [✂].
[2] Microsoft submission to the CMA [✂].

Figure F.1 [✂]

Source: [✂].

F.8 Each service is made of several products. For example, in 2022, [✂] included [✂] distinct products.[3] For each service, we looked at the products underlying each service and analyse their price trends accounting for inflation. In particular:

(a) we computed revenue-weighted average prices for each service over time; and compute the percentage change in this average price in each SL2, relative to 2018;

(b) we computed the revenue-weighted average of the percentage change in price for each product in each SL2;

(c) we decomposed each service into subsets of products according to whether their price increased, decreased, or remained stable; and

(d) we present the distribution of price changes over the period 2018-2022.

F.9 This methodology is similar to Microsoft's,[4] but our methodology differs in four main respects:

(a) We have used a different price index to control for inflation. While Microsoft used a general inflation index, the Consumer Price Index (CPI), we consider it more appropriate to use the ONS Information Service Activities index. [5] This is because it may account for inflation specific to cloud services better than the CPI.

(b) We have considered average prices of products within services weighted by the revenue of each product. We consider this to be an improvement on Microsoft's submission as each product is weighted by its relative importance.

(c) We have computed two measures of price trends: (i) the revenue-weighted average prices for each service over time, and (ii) the revenue-weighted average of the percentage change in price of products. The second metric excludes the so-called 'composition effect', ie the effect of changes in the set of products underlying a service over time.[6]

[3] Microsoft's submission to the CMA [✂].
[4] See Microsoft's submission to the CMA [✂].
[5] Office for National Statistics Industry Deflators, accessed on 15 August 2024.
[6] If, for example, the price of one service decreases over time, that may be due to: (a) products under that service changing prices; and, (b) new cheaper products replacing older more expensive ones. While the revenue-weighted average prices for each service over time captures both, the revenue-weighted average of the percentage change in price of products isolates only (a).

(d) When looking at price changes, we have looked not only at whether the price change was positive or negative, but also the magnitude of this change.

(e) We also excluded all products that are free. That is, we have excluded products that are priced at zero when they are first and last observed.[7]

F.10 In line with Microsoft's submission,[8] we used effective prices.

F.11 One limitation of this analysis is that it has looked at prices but not at costs incurred by cloud providers. In cloud services markets, where economies of scale are important and cloud providers are growing, we would expect unit costs to fall. Therefore, falling prices might not necessarily be a positive sign of competitive pressure. Indeed, if unit costs were to fall faster than prices, this would indicate an increase in profit margins, an indicator of market power. An analysis of profitability is more indicative in that case. This analysis also does not adjust prices for the relative quality of the products. Given these limitations, we give limited value to the results of this analysis.

Results

F.12 In this section, we present the main results of our analysis on the:

(a) revenue-weighted average prices for each service over time;

(b) revenue-weighted average of the percentage change in product prices;

(c) share of products that increased, decreased, or remained stable in price; and,

(d) magnitude of product price changes.

Change in revenue-weighted average price

F.13 Figure F.2 below shows the percentage change in the revenue-weighted mean of prices in each of the top five SL2s.

(a) Relative to 2018, the price of [✂] and [✂] decreased by [30-40%] and [60-70%] respectively.

(b) Prices for [✂] have fluctuated substantially over time. However [✂] prices for '[✂] were similar to prices in 2018.

(c) For [✂], prices increased by [70-80%] between 2018 and 2022.

[7] Microsoft submission to the CMA [✂]. This is particularly relevant when taking the percentage change in price as products with a price of zero cannot return a percentage change.
[8] Microsoft submission to the CMA [✂].

(d) For '[✂],' prices more than doubled between 2018 and 2022.

Figure F.2: [✂]

[✂]

Source: CMA analysis of Microsoft's response to the CMA's information request [✂].

Revenue-weighted average of the change in price

F.14 Figure F.3 below shows the revenue-weighted mean of the percentage change in price for each of the top five SL2s.

(a) The average percentage change in price for products in [✂] is always below [10-20%] in absolute value.

(b) Products in '[✂] show greater average percentage changes in some years of around [20-30%]-[30-40%].

F.15 This suggests that the substantial increase in average price for '[✂] and '[✂] shown in Figure F.2 is driven by changes in the mix of the products that underlie the services, rather than price changes of existing products.

F.16 Given these price changes are driven by the product mix, it is possible that there has been a change in the quality of the products that made up these services. This is not feasible to quantify across all products included and is therefore not reflected in this analysis.

Figure F.3: [✂]

[✂]

Source: CMA analysis of Microsoft's response to the CMA's information request [✂].

Distribution of product-level price changes

F.17 Figure F.4 below shows real price changes in the products underlying each of the five SL2s considered above. Results show that:

(a) the [✂] of products in each SL2 decreased in price;

(b) approximately [30-40%]-[40-50%] of products in each SL2 increased in price;

(c) [0-5%]-[10-20%] of products did not experience any material change in price.[9]

[9] We define 'no change' in price as a price change of less than 1% in absolute value.

Figure F.4 [✂]

[✂]

Source: CMA analysis of Microsoft's response to the CMA's information request [✂]. Note: figures may not add to 100 due to rounding.

F.18 The median percentage change in for each SL2 was negative with the largest median change (in absolute terms) being [✂] at approx. [-20-10%]. The smallest median change in price was in '[✂] at approx. [-5-0%].

F.19 Figure F.5 below shows the percentage of products experiencing price changes of various magnitudes between 2018-2022. Results show that:

(a) there is variety in the direction and size of changes in real price.

(b) the majority of products show a decrease in price of any magnitude, with more than [30-40%] of products decreasing by a magnitude of [10-20%]-[50-60%].

(c) [40-50%] of products increased in price by a magnitude less than [100-110%].

(d) [5-10%] of products at least doubled in price. Most of these products belong to the '[✂] service.

Figure F.5: [✂]

[✂]

Source: CMA analysis of Microsoft's response to the CMA's information request [✂].

F.20 Our analysis shows that:

(a) there is variety in the direction and size of real price changes for each of the top five services of Microsoft; and

(b) while most of the products underlying each of these services have decreased in price, a significant share of products has increased and some have more than doubled in price.

Google

F.21 Google provided data for list and effective prices for the top 10 products,[10] in each of the top 20 cloud services by UK revenue, covering the years 2020-2023.[11] It

[10] Google referred to these products as SKUs.
[11] Google's response to the CMA's information request [✂].

also provided invoice revenue data for each SKU.[12] We use this data to assess the extent to which prices of Google's cloud services have changed over time.

F.22 In the sections below, we present the methodology we used to analyse this data and the results.

Methodology

F.23 The methodology is similar to the methodology used for assessing the changes in Microsoft's product prices described above. However, due to the data available, it was impossible to replicate the same analysis in full.

F.24 In particular, the product IDs (SKUs) were not unique to individual services. That is, the same SKU can appear in the data set multiple times each year under different services and different prices.

F.25 For this reason, when computing product-by-product price changes, the 'product' is taken to be an SKU-service pair.

F.26 As above, we restricted this analysis to the top 5 services by revenue. For [✂], these are: [✂].[13]

F.27 In total, these five services account for approximately [60-70%] of the revenue in the data set (which covers the top ten SKUs from the top 20 services provided by Google). [✂] accounts for approximately [20-30%] of the revenue in the data set, while [✂] each account for approximately [5-10%]-[10-20%] of the revenue in the data set.[14]

F.28 Each service is made up of several products. For each service we observe only the top ten products by revenue. Therefore, this analysis has a smaller sample size than the analysis for Microsoft.

F.29 In contrast to Microsoft, we use list prices rather than effective prices. This is because the list price data is of higher quality than the effective price data.

Results

F.30 In this section we present the main results of our analysis on the:

(a) revenue-weighted mean price of each service over time;

[12] Google's response to the CMA's information request [✂].
[13] [✂] CMA analysis of Google's response to the CMA's information request [✂].
[14] CMA analysis of Google's response to the CMA's information request [✂].

(b) share of products that have increased, decreased, or remained stable in price over time; and,

(c) magnitude of product price changes over time.

Change in revenue-weighted average price

F.31 Figure F.6 below shows the percentage change in the revenue-weighted mean price of SKUs within each service.

(a) Relative to 2020, prices of four out of five of the top services offered by Google decreased by a range of [30-40%]-[50-60%].

(b) Prices for one other top service increased by approximately [5-10%] in real terms.

Figure F.6: [✂]

[✂]

Source: CMA analysis of Google's response to the CMA's information request [✂].

Revenue-weighted average of the change in price

F.32 Figure F.7 below shows revenue-weighted mean of the percentage change in price for each of the top five services.

(a) The revenue-weighted mean of percentage change in price does not exceed [10-20%] for any of the top five services offered by Google, other than one [✂], which experienced a substantial decrease in price in 2021.

Figure F.7: [✂]

[✂]

Source: CMA analysis of Google's response to the CMA's information request [✂].

Distribution of product-level price changes

F.33 Figure F.8 below shows real price changes in the products underlying each of the five services considered. Results show that:

(a) the majority of products in each service decreased in price;

(b) [10-20%] of the products in one service [✂] increased in price, while no products in the other four services [✂] increased in price;

(c) Between [0-5%] and [20-30%] of products in each service experienced no material change in price.[15]

Figure F.8: [✂]

[✂]

Source: CMA analysis of Google's response to the CMA's information request [✂].

F.34 Figure F.9 below shows the percentage of products experiencing price changes of various magnitudes between 2020-2023. Results show that:

(a) There is some variety in the direction and size of changes in real price.

(b) The majority of products show a decrease in price, with approximately [50-60%] of products decreasing by [10-20%]-[50-60%].

Figure F.9: [✂]

[✂]

Source: CMA analysis of Google's response to the CMA's information request [✂].

F.35 Overall, our analysis shows that:

(a) Most products experienced a small decrease in real price.

(b) A few products increased or did not change in real price.

AWS

F.36 AWS provided data on prices for the primary SKU in each of the top 20 cloud services based on UK Revenue, covering the years 2019-2023.[16]

F.37 AWS also provided data on total revenues for over 300 public cloud services covering the years 2018-2022.[17]

F.38 Based on this data, it is impossible for us to replicate the methodology used for Microsoft and Google with the AWS data as we only observe one SKU per service.

F.39 AWS provided prices weighted by customer spend.[18] We are not able to verify or replicate this weighting with the data provided to us.

[15] We define 'no change' in price as a price change of less than 1% in absolute value.
[16] AWS' response to the CMA's information request issued under [✂].
[17] AWS' response to the CMA's information request issued under [✂].
[18] AWS' response to the CMA's information request issued under [✂].

F.40 We also cannot compute revenue-weighted average prices as we have done with Google and Microsoft. This is for two reasons:

(a) we only observe one SKU per service, so cannot compute weighted averages for each service; and

(b) the revenue data available to us did not allow for computation of weighted averages across services. In particular, the share of service revenue accounted for by the primary SKU is observed to [✂] in 2022 and 2023. We cannot verify the reliability of these shares.

F.41 AWS further submitted a revised analysis that addressed all of the concerns we had on the above analysis in our PDR.[19] AWS submitted that its revised analysis shows that the prices of S3, EC2 and DT have fallen between 2018 and 2024. We have assessed these findings in chapter 3.

[19] See paragraph 3.284 of the PDR.