Comment on

The UK Competitive Market Authority's (CMAs)

Cloud Services Market Investigation

Three Working Papers on

The Supply of Public Cloud Infrastructure Services in the UK

Covering The CMA's

1. Competitive Landscape Working Paper

2. Egress Fees Working Paper; and

3. Committed Spend Agreements Working Paper

By

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I. Introduction

After contacting the CMA, and obtaining the CMA's agreement, this report responds to **all three** working papers (WP) issued by the UK Competition and Market Authority (CMA) on 23 May 2024 including

1. Competitive Landscape Working Paper
2. Egress Fees Working Paper; and
3. Committed Spend Agreements Working Paper

These current working papers originate in a referral by Ofcom to CMA on 5 October 2023 for a market investigation by the CMA into the supply of public cloud infrastructure services in the UK.[1] The CMA published an Issues Statement [2] 12 days later on the 17 October 2023 which described the basis of this referral by Ofcom as follows

> 2. Ofcom had reasonable grounds to suspect that a feature or a combination of features of the markets for the supply of those goods and services in the United Kingdom prevents, restricts or distorts competition. In particular, conduct which may create barriers to switching and multi-cloud.

In its Issues paper the CMA notes that based on the Ofcom Market Investigation Reference (MIR), under the Enterprise Act

> 4. The CMA is required to decide whether any feature, or combination of features, of each relevant market prevents, restricts or distorts competition in connection with the supply or acquisition of any goods or services in the UK or a part of the UK. [3]

I summarize the relevant statutory provisions of the Enterprise Act in Appendix One, but in summary under the Enterprise Act the CMA has to prove with reasonable or strong evidence that there is a "feature, or combination of features of a relevant market"[4] that create "an adverse effect on Competition"[5] (AEC) "or a detrimental effect on customers or future customers."[6] – not offset by "any relevant customer benefits of the feature or features"[7] that are "unlikely to accrue without the feature or features concerned"[8] "within a reasonable period". [9]

The CMA notes in its Issues Statement

> 19. Having reviewed Ofcom's findings and our guidelines on potential sources of

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[1] See Ofcom Terms of Reference (ofcom.org.uk) On 5 October 2023 the Office of Communications (Ofcom), in exercise of its powers under sections 131 and 133 of the Enterprise Act 2002 (the Act), as provided for by section 370(3A)(b) of the Communications Act 2003 read together with section 130A of the Act, made a reference for a market investigation into the supply of public cloud infrastructure services in the UK

[2] https://assets.publishing.service.gov.uk/media/652e958b6972600014ccf9f6/Issues_statement_updated.pdf

[3] Section 134 Enterprise Act 2002 (legislation.gov.uk)

[4] section 134(2)

[5] section 134(2) of the Act

[6] s134(4) of the Act

[7] s134(7) of the Act

[8] s134(8)(b)(ii) of the Act

[9] s134(8)(b)(i) of the Act

> competitive harm, we propose to focus our investigation on four groups of high-level hypotheses, also known as 'theories of harm', based on both the structure of the market(s) that we will investigate and the conduct of relevant firms within these or other related markets.[10]

The four hypotheses or theories of harm are listed in the CMAs issues paper in on paragraphs 21 to 35 pages 5-7as

> *Theory of harm 1: Technical barriers make switching and multi-cloud harder and limit competition between cloud service providers Para 22-25*
>
> *Theory of harm 2: Egress fees harm competition by creating barriers to switching and multi-cloud leading to cloud service providers entrenching their position. Para 26-28*
>
> *Theory of harm 3: Committed spend discounts raise barriers to entry and expansion for smaller cloud service providers by incentivising customers to concentrate their business with one provider. Para 29-31*
>
> *Theory of harm 4: Software licensing practices by cloud service providers restrict customer choice and prevent effective competition Para 32-25*

The CMA notes

> 21. The four hypotheses draw on the three features Ofcom was most concerned about and also the software licensing practice

The CMA is in the process of conducting its inquiry through information-gathering and analysis and will proceed to prepare its provisional decision report, which is currently scheduled for publication in September/October 2024.

In a Progress Update[11] accompanying the release of the three working papers on 23 May 2024 the CMA noted

> 5. Today we have published the first set of our working papers: these are on the competitive landscape for cloud services in the UK and two of the four theories of harm set out in our issues statement: egress fees and committed spend agreements.
>
> 6. The Inquiry Group Working papers set out a snapshot of our work to date and any emerging findings the inquiry group has, based on the evidence we have seen and the analysis we have conducted to date. These papers do not set out any provisional decisions. The Inquiry group is carrying forward its information-gathering and analysis and will proceed to prepare its provisional decision report later this [12]

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[10] see Issues Statement page 4
https://assets.publishing.service.gov.uk/media/652e958b6972600014ccf9f6/Issues_statement__updated.pdf

[11] See progress Update Page 1 Para 5-6
https://assets.publishing.service.gov.uk/media/664f0369bd01f5ed32794105/__Progress_update__.pdf

[12] Ibid Page 1 Para 5-6

The three working papers I address in this report respectively address different key questions:

1) The Competitive Landscape paper answers a number of necessary general or high levels questions or preconditions for the CMA reaching a decision including: What is the appropriate market definition, or what are the relevant markets which the CMA is considering as part of this investigation? Is there evidence of significant market power being held by providers in the market?
2) Egress Fees Working Paper fundamentally asks whether egress fees are a feature of the market that gives rise to an adverse effect on competition (AEC)? And whether, and if so what, remedial action should be taken to address that AEC?
3) Committed Spend Agreements (CSA) Working Paper addresses whether CSA or Committed Spend Discounts (CSD) are a feature of the market that gives rise to an AEC? And whether, and if so what, remedial action should be taken to address that AEC?

I have combined my response to these three working papers in this report, after contacting the CMA to confirm, as I concluded this would be the best approach, for two reasons

1) First one can't look at the working papers in isolation from each other and the Issues Statement. The frontispiece of each working paper confirms this, noting that each paper "should be read alongside the Issues Statement published on 17 October 2023 and other working papers published."
2) In particular to answer the questions raised in each working one has to address seven more fundamental ones

    i. Regulatory Objective. What is the CMA's Objective?
    ii. The Burden of Proof: What is the burden and standard of proof?
    iii. Market definition: What is the relevant Market?
    iv. Market power: Is there market power?
    v. Abuse of market Power: is there an abuse of market power in Egress fees or CSA?
    vi. Evidence of Harm; Is there evidence of harm to consumers from Egress fees or CSA?
    vii. Regulatory Failure: What are the risks and costs of regulatory failure that need to be factored into any decision?

II. Outline

The remainder of the report is divided into two major parts

- The next section provides an *overview* of my answers on the seven prior and more primary or fundamental questions that have to be addressed and that I identify above 2) i)- vii) above
- The next seven core sections then provide my *detailed* response on each of the seven more fundamental issues/questions, 2) i)- vii) identified above, in separate sections. Each subsection first identifies the CMA's own view where one is clearly expressed on these issues/questions drawing from the CMA three working papers and then provides my own comments.

As noted I have chosen to organise my response to the CMA's three working papers around the seven more fundamental issues/questions I identify above 2) i)- vii) above identified in the table below in the first column on the left of the table below. The CMA's working papers are identified in the last three columns. In each cell in the table matrix I have inserted a tick identifying each section is relevant to all three working papers.

Sections of this report	CMA Working Papers		
	Competitive Landscape	Egress Fees	Discounts/CSD
1. Regulatory Objective	✓	✓	✓
2. The Burden of Proof	✓	✓	✓
3. Market Definition	✓	✓	✓
4. Market Power	✓	✓	✓
5. Abuse of Power	✓	✓	✓
6. Harm	✓	✓	✓
7. Regulatory Failure	✓	✓	✓

III. Overview and Summary

For reasons I outline in detail below the weight of theory and evidence on the CMA's hypothesis or theory of harm relating to egress fees and committed spend discounts (CSD's) is that these features of contractual agreements

1) Have legitimate business, and efficiency rationales, and pro-competitive effects that benefit consumers, in that the terms (egress fees and CSD) better ensure prices approximate suppliers direct and incremental costs or efficient costs in the computer storage and processing power (CSPP) market
2) Can <u>not</u> have an adverse effect on competition (AEC) or detrimentally effect consumers for reasons outlined below in particular there are no barriers to entry and expansion, and any attempt to have an AEC would lead to punishing competitive responses from other incumbent firms and new entrants, and both customer and supplier switching and countervailing responses, with the parties to the agreements themselves reneging on any anticompetitive part to the deals, or failing.

I conclude therefore that in fact the agreements are more likely to substantially enhance competition, and have legitimate business and efficiency rationales and effects as outlined above, with no AEC overall.

These conclusions appear obvious from the outset, and so a more fundamental point I make is that it is very premature for the CMA to be raising these specific "applied" or case related questions and conducting a public inquiry into competitive conditions in the CSPP market. Indeed the CMA decisions to continue its investigation and then issue these working papers seem unreasonable, seriously unfounded and even ultra vires or beyond its jurisdiction. The CMA was not set up to investigate clearly competitive markets.

The CMA's inquiries into the CSPP market are more likely to lead to a lessening of competition than the agreements being investigated.

To test the hypothesis posed by the CMA Issues paper however one first has to stand back and address the seven more fundamental or primary prior questions, and assess the evidence justifying the inquiry in the first place. In short the CMA's working papers beg a large number or prior and more primary questions that the CMA has not provided a satisfactory answer on and need to be answered to justify the MIR and any further action.

As noted there are at least seven prior primary questions to address in prior necessary steps before one can test the CMA's hypothesis or secondary or applied questions. These seven questions are listed and discussed briefly below.

1) **Regulatory Objective** –What is the objective of the CMA? One needs to be clear on the overarching objective of competition law to formulate answers to the CMA's applied questions in relation to egress fees and CSD. The Enterprise and Regulatory Reform Act 2013 (ERRA) states "The CMA must seek to promote competition, both within and outside the United Kingdom, for the benefit of consumers." [13] The CMA's exercise of its powers under the Enterprise Act thus must fulfil or comply with its duty to promote competition for the benefit of consumers. The working papers however do not make reference to the overarching objective of the CMA, or test, nor embed it in the formulation of the hypothesis. This reflects and creates a fundamental weakness in working papers, and in all likelihood in the comments received, and the MIR process.
2) **Burden and Standard of Proof:** A key preliminary question then is what is the burden and standard of proof here? An appropriate evidentiary or scientific approach to hypothesis testing by the CMA would focus on the underlying hypothesis to refute. The underlying "null hypothesis" or working hypothesis is that the markets are competitive or exhibit workable competition that benefits consumers requiring not further regulatory action. Unless therefore the CMA can present a reasonable theory and strong evidence to refute this null or working hypothesis then the investigation should end, and certainly no regulation, or what the CMA calls "proposed remedies" should be considered. In my view the law including the Enterprise Act governing the CMA requires the CMA to protect the fundamental rights of market participants, especially the right to property or property rights (and by implication freedom of contract) of customers and suppliers. This legal protection of property rights goes as far back as the Magna Carta, and is of the same standing as rights to liberty and life and other fundamental rights protected by due process.
3) **Market definition-** What is the relevant market definition? It is not possible to assess CMA hypothesis about egress fees and CSD without a clear market definition. To decide whether the agreements create an AEC in a market in the UK one has to define the market. The CMA does not formally and explicitly derive the relevant market(s) in theory or use the received

[13] Section 25(3) of the Enterprise and Regulatory Reform Act 2013 (the ERRA13).

hypothetical monopolist test (HMT) or sustained non-transitory increase in price (SNIP) test to define the market. This seems negligent not to have done this work to establish a prima facie case for the MIR. The CMA's approach in essence adopts a fundamentally supply side engineering approach to defining the relevant products it proposes to analyse, combined with the use of metaphors (e.g. "the cloud"). The CMA simply starts with existing engineering components, and an engineering design plan, or "technology stack" or map including components that it then aggregates into elements that it alleges offer services that are ill defined (e.g. "infrastructure", "platform"). It then considers the degree of substitution between these "off the Tech stack" focal products to test and define markets. This is not an economic approach to product or market definition and it is fundamentally flawed. In an economic approach one focuses on the key decisions about property rights that need to be made on the demand and the supply side, the interdependencies between these decisions, and how these are reconciled through exchange, and contracts in markets. In making these decisions customers on the demand side like those on the supply side will weigh the expected costs and benefits of alternatives and choose the best for them. Thus one has to consider the demand side or value function and the benefits of the services or products, as much as the supply side's components and costs of the production. One also has to also consider the transaction costs that affect how exchange is organised, both in markets and in firms, and how the boundaries between markets and firms are determined or drawn. The result of the CMA's vague "technology stack" plus "metaphor" approach is that it defines a set of very narrow markets for IaaS, PaaS and SaaS. As a result the CMA fails to identify and test key constraints that would prevent the exercise of market power in any of the assumed separate markets. This leads the CMA to overstate both the extent of market power of firms, and the potential for abuse of market power by those firms, by for example negotiating anti-competitive egress fees and discounts as discussed later. The CMA further increases the narrowness of the market it investigates by limiting it to markets in the UK or EEA wh=ith cloud data centres, rather than a global market. The CMA's very narrow resulting market definition then leads the CMA too readily to the unreliable conclusion that firms hold significant market power and ultimately are abusing that power. By comparison I propose and derive and explore a wider market for the acquisition and supply of computer storage and processing power (CSPP) globally. This global CSPP market subsumes the various separate markets the CMA uses (i.e. IaaS, PaaS and SaaS) and others.

4) **Market power.** What is the theory and evidence to prove the existence of market power in the relevant market? This question has to be answered prior to addressing whether egress fees or CSD's create an adverse effect on competition (AEC). To be subject to CMA regulation under the Enterprise Act any market feature has to have the impact or effect of adversely affecting competition. But this depends on the prior question whether there is market power, or whether the market is sufficiently competitive to prevent sustainable anticompetitive behaviour, and have an AEC in the first place. Five key relevant competitive conditions I discuss in detail below are
    i) In market rivalry
    ii) Substitution possibilities for customers, consumer's and/or suppliers

iii) Barriers to entry
iv) Counter-veiling Consumer power,
v) Counter-veiling Supplier Power.

Having defined the market(s) then one then needs to evaluate the markets' five key competitive conditions and whether there is evidence of any market power, which I do and show there is no market power in the CSPP. I show on all five counts that the CSPP market is competitive. For example the agreements could not have an AEC, as there are no barriers to entry to new entrants, nor to expansion by the parties in the CSPP market. Even if the parties to a contract sought to have an AEC they would fail, as consumers would avoid any such effects, as there were low barriers to entry and expansion. This prior and more primary question on competitive conditions (including barriers to entry and expansion) needs to be addressed first before considering egress fees and CSD's. The problem with CMA's approach is that it fails to define a barrier to entry properly as a cost incurred by an incumbent not incurred by a new entrant. It instead treats economies of scale (both in production and consumption, the latter termed network effects) and economies of scope as barriers to entry, which they are not, as they don't involve cost barriers that the incumbent does not face. This together with a narrow market definition leads the CMA to conclude there is market power in the CSPP market when there is not. Whatever the details of agreements one has to ask whether the parties to any of the agreements have relevant market power, or can through the agreements create market power that enables them acting together have an adverse effect on competition. To answer this question as noted one must consider the likely behaviour of the parties involved in the agreement, and of others not directly involved in the agreement as outlined above.

5) **Abuse of market Power.** Is there an abuse of market power? Even if market power is shown to exist, there has to be evidence of behaviours that entail abuse of market power, and not legitimate commercial practise. This includes evidence of
    i) Unilateral abuse of Market Power - relating to pricing, quantity, or quality
    ii) Co-operative behaviours likely to substantially lessen competition including
        (1) Contracts or agreements in restraints of trade
        (2) Mergers and acquisitions and
        (3) Cartels

The CMA working papers alleges the parties contracts or agreements may be in restraint of trade, hypothesising that both egress fees and CSD's terms in the parties contracts or agreements have an adverse effect on competition. Before raising these two hypothesis the CMA should have answered the above four prior questions first, and thus have provided sound theoretical grounds or reasons and prima facie evidence why the agreements would be likely to have an AEC. Two main reasons they cannot. First there is no scope of recoupment, as market competition would eliminate them over time, and second contract terms like the ones identified would not be enforceable in the common law doctrine of restraint of trade anyway. The problem of recoupment is that the CSPP provider asking for excess egress fees and

offering excessive egress fees, or CSDs that are above market rates (i.e. "excess" egress fees and CSDs) is incurring a cost upfront that they can't recover. Excessive egress fees above market rates will have costs elsewhere in a contract. CSD's are also clearly costly particularly if the discounts are below direct and opportunity costs or not aligned to actual economies of scale they might legitimately reflect, and as the CMA must be assuming. Given the CSPP market is competitive the CSPP firm will not be able to recover these upfront costs of excess egress fees and CSDs later. New entrants will enter the market, and incumbents will expand to take the clients from them. Not only is the CMA's theory of harm weak on egress fees and CSDs, the CMA does not provide any prima facie evidence that the agreements are unreasonable restraints of trade as claimed. If they were however, they would be unenforceable anyway under the common law and not require CMA intervention. The burden is on the CMA to be both reasonable, and not act beyond its jurisdiction or powers. By failing to make a prima facie case to justify its increasing intervention in the affairs of market players and their property rights it is arguably failing to do that.

6) **Evidence of Harm.** Is there adequate theory and evidence on the nature and extent of harm from the agreements? The CMA provides no evidence of harm from egress fees and CSDs. I show however that the profitability data of suppliers presented by CMA is not relevant evidence of market power, the scope for its abuse and harm. Whereas prices have clearly fallen - not risen - and investment and innovation (e.g. AI) and quality are rising.
7) **Regulatory Failure** What are the relevant risks and costs of regulatory failure by the CMA? Even though markets may fail, it has to be recognised that regulation may contribute to that failure - or only make matters worse. While intervening in a workably competitive market is simply unjustifiable in the first place, as it will inevitably weaken property rights (including the right to contract) without compensation, and have AEC and distort the markets operations as a result. There is no discussion of regulatory failure and regulatory risk and costs, yet this needs to be assessed to justify for the ITC in the first place. It appears the CMA assumes that so long as it can identify a restrictive contract term then of course the CMA can make matters better, and this justifies a MIR. It is assumed that inquiry into such matters itself has no adverse effect on competition. Regulatory failure is however well documented, likely if not inevitable and common, it's theoretical foundations are well established and empirical methods exist to test its extent - but the CMA does not seem to embed or factor it into its analysis or do any work on it. The costs of regulatory failure need to be factored into cost-benefit decisions on whether to establish an inquiry, launch a MIR and/or otherwise regulate. Public choice theory, regulatory economics and the theory of bureaucracy clearly explain the key problems including interest group capture, information costs, incentive problems, median voter problems, regulatory creep, regulatory bias etc. Regulatory failure is thus often driven by protectionist motivations, or justifications that in fact are most likely to contribute or cause problems like ""entrenched market positions" and "potential harmful competition behaviour" through premature and costly inquiries, and then adoption of harmful regulatory interventions that foreclose competition, and weaken competition by "balkanisation" of the

global market through domestic regulation. The MIR will clearly stimulate domestic interest group coalition formation, facilitate regulatory capture, and therefore exacerbate, and accelerate the risk of regulatory failure. This justifies not calling for contributions to the MIR at such an early stage, and ending the inquiries into competition in the CSPP market before they cause more regulatory problems and harm to consumers than it has been proven it could ever actually avoid. A prima facie case that embeds and factors in the costs and risk of regulatory failure is required first.

IV. Regulatory Objective

The Enterprise and Regulatory Reform Act 2013 (ERRA) states

> "The CMA must seek to promote competition, both within and outside the United Kingdom, for the benefit of consumers." [14]

The CMA's exercise of its powers under section 134 of the Enterprise Act must thus must fulfil or comply with its duty to promote competition for the benefit of consumers. The CMA can **fail** in its duty to promote competition for the benefit of consumers through exercising its powers under section 134 by

- Intervening too little in markets
- Intervening too much in markets

Failures in the CMA's duty on these count may well be subject to court review under administrative law.

CMA Position

The working papers do not make reference to the overarching objective of the CMA, nor explicitly embed it in the formulation of its questions or hypothesis.

Comment

The failure to focus and reference the CMA's overarching objective reflects and creates a fundamental weakness in the working papers, and in all likelihood in the comments received to them.

[14] Section 25(3) of the Enterprise and Regulatory Reform Act 2013 (the ERRA13).

V. The Burden and Standard of Proof

As noted above the CMA "propose to focus our investigation on four groups of high-level hypotheses". An appropriate evidentiary or scientific approach to hypothesis testing by the CMA would focus on the underlying hypothesis to refute. The underlying "null hypothesis" or working hypothesis is that markets are competitive or exhibit workable competition that benefits consumers. Unless therefore the CMA can present a reasonable theory and strong evidence to refute this null or working hypothesis then the investigation should end, and certainly no regulation, or what the CMA calls "proposed remedies" should be considered.

As noted I outline the relevant statutory provisions in Appendix One, but in short the CMA has to prove or show that there is a "feature, or combination of features of a relevant market"[15] that have "an adverse effect on Competition"[16] (AEC) "or a detrimental effect on customers or future customers."[17] – Not offset by "any relevant customer benefits of the feature or features" [18] that are "unlikely to accrue without the feature or features concerned"[19] "within a reasonable period" [20]

A key preliminary question then is what is the burden and standard of proof here? In my view the law including the Enterprise Act governing the CMA requires the CMA to protect the fundamental rights of market participants, especially the right to property or property rights (and by implication freedom of contract) of customers and suppliers. This legal protesction of property rights goes as far back as the Magna Carta, and is of the same standing as rights to liberty and life and other fundamental rights protected by due process.

One of the ways the law should and probably would ensure the protection of property rights, and the CMA should too, is by the adoption of the presumption or null hypothesis that markets are competitive, putting the burden of proof on the CMA and other regulators like Ofcom to prove that the market is not competitive, and this proof must meet a reasonable standard, or else they are acting ultra vires. Indeed the regulators themselves are likely to have an adverse effect on competition (AEC), to the detriment of consumers if they don't follow this approach. In other words the presumption should be that people are allowed to go on with their ordinary business of life.

Ofcom claims however that

> The Competition Appeal Tribunal has recently confirmed that Ofcom's discretion to make a reference is wide and, provided Ofcom has addressed matters sufficiently, that the "reasonable grounds for suspecting" threshold is low.[21]

It is my view that the threshold still has to be reasonable, and even the very low one that Ofcom seems to adopt. The approach of Ofcom, and concessions CAT made to it are however understandable as a special case in a historical context, given Ofcom's origins

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[15] section 134(2)
[16] section 134(2) of the Act
[17] s134(4) of the Act
[18] s134(7) of the Act
[19] s134(8)(b)(ii) of the Act
[20] s134(8)(b)(i) of the Act
[21] Ofcom makes the following further comment in a footnote to this claim "See the explanation of the Competition Appeal Tribunal in *Association of Convenience Stores v OFT* [2005] CAT 36, paragraph 7. See also more recently, *Airwave Solutions Limited & Others v CMA* [2022] CAT 4 at [9]-[10], [12] and [27] and *Apple Inc & Others v CMA* [2023] CAT 21 at [39] were the Tribunal referred to the trigger of that threshold as "low" and one that needs to "viewed in the round". "

lie in the merger of historic regulatory authorities for the postal, telecommunications, Radio-communications, and broadcasting (including radio, and television) industries of the United Kingdom. All these industries were typically founded through grants of exclusive legal monopolies, or easements over crown owned assets, compulsory takings of private property, and state subsidies, and taxpayer guarantees, especially during periods in state ownership. New entrants to these OfCom regulated markets thus had to incur costs that incumbents had avoided, or that incumbents had been subsidised to acquire by some state aid. This is the original and very definition of a barrier to entry justifying a more vigilant and active independent regulator like Ofcom. These are not however features of the market for the acquisition and supply of computer storage and processing power (CSPP) that is the subject of this CMA MIR.

The CMA by comparison under sections 134 (1) and (2) of the Enterprise Act clearly bears the burden of reasonable proof - or is required to find evidence or prove that there is a "feature" or a "combination of features" in the markets it engages with that refutes the hypothesis or assumption that the market is competitive before conducting an investigation – including markets referred to it by Ofcom. Evidence on all such features has to be reasonable, or strong. There needs to be reasonable, that is strong evidence that the market is not competitive. This is how the investigation should be framed.

The fundamental or null hypothesis that should be being tested then by CMA, or that needs to be refuted by clear evidence to the contrary is that the market(s) being investigated are competitive. Thus

- To justify an investigation in the first place the CMA needs at least prima facie evidence to refute the hypothesis that the market is competitive
- To then justify further intervention in the market the CMA needs much stronger evidence to refute the hypothesis that the market is competitive, and that regulatory intervention can and indeed is likely to substantially improve outcomes.

For a number of reasons that I outline below the current CMA market investigation as a whole does not meet this burden, and appears unreasonable, and very premature. In short as I outline below there is no evidence presented to refute the presumption or null hypothesis that the computer storage and processing power (CSPP) market is competitive. There is no evidence that that there is market power that could be abused, beyond a reasonable standard of proof. On the contrary such evidence as is available is consistent with the market being competitive and that there is no market power and no abuse of it.

The investigation so far, including the Ofcom reports, and the CMA issues paper, and update report, and the working papers don't seem to proceed on the required basis that the market is competitive and that competition and industry regulators need to prove otherwise to a reasonable standard. As noted Ofcom assumes it can make a reference to CMA by meeting a low threshold of proof (which I don't think means a less than reasonable threshold, and which I don't think Ofcom met). From that point it seems to be me that the CMA seems to think the hypothesis or assumption changes to one that the market is not competitive, and it has to then look for evidence that the market is competitive. This is confirmed for example in the quote in paragraph 9.6 of working paper 1 "The Competitive Landscape" that

> "We have not seen strong evidence that switching between cloud providers is common"

Why does CMA need to look for such strong evidence of switching – and multi clouding which the CMA itself notes it usually subsumes in the term switching in the working papers? The CMA seems to be starting with a presumption that one needs to find strong evidence of a competitive market, and therefore has to prove it by showing switching is common. That is not necessary. One does not need strong evidence of switching, one needs strong evidence of market power, and in particular of barriers to entry, properly defined, like those enjoyed originally or still by the Post Office, BT and the BBC who OfCom regulates.

VI. Market Definition

The CMA discusses market definition at only two points, and these are both in the Competitive Landscape working paper. First in the introduction, and then in the market definition section of the Competitive Landscape working paper

In what follows I first summarise the CMA's market definition and then provide my comment on it. In summary:

a) On product definition: CMA defines five very narrow separate product markets, each for a unique product, which the CMA respectively calls IaaS, Paas, SaaS, Private Cloud, and Traditional IT. The CMA then goes on to analyse these product markets in the rest of the working paper(s).
b) On Geographic market definition: The CMA further limits its inquiry to firms with data centres located in UK and EEA, further creating even more narrow market definition(s)

For reasons I outline below I believe the CMA has underestimated the degree of substitution between the five products it has identified (ie Iaas, Paas, Saas, Private Cloud, and Traditional IT). This leads it to identify separate markets for each of the five products. The risk with the CMA adopting such narrow market definitions along product and geographic dimensions is that market definition serves to identify key constraints that would prevent the exercise of market power. In my view CMA's overly narrow market definition can thus lead the CMA to understatement the extent of competition and overstate or overestimate the extent of market power of firms supplying services to the market(s) it is examining, and also the potential for the abuse of market power in the markets as a result, through for example excess egress fees and CSD. For example the CMA appears to arrive at inappropriate conclusions on key issues like market shares, the extent of switching and multi cloud, barriers to entry etc. in all of it's assumed five separate markets.

By comparison for reasons outlined below I propose

a) On product definition: A single wider product market definition that I call the market for the acquisition and supply of computing storage and processing power (CSPP). This includes all of those listed by CMA and is more consistent with appropriate theory and available evidence.
b) On Geographic Definition: A global market definition that includes at least 10 major firms (and growing) listed below actually capable of supplying computing storage and processing power (CSPP) in all markets globally over time including the UK. Again this includes all of those markets in the UK listed by CMA and is more consistent with appropriate theory and available evidence

My conclusion outlined in later sections based on economic theory and evidence is that in the broader market there are strong competitive checks on market behaviour and clearly no market power, and consequently no scope for its abuse across all the issues it is exploring, and therefore the CMA should end any further market investigation.

Product Market definition

CMA View

In the introduction to its Competitive Landscape Working Paper (CLWP) the CMA claims that

> 1.3 In this market investigation we are considering the supply of public cloud infrastructure services (cloud services).

This statement is taken directly from Ofcom's Terms of Reference (ToR) for the CMA Market Investigation Reference (MIR). The statement clearly implies the intended product market definition for the MIR was *the market for "the supply of public cloud infrastructure services."* The CMA notes that:

> For these purposes:
> (a) 'Cloud infrastructure services' means services that provide access to processing, storage, networking, and other raw computing resources (often referred to as infrastructure as a service, IaaS) as well as services that can be used to develop, test, run and manage applications in the cloud (often referred to as platform as a service, PaaS).
> (b) 'Public cloud computing' means that cloud services are open to all customers willing to pay, with computing resources shared between them.
> (c) 'Public cloud infrastructure services' are therefore cloud infrastructure services delivered via a public cloud model. 22

After completing it's analysis in the CLWP the CMA claims that in fact there are at least three separate cloud services markets respectively for IaaS, PaaS and Software as a Service (SaaS) when it states:

> 4.80 The evidence we have seen to date suggests that
> - There is a relevant product market for the supply of IaaS, but
> - PaaS is not part of the same relevant market and, where relevant,
> - PaaS would be considered as an out-of-market constraint.
>
> We have considered
> - the extent to which there is a relevant product market for the supply of PaaS and
> - the evidence on the extent of substitutability between PaaS and SaaS is mixed and limited. 23

This implies at least three separate cloud services markets respectively for IaaS, PaaS and SaaS.

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[22] Competitive Landscape Working Paper p6
[23] Competitive Landscape WP1 pages 95-96

It further suggests however there are also separate markets for what it calls "traditional IT" and "private cloud" where it states

> 4.81 Further, the evidence to date indicates that, even for large customers, switches from public cloud to traditional IT and private cloud would be unlikely due to the specific reasons they place workloads on public cloud and the costs and time associated with doing so. Therefore, our emerging view is that traditional IT and private cloud should be considered as out of market constraints where applicable. [24]

As we shall see these conclusions that there are five separate markets imply the CMA adopts very narrow product market definitions. As a result the CMA fails to identify key constraints that would prevent the exercise of market power in any of the assumed separate markets. This leads the CMA to overstate both the extent of market power of firms supplying computer storage and processing power (CSPP), and the potential for abuse of market power by those firms, through, for example, negotiating anti-competitive egress fees and discounts as discussed later. The CMA's narrow market definition then leads CMA too readily to the unreliable conclusion that firms supplying CSPP hold significant market power and ultimately are abusing that power.

The CMA itself notes some of the weaknesses in it's product market definition in footnotes, including footnote 3 of its Competitive Landscape report that discusses the focal product definitions underlying the separate market definitions for IaaS PaaS and SaaS as follows

> " Some services may not 'fit' neatly into these service models and the lines between each of IaaS, PaaS and software as a service (SaaS) may be blurred (for example, see paragraph a)). However, we still consider them to be useful to inform our analysis in this market investigation. For an explanation of SaaS, please see paragraph 1.4 (c) below. "

In paragraph 1.4 CMA nevertheless goes on to claim that

> 1.4 ….. IaaS, PaaS and SaaS form a vertical 'cloud stack', where each layer is notionally built on top of the previous one(s).
>
> (a) IaaS are cloud services that provide access to raw computing resources (compute, storage, and network) for processing workloads and storing data. The hardware associated with these computing resources take the form of servers and networking equipment owned and managed by the IaaS provider (and typically held on racks in a remote data centre). To allow and manage that access, IaaS also includes some necessary software, including networking and virtualisation.[25] The IaaS service model provides the customer with the highest level of control over the cloud stack, including over the operating system, applications, and data. IaaS should be

[24] Competitive Landscape WP1 pages 95-96

[25] The CMA notes "Virtualisation is the process of using software to create an abstraction layer over servers that allows the hardware elements of a single server to be divided into multiple virtual servers, commonly called virtual machines. Each virtual machine runs its own operating system and behaves like an independent server, even though it is running on just a portion of the actual underlying server hardware. The software that creates, runs and manages virtual machines is called a hypervisor. "See WP1 Competitive Landscape footnote 8

distinguished from bare metal[26] services.

(b) PaaS are cloud services that provide access to a virtual environment for customers to develop, test, deploy and run applications. They include application development computing platforms and pre-built application components and tools which customers can then use to build and manage full applications. The customer has less control over the cloud stack compared to IaaS – they still manage applications and data but not the PaaS computing platform (including its operating system) and the pre-built application components and tools.

(c) SaaS are complete applications hosted in the cloud. Like PaaS, they can be offered by the cloud provider that owns the underlying raw compute resources or by an independent software vendor (ISV). The service provider(s) manages all hardware and software.

The CMA notes there are fundamental weaknesses in the largely engineering based conceptualisation it adopts of relevant products or that

> "IaaS, PaaS and SaaS form a vertical cloud stack , where each layer is notionally built on top of the previous one(s)"

Commenting for example in footnotes that

> ""Some services may not 'fit' neatly into these service models and the lines between each of IaaS, PaaS and software as a service (SaaS) may be blurred" [27]
>
> In practice, this vertical stack is not strictly applied. For example, SaaS may be built and deployed using IaaS only. " [28]

Based on these unclear and blurred engineering based product definitions however the CMA then addresses the extent to which these three hypothesised products are in the same market. The CMA finally then claims there are separate markets in each product, in a later section entitled market definition, where the CMA considers a series of questions as follows:

> 4.8 This section considers whether:
> (a) IaaS is the relevant focal product;
> (b) PaaS is substitutable for IaaS;
> (c) Alternative IT models are substitutable for IaaS;
> (d) PaaS is the relevant focal product;
> (e) Alternative IT models are substitutable for PaaS; and
> (f) SaaS is substitutable for PaaS. [29]

In what follows I briefly identify the CMA's definition of each of its three "cloud service" markets IaaS, PaaS, and SaaS.

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[26] The CMA notes "Bare metal services offer access to dedicated servers (or 'hosts') with no or limited software installed (eg no operating system or virtualisation)." See WP1 Competitive Landscape footnote 8

[27] WP1 Competitive Landscape footnote 3

[28] WP1 Competitive Landscape footnote 5

[29] Ibid Page 80

IAAS Market Definition

The CMA concludes that IaaS is the relevant focal product for the purposes of our market definition assessment, and that the resulting focal IaaS market should not be broken down into IaaS' component elements, commenting that

> 4.9 ….. IaaS is the relevant focal product. In particular, while IaaS consists of three services that provide access to raw computing resources for processing workloads and storing data, namely compute, storage, and network. Our current view is that it is reasonable not to use these narrower segments as our focal products for the purposes of our market definition assessment. [30]

The reasons given for this decision to focus on IaaS as the focal product and the market for IaaS are that

> 4.13 we consider that each element of IaaS serves a different function, generally relies on each other and is not used in isolation by customers such that there may be no distinction made by customers. As such it is not clear that each element of IaaS are demand-side substitutes.
>
> 4.14 On the supply side, we understand that all IaaS suppliers supply each of compute, storage and networking. Further, we have not received any evidence to date that suggests that competitive conditions are different for each element. As such, we consider that there is likely to be supply-side substitution between IaaS elements.

The CMA however comments that it leaves the door open on this conclusion and the option to adopt an even narrower product market definition, noting

> 4.15 However, we currently consider that we can leave open whether the market should be subdivided into IaaS elements.

and

> 4.17 Having said this, in our analysis we will bear in mind where relevant that there are likely to be different segments within IaaS

IaaS Vs PaaS

On the distinction between Iaas and Paas that the CMA draws, the CMA notes

> 4.23 Although providers said that they do not necessarily segment their products along the IaaS/PaaS/SaaS categorisation, and there is a spectrum of products that do not necessarily fit neatly into these categories, our emerging view, based on the evidence to date, is that this does not mean that the underlying products and services are in fact substitutes.

As we outlined above, the burden of proof is <u>not</u> on market participants to prove the market is competitive or contestable. The burden of proof is on the CMA to prove it is NOT competitive or contestable. The fact that providers not only say that they do not segment the IaaS/PaaS/SaaS products, implying the IaaS/PaaS/SaaS products are either

[30] ibid page 81

not the relevant products, or are substitute products that are in the same market, is consistent with the market being competitive. There is a burden of proof on the CMA then to find reasonable evidence that this is not true, that the market definition it proposes, which as noted is inherently less competitive, and therefore simply assumes the market is less competitive without proving it. There is a clear and received methodology for doing this namely the hypothetical monopolist test (HMT) of beter named sustained non-transitory increase in price test (SNIP). The CMA comments on this as follows:

> 4.24 Our guidelines refer to using the hypothetical monopolist test (HMT) to identify effective substitutes. We consider that, in the context of the HMT, PaaS is unlikely to be an effective alternative to IaaS. In particular, the HMT asks whether a hypothetical monopolist of IaaS could profitably increase price by 5-10%. We can consider two types of affected customers for IaaS: (a) ISVs who use IaaS as an input into the PaaS products they supply; and (b) other IaaS customers:
>
> > (a) ISVs that supply PaaS products cannot switch to using a PaaS product to avoid a price rise on infrastructure; they need the underlying infrastructure as an input to their product. While some ISVs may be relatively large customers of cloud providers and thus able to negotiate generally to attract better terms from specific cloud providers, they also rely on the underlying infrastructure to supply their own PaaS products so would not be able to switch away from the price rise of a hypothetical monopolist IaaS provider. This is particularly the case as the number of customers using a specific cloud provider's infrastructure is important to ISVs (see the discussion of network effects in Section 7 below) such that ISVs have relatively less bargaining power in relation to larger IaaS providers.
> >
> > (b) Other IaaS customers face the choice of absorbing the price increase or switching to PaaS. However, as discussed, ISVs also face an increase to their input costs. As IaaS is a variable cost to ISVs, it is likely that this will be passed through to the price they charge for supplying PaaS. As such, both options for IaaS customers result in increased price and would essentially mean that they continue purchasing IaaS despite 'switching away'.

As discussed below in detail, this justification for treating IaaS and PaaS as being in the separate markets is based on a flawed analysis of the HMT, and pass through, and a related flawed assumption that alternative ways of organizing supply of CSPP (including private cloud and traditional IT) are simply not available to all parties including ISV's, their final customers, and other customers. The CMA also makes an unjustified assumption that PaaS providers have limited ability to switch IaaS suppliers, due to irrelevant, and unverified claimed network effects.

The key point is the CMA does not in fact apply a HMT or SNIP using data, it just mentions the HMT, describes it vaguely and expresses an opinion about it's possible application. In reality it seems reasonable to believe that all parties (including ISV's) can opt to use other IaaS providers, Private Cloud and Traditional IT to avoid the hypothetical monopolists price rise. Thus ISV's can opt to use Private Cloud and Traditional IT to avoid the hypothetical monopolists price rise and/or they can negotiate with their own ISV customers referred to in a) and other IaaS customers

referred to in b) to do so jointly with them or negotiate better terms. All parties have the option of switching to Traditional IT and private cloud. This provides final customers, ISV's and other customers the ability to avoid pass through to PaaS and/or to final customers any SNIP.

The CMA's assumption that excludes from analysis alternative ways of organizing supply of CSPP (including private cloud and traditional IT), without any evidence, does not refute the prior hypothesis that the market is competitive i.e. that the relevant market includes private cloud and traditional IT. As we outlined above, the burden of proof is not on market participants to prove the market is competitive or contestable and includes private cloud and traditional IT. The burden of proof is on the CMA to prove it is NOT competitive or contestable. To simply remove the private cloud, traditional IT, from the same market as IaaS and PaaS for purpose of its analysis in this section is to assume the market is not competitive - without evidence or without refuting the required assumption that the market is competitive, and includes private cloud, traditional IT, IaaS and PaaS.

There is no evidence provided that private cloud, traditional IT are NOT part of the same market as IaaS and PaaS by the CMA, which together would make up a competitive market. That is to say there is no evidence to refute the hypothesis that the market is competitive and includes all four products. There is evidence that is consistent with the competitive market hypothesis. The CMA should not simply assume the market is not competitive, or frame its analysis in this way, or assume the market is NOT competitive, and require others to prove it is competitive.

The CMA further later claims:

> 4.25 We note that the fact that some customers shift from IaaS to PaaS does not necessarily indicate that demand is contestable between IaaS and PaaS and may instead indicate changing requirements causing migration, rather than substitution between two products which serve the same need.

The CMA's statement in this paragraph again appears to invert the burden of proof. As we outlined above, the burden of proof is not on market participants to prove the market is competitive or contestable. The burden of proof is on the CMA to prove it is NOT contestable. The fact some customers shift from IaaS to PaaS is consistent with the market being competitive, and therefore serves to maintain the prior hypothesis that the market is competitive. The CMA has adduced no evidence at this point then that the market is not competitive and its discussion and discounting of this evidence at this point is unreasonable.

The CMA then claims

> 4.26 We recognise that for some customers, for some workloads, IaaS and PaaS are substitutes. However, we consider that evidence we have seen to date from customers indicates that PaaS is not a good substitute for IaaS for most customers and workloads and that most customers expressed that they are unwilling to substitute between the two, even if it may be technically possible to do so.

The evidence cited here also does not refute the prior hypothesis that the market is competitive. The evidence that some customers switch - and some don't - is instead consistent with a competitive market. One cannot rely on data on customer's stated preferences about IaaS and PaaS, or that customer comment that they are "unwilling to

substitute between the two" – one has to test actual behaviour to a price rise, if its technically possible (as noted by the CMA) then it is likely people will respond to a price rise or SNIP and switch. Simply asking people what they would do, when they have already chosen a course of action, ceteris paribus or with no SNIP, does not prove anything – let alone that the market is not competitive, or should be assumed to be less competitive than theory suggests it might be.

The MA then concludes:

> 4.27 In light of the above, our emerging view is that it is unlikely that there would be a sufficient degree of demand-side substitutability to warrant widening the market to include PaaS.

The above discussion for reasons outlined above does not however refute the prior hypothesis that the market is competitive, and so CMA has no basis for its emerging view that there is evidence to refute the hypothesis that there is sufficient degree of demand-side substitutability to warrant the market to include PaaS and therefore more competitive than the CMA assumes.

> 4.28 We also currently consider that supply-side substitution is unlikely to be sufficient to warrant aggregating IaaS and PaaS together. …

Once again the CMA does not however refute the prior hypothesis that the market is competitive, and includes supply side substitution, and so the CMA has no basis for simply concluding that supply-side substitution is unlikely to be sufficient to warrant aggregating IaaS and PaaS together

> 4.29 As such, based on the evidence we have seen to date, our emerging view is that the market should not be widened to include PaaS.

In short then and as we shall discuss further below, the CMA persists in asserting separate market between IaaS and PaaS, based on poor theory and weak or no real evidence.

SaaS

CMA defines SaaS as "complete applications hosted in the cloud" and concludes SaaS is not a substitute for PaaS, and therefore belongs in a separate market for the following reasons.

> 4.48 The evidence we have seen to date shows that customers use a combination of PaaS and SaaS (and IaaS) products. While there is some evidence that showed that the choice of where to place the workload reflected the requirement of that particular workload (or a business strategy to place their workloads in that layer) where possible, in general the evidence on the extent to which these are substitutable is mixed and limited.
>
> 4.49 In relation to supply-side substitution, based on the evidence we have seen to date, our emerging view is that competitive conditions for PaaS and SaaS are significantly different, in terms of the number of firms, such that our initial view is that we do not consider there to be supply-side substitution between the two layers.

Once again however the CMA does not adduce any reasonable evidence to refute the

prior hypothesis that the market is competitive, or refute the hypothesis that the products are substitutable on the demand side and supply side. So the CMA has no basis for concluding that demand side and supply-side substitution is unlikely to be sufficient to warrant aggregating IaaS and PaaS and SaaS together. The CMA should not be looking for, let alone relying on evidence on "the extent to which these are substitutable" to draw conclusions. It should be looking for and relying on strong evidence on the extent to which these are NOT substitutable, which it has not done. This can only be tested by actual behavioural responses to a SNIP. The CMA has no such evidence.

Own Supply/Traditional IT and Exclusive Use Options

The CMA claims that

> 4.78 Based on the evidence we have seen to date, our emerging view is that:
>
> (a) traditional IT should be treated as separate from the markets for IaaS, PaaS and SaaS for the purposes of this investigation; and
>
> (b) private cloud should be treated as separate from the markets for IaaS, PaaS and SaaS for the purposes of this investigation.

On the first point a) above what the CMA describes as "Traditional IT" is more precisely and usefully described as the option of "Own Supply" - while what the CMA describes as "IaaS, PaaS and SaaS" is more precisely and usefully described as "shared rental " (albeit through the internet). While on the second point b) it is an example of "exclusive rental", rather than shared rental (through the internet).

In any event once again however the CMA does not adduce any reasonable evidence to refute the prior hypothesis that the market is competitive, or refute the hypothesis that the Traditional IT "own supply) and Private Cloud (exclusive rental) options and IaaS PaaS and IaaS products (shared rental) are substitutable on the demand side and supply side. Theoretically own supply, exclusive rental and shared rental are clearly substitutable depending on relative price changes. So the CMA has no basis for concluding that demand side and supply-side substitution is unlikely to be sufficient to warrant aggregating Traditional IT, Private Cloud, IaaS, PaaS and SaaS together. They clearly should be aggregated theoretically as a prior - and the CMA has no evidence to disprove that prior – and therefore claim they should be disaggregated, and as a result the markets assumed less competitive.

In my view for reasons I outline below I believe all these products or services are clearly part of a wider CSPP market that includes Traditional IT, Private Cloud, IaaS, PaaS and SaaS.

Comment

The accepted way to formally proceed to define relevant product markets for competition analysis, is to

1) Start with a proper product definition and then
2) Test the proper extent of the market using the so-called small non-transitory increase in price (SNIP) test of Hypothetical Monopolist Test (HMT).

A fundamental problem with all the CMA's reports is that they have adopted a very elusive approach to both product definition and then market definition that is neither supported by economic theory nor evidence.

The critical first step in product definition should be an analysis of the nature of the decisions involved, the property rights exchanged, the contracts that determine the nature and terms of the exchange, and therefore the product or service being exchanged in any market, the transactions costs that underlie exchange, the production costs that underlie supply functions, and customer valuation or preferences that underlie demand functions related to exchange, which all together determine both

- The actual boundaries of firms and markets, and
- The optimal or efficient boundaries of firms and markets (or those that best serve the interest of consumers)

The key fundamental property rights that are the subject of the CMA MIR analysis are the rights to use networked computer resources or assets, especially computer storage and computing processing power (CSPP). These assets (often identified in so-called technology stacks discussed below) can be owned by a user, or by a supplier and sold to users, with the terms of the latter exchanges being determined by contracts negotiated in a market. The terms of any contracts have to cover a range of matters of interest to the customer, and supplier, not merely the technology or assets deployed. The terms need to include the degree of exclusive use of the assets (what the CMA wrongly describes as private use) or non-exclusive use (what the CMA wrongly describes as public use – but also more accurately at times describes as shared use). The contract will also have to deal with a host of other rights, like what happens to the user's software stack, whether to recompile, whether hyper threading[31] is included, what gigahertz performance is being targeted etc. etc. These terms all go to determining *product* definition, and *functionality*, - equally important or material, are contract terms relating to *geography* or location of service, and *timing* of delivery.

Contracting has to be looked at in its entirety. One cannot look at any term then focus on specific contract terms in isolation (like price, discounts, egress fees or sharing etc.) as each term will vary with variation in other contract terms -and vice versa. In order to properly define a product or service under any market, the underlying market contracts thus have to be examined in their entirety. One also has to focus on decision making on both the demand side and supply side of the market when framing market definition analysis. The consumer, for example, when making a decision about how to acquire computing storage and processing power (CSPP) will evaluate options based on how they contribute to the consumer's objective whether it is for profit, non-profit, a mixed objective firm, or a final consumer interested in their wellbeing or utility.

Having defined the underlying product or service one proceeds to test the market definition by testing a narrow product definition. A narrow product definition will tend to mean the market is less competitive. This involves starting with a specific *service or product* defined in contracts offered by specific relevant firms, performing particular *functions* in the value chain (e.g. at wholesale or retail) in a narrow *geography* at a specific market price. One can test whether a SNIP (say a 5-10% price rise) in the relevant product or service would trigger demand and/or supply responses or substitution behaviours involving other products, services, functional stages or geographies. If so, then the market definition would need to be widened to capture those other relevant products, services, functional stages or geographies. Time is also a

[31] see eg https://azurealan.ie/2020/01/21/azure-vcpus-and-hyper-threading/

relevant dimension to assessing the intensity of competitive forces, in that dynamic competition may emerge over time from new entrants, products, services or locations over time in response to the price rise depending on the behaviour of incumbents.

Compared to the above approach to product definition the CMA (discussed in more detail below) lacks a clear and reliable starting point and methodology. It seems to define products vaguely using high-level supply side engineering components in the technology stack, that are then grouped and described using vague metaphors (like the cloud, the platform or infrastructure).

Leaving aside the issues with the CMA's approach to product definition the CMA did not apply the SNIP test to its market definition. It should have tested whether a SNIP applied to the narrowly defined IaaS product that relies on data centres in UK and EEA only , would lead to switching to other products, and other regions, that should be included in the market. If CMA does not test the degree of switching from the narrow market definition it has adopted then the CMA has not refuted a more competitive or wider product and global market assumption. The burden is on the CMA to prove the market is NOT wider and global before it can adopt the less competitive one it has assumed.

The CMA's market definition in short lacks a clear and reliable starting point and methodology. It appears based on high-level engineering or technology maps and vague metaphors (e.g. the cloud) rather than detailed product analysis, and does not apply the SNIP test or the market analysis required to later assess market power, and market conduct or market features, and identify competition law problems, test theory of harm hypothesis, and evaluate the consequence of potential remedies.

Three key problems stand out with the CMA's analysis that we shall discuss further in detail below.

i) *Weaknesses in Focal Product Definition*. The CMA Improperly and too heavily relies on
   a. High level standard engineering design plans or "the technology stack" or "technological maps" with descriptions of the key components or elements of computing services in general and their relationships ("the technology stack"), combined with
   b. Categorisations and Metaphors (Cloud. Platform etc.) that combine the engineering assets in the "technology stack" into arrangements and then vaguely describe these arrangements as services or products, and

   A clearer and more appropriate economic decision-making approach to build up product and market definition is outlined below. This approach would elaborate, and analyse customer and supplier's joint decision making , based on the player's objectives, using a decision tree (or "decision stack") approach that isolates key choices, and constraints like income and price. This analysis would then be used to frame, predict and test actual decision making behaviour in response to changes in contract terms – like price, egress fees, CSD's etc. - using data on measured behaviour.

ii) *Weaknesses in Market Definition methodology*. Leaving aside the above problem with poor focal product definitions, the CMA s also fails to consistently use a suitable or adequate market definition methodology (like the SNIP) test to define markets based on the focal products it adopts, and therefore the extent of competition in the market.

iii) Weaknesses in Evidence. There are three problems here
   a. The CMA relies on incomplete and non representative survey samples
   b. The CMA asks survey participants questions, and relies heavily on their responses about their current "stated beliefs" or "preferences" which are

notoriously unreliable, rather than measuring relevant actual behaviour (e.g. consumption) over time and statistical or econometric analysis.

c. The CMA presumably defines the services in survey questions using combinations of technological components taken from an engineering "technology stack" or map, arranged in categories, that are then described vaguely or metaphorically (e.g. as "cloud", "infrastructure", "platform", or "as service") in a seemingly resonant, and even relevant - but ultimately vague, unclear, and unreliable manner.

Weaknesses in The CMA's Focal Product Definitions

The CMA claims that

> "there is a relevant product market for the supply of IaaS"

It also claims that separate from the above market

> "there is a relevant product market for the supply of PaaS"

The CMA's definition of the products that underlie these two markets however is very poor. It is therefore hard to understand why it could claim there is even a market for the products at all, let alone separate markets.

A core problem then is that the CMA relies on vague high-level terms or concepts of a product or service that do not in themselves narrowly define or describe specific products or services, and that cannot therefore be used to describe or define markets for the purpose of competition law analysis. Take the CMA's markets for the supply of IaaS, or "Infrastructure as a service", and the other for PaaS, or "Platform as a Service". The key defining terms at issue here are infrastructure and platform. Both of which are very vague terms, at best borrowed from computer engineering to describe components of computer systems production. Or consider the vague metaphorical term "cloud" used frequently by CMA to define products or services like "the cloud", "cloud services" or "public cloud infrastructure services" which only compounds problems.[32] In general it is better to avoid vague and confusing terms like infrastructure or platforms and the cloud and focus instead on defining the underlying economic decisions, the specific economic activity or function being produced and/or exchanged, and identifying or characterising the decision making and economic costs and value add that is created.

As a result of the above approach the CMA doesn't seem for example to provide a clear economic definition of "the cloud" (discussed in more detail later). While at best the infrastructure and platform products involved are simply defined by CMA as covering a bundle of terms from computer engineering used to describe elements or components of computer systems (again described in more detail later). The CMA does not consistently identify these elements however. For example on infrastructure the CMA refers at one point to three specific elements ("compute, storage, and network"[33]), and at other points to more than three elements, and some times even mentions "others" or unspecified elements (e.g. "processing, storage, networking, and *other* raw computing resources"[34]).

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[32] Para 1.3 WP1 Competitive Landscape
[33] ibid Para 4.9 Page 81
[34] ibid Para 1.3 a P6

The CMA further uses the vague term platform to refer to another different bundle of computer elements or components. Rather than use a vague term like "platform" it may be better to try to focus more clearly on the decision makers and the decision making or what economic activity is occurring or being exchanged on the so called "platform". Often when the term platform has been used in the past the actual economic activity was intermediation, or other specific agent activity. The owner of "the platform" in other words acting as an agent, or intermediary, is providing intermediation or a means of exchange, co-operation, communication, and/or networking between two or more principals or sets of users. The service may thus be better described as intermediation rather than a "platform" service. The platform may otherwise provide a technical means for digital production, or for creating new software, or analysis or storage of data – i.e. involve a production service.

The CMA's Product definition using the "Cloud Technology Stack"

In order to define services, and therefore the relevant market's product dimension, the CMA in effect relies on a fairly standard high level "technological map" or engineering design plan that identifies key computing assets, components or elements and their relationships in general terms often termed "the technology stack". As any web search will reveal various versions of this technology stack can be found in which, as the CMA notes, "each layer is notionally built on top of the previous one(s)", including the technology stack shown in the table below with nine layers from 1) a data centre at the bottom to 9) applications at the top.

9) Applications
8) Security
7) Databases
6) Operating Systems
5) Virtualisation
4) Severs
3) Storage
2) Networking
1) Data Centres

There are many versions of this stack however and the stack is notoriously "blurry" at the edges and evolves with innovation, and so is inevitably out of date, one thus needs to avoid imposing and freezing firm imagined, but inevitably vague divisions in place through ill informed regulation.

The CMA proceeds by adopting the technology stack concept however and imposing the view that "One way in which …. service models are differentiated is by the level of control the customer has over the management and maintenance of the computing resources" in the technology stack like the one above. The CMA then bases it's product definition and therefore market definition on this degree of control variable arbitrarily applied to an assumed underlying fixed but unclearly delineated technology stack. The table below identifies the kind of "product map" the CMA arbitrarily and intuitively generates in this manner from a technology stack or map. The table in the first row identifies the CMA's four "service models " using its degree or level of customer control variable. Under each model the second row in the first sub-column identifies the locus of control (ctrl) or the holder of property rights, while the second column identifies the "product name" given each by CMA (Traditional IT, IaaS, PaaS and SaaS) under the numbered "cloud service" models 1-3 in the columns on the right.

Own Service Model		"Cloud Service" Model 1		"Cloud Service" Model 2		"Cloud Service" Model 3	
Ctrl	Traditional IT On Premise	Ctrl	IaaS	Ctrl	PaaS	Ctrl	SaaS
Customer Managed	Applications	Customer	Applications		Applications	Provider	Applications
	Security		Security	Provider	Security		Security
	Databases		Databases		Databases		Databases
	Operating Systems		Operating Systems		Operating Systems		Operating Systems
	Virtualisation	Provider	Virtualisation		Virtualisation		Virtualisation
	Severs		Severs		Severs		Severs
	Storage		Storage		Storage		Storage
	Networking		Networking		Networking		Networking
	Data Centres		Data Centres		Data Centres		Data Centres

Thus the CMA assumes that there are three "**cloud service**" models as shown in the last three columns in row one at the top of the table. The CMA adopts these three "cloud service" models to define three *products*, each respectively named **IaaS, PaaS and SaaS** as shown in the second row at the top of the table next to the Ctrl column. Each cloud product and service model is differentiated by the degree to which the customer decides to contract out and share computer storage and processing power (CSPP). The tangible and intangible assets that the CMA assumes are "rented and shared", rather than owned exclusively by the customer, are shown shaded in black in the table under each cloud product and service model. Thus as shown in the table the IaaS product includes less customer owned assets and more shared rental of assets, than PaaS and SaaS respectively.

The question the CMA then addresses is the extent to which the three "rented and shared" products (IaaS PaaS and SaaS) are in the same market. The CMA incorrectly in my view then claims there are separate markets in each cloud service products (IaaS) (PaaS) and SaaS) and the traditional IT model for reasons outlined below, but beasicaly because it doesn't base its analysis on a decision making or economic approach.

A Decision Making or Economic Approach

The CMA's approach in essence adopts a fundamentally supply side engineering and control approach to defining the relevant products it proposes to analyse. It simply starts with existing engineering components, and an engineering design plan, or technology map of CSPP to define focal products or services and therefore frame its analysis. It then considers the degree of substitution between these "off the stack" focal products to test and define markets. This is not an economic approach to product or market definition and it is fundamentally unclear and unreliable.

In an economic approach one focuses on the key decisions about property rights that need to be made on the demand and the supply side, and how these are reconciled through exchange, and contracts in markets. In making these decisions customers on the demand side like those on the supply side will weigh the expected costs and benefits of alternatives and choose the best for them. Thus one has to consider the demand side or value function and the benefits of the services or products, as much as the supply side

and the costs of the production. One also has to consider the transaction costs that affect how exchange is organised, both in markets and in firms, and how the boundaries between markets and firms are determined or drawn.

As noted CMA instead proceeds by adopting the technology stack and imposing the view on it that "One way in which …. service models are differentiated is by the level of control the customer has over the management and maintenance of the computing resources" in the technology stack like the one above, which it describes but does not analyse the underlying decision making involved. The CMA bases it's product definition and therefore market definition however on the degree of control variable arbitrarily applied to an assumed underlying fixed, but in fact unclearly delineated, and dynamically changing technology stack, and relies on surveys utilising this underlying assumed technology/ownership map to frame its questions.

A better approach would start and focus more on the nature of customer decisions about computer storage and processing power (CSPP) as the focal product or service. CSPP can be assumed to add value through various value-added functionalities. As noted the consumer decision the CMA focuses is in essence just the ownership and control of key CSPP assets. This misrepresents, neglects and conflates other key elements of decision making and how they fit together in the underlying economic decision problem about whether to and if so how to acquire CSPP goods and services – that in turn determines sharing and the boundaries of markets and ownership separately.

The more general way to model the decision-making is to first focus on customer choice about two dimensions

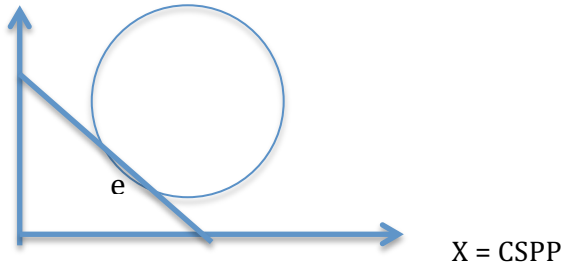
1) The volume of CSPP purchased
2) The degree of sharing of the CSPP

These choices then have to be evaluated from a net benefit point of view, where benefits or value and costs are also explicitly factored in. Only then can the third choice the CMA focuses on be addressed namely

3) Ownership and control be considered

The very simple diagram below shows a very simple model of the first two choices, or 1) *choice over the volume of CSPP* purchased (shown on the X axis) and 2) *the degree of sharing* (shown on the Y axis) to illustrate how these decision are separate but interrelate in any contract.

Y= sharing



The circle shown in the above diagram captures points where the customer experiences the same amount of value from a given combination of

- CSPP quantity (x) and
- Sharing (y)

or points of indifference (x,y). Generally more of each, CSSP volume(x), and sharing (y) is preferred, up to a point of saturation and congestion on each as described below. The

diagram shows just one of many constant benefit curve. Within the constant benefit circle drawn there are assumed to be other constant benefit circles capturing higher constant benefit levels (like ridge lines around a rising "hill" of benefit in the centre transposed to two dimensional space), leading at the centre of the circle to the maximum benefit point (or top of the benefit hill). Starting at any point on the constant benefit curve drawn (like point e) a reduction in the volume of CSSP (x) or move to the left will reduce the customer's level of benefit, and move them off the constant benefit curve. The original constant benefit however can then be restored by increased sharing (y), assuming there are positive joint consumption or "network" benefits from sharing over the initial range as CMA seems to suggest. On the other hand as the volume of CSPP (x) consumed increases along x, moving the customer to the right of point e, there is a tendency for the customer's benefit to increase. But beyond a certain point of increasing x or use of CSSP, marginal value-add declines, negative marginal value emerges from over use (unless there is more investment in the underlying capital), and one returns to the "other side" of the original constant benefit curve. As sharing of CSPP increases upwards from point e, along y, there are also assumed to be benefits initially, from economies of scale in consumption e.g. network effects, but then negative "congestion effects" eventually offset these, and increases in y are needed to compensate for the congestion effects. Hence the circular shape of the benefit curves.

The constant benefit curve helps determine the optimal scale, and degree of sharing of CSPP, but to do that one has to first introduce costs and the customers budget constraint. The customer's budget constraint, shown as the straight line between the X and Y axis to the left of the constant benefit circle. This defines the feasible purchases of the customer, given their budget constraint, the volume of X and the degree of sharing Y. With a larger budget one can buy more X or CSPP - moving the budget constraint curve out in parallel to the existing one. By sharing one can also share the cost per user (c/y) and therefore reduce the "price" per user and buy more CSPP - hence the slope of the budget constraint curve. Given their budget constraint line the customer would chose the optimal mix of sharing (Y) and volume of CSPP (X) for them shown at the point of tangency of their budget constraint line and the maximum attainable constant benefit circle they can achieve with it – or point at **e** in the example illustrated in the diagram.

Turning to point 3) above or the *ownership and control* decision that is the focus of CMA, or the decision whether to then own and control a proprietary CSPP system is separate. This depends on the comparative transactions costs, and production costs that can be obtained by renting, or contracting out the ownership and management or supply of the CSPP. Here there are the issues of the structure of ownership (there could a non-profit club ownership, or for-profit arms length ownership structure, shared ownership or partnership etc) and the nature of any contracts for supply to consider, which drive transaction costs, including agency costs, and depend on incentives, specific assets and information costs (e.g. transparency and security). Changing the ownership and contractual structure can change the position of the constant benefit and budget constraint curves and/or shape of the former and/or slope of the latter etc. in the above diagram. The reason why is that the decision about vertical integration of assets involves benefits (e.g. greater investment in specific assets) and costs (e.g. greater bureaucracy) outlined further below that depend critically on features of economic assets, human beings and their environment. This can vary between industries and firms. In general, in competitive markets however (like CSPP markets) vertical integration will occur for efficiency reasons or when benefits exceed costs.

The benefit of vertical integration of assets is that it can reduce transactions costs when there are specific assets, information problems and risk of opportunism. Specific assets involve investments in systems and models that are tailored to specific customer or

users needs. This means there may be competition ex ante or before the relationship is formed, but ex post parties have sunk investment costs, and may be locked into the relationship. Given inevitable information costs problems will also arise from information asymmetries, where it not possible to easily monitor performance and measure the value created by each side to a market (demand and supply). This will give rise to opportunism or interest seeking with guile as people try to capture value from the relationship that is disproportionate to their contribution and agreed terms, and appropriate the value of the other parties sunk specific investment. Given the costs of enforcing ex ante agreements, the risk of opportunistic behaviour ex post will deter specific investment ex ante. With vertical integration however, the CEO of the merged firm will be able to enforce terms of exchange ex post that support greater value creating specific investments, that enhance the efficiency of the firm and its ability to compete to meet its customers needs. So vertical integration is pro-competitive.

Vertical integration by substituting hierarchy for market exchange can also however involve costs including bureaucracy that will need to be weighed in any merger and acquisition decision. Arms-length competitive market relations provide more high-powered incentives that can address principal agent problems better and when there is little or no value from specific investments, few information problems and weak risk of opportunism, there may be offsetting costs and not gain to vertical integration. A result arms length exchange rather than ownership and control of underlying assets may be better. This decision does not however raise a competition law problem.

Thus one can see how volume, sharing and ownership and control are all variables that affect benefits and costs and drive customer decision-making. All contract terms, and ownership options thus have to seen as defining substitute "products". The above essential decisions are made through exchange in a market by a customer and supplier and underlie the CMA's so called "cloud service market", but they are <u>not</u> explicitly identified and fully elaborated by the CMA and are not the focus of its attention. The essential economic decisions are however numerous and layered in what one might call a "decision stack" - but usually called a decision tree, drawn from a "decision set" of "decision options" – rather than a simplified (and probably dated) "technology stack".

Just some of the enduring decision options in the "decision stack" are:

1) The customer's and the suppliers fundamental decisions – respectively:
    a. For customers whether to acquire Computer Storage and Processing Power (CSPP)? and
    b. For suppliers whether to supply CSPP? and then
2) If so, how should they respectively acquire and supply their CSPP?
3) As in other markets (like real estate) customer's for example need to decide whether to
    a. "Buy the assets and make" the final CSPP service themselves. (This the CMA calls "the traditional IT option") or
    b. "Rent" the final CSPP service or some component part of it.

    As in other markets where customers decide to buy and/or rent an office - or a company car - or most things.
4) If they rent there is also the decision whether to
    a. Rent an exclusive service, or
    b. Rent a shared service. The CMA tends to imply this involves a choice between only three cloud service models in the above table (Iaas, PaaS and SaaS), whereas the range of CSPP choices is much more numerous.

    Again as in other markets where customers decide to rent a building or part of a building etc.

5) Similarly as in 3) for example under the "buy" option there is the decision whether to
    a. buy assets for exclusive use or
    b. Buy assets to own but then share with and rent the asset's services to others. On this last point as the CMA notes this is how what it calls cloud services began and then began to grow only just over ten years ago as follows in Competitive Landscape WP 1

> 2.8 AWS was the first provider to supply cloud services in 2006 using infrastructure that AWS developed initially to support its online retail business. Microsoft made Microsoft Azure generally available in 2010, and Google made Google Cloud generally available in 2011. [35]

> One could thus imagine a world with a decentralised or distributed sharing model emerges enabling owners to lease their unused private computing capacity over encrypted systems – (an Uber IT?)

The decisions required of customers and suppliers however are much more numerous than the above, and once made ultimately these decisions determine the nature of the CSPP property rights a customer or supplier may own and what CSPP services they may rent and how, and the products that emerge and compete over time, and that we ultimately come to observe.

The truth then is that the CMA is very prematurely simply superimposing on a vast complex and evolving decision tree, a set of choices and outcomes using the straight jacket of current engineering thinking on how to summarise past cloud engineering design elements and covering only just some of the relevant choices that have been made to date. The above are but a few of the key economic decisions relevant to market definition that the CMA seems to have picked up on. In short the full choice set of the players on the demand and supply side of the market for the acquisition and supply of CSPP is not captured in the above table - or in the CMA's working papers nor yet fully evolved. The CMA is therefore acting too prematurely before more about CSPP is better understood. In the meantime the market seems sufficiently competitive, and innovative, productive and growing to be allowed to evolve without regulatory intervention other than ordinary property, contract and commercial law.

Applying a decision making approach to the CMA product definitions illustrated in the above technology stack table, the economic choices of consumers and suppliers identified by the CMA and posed in the above table are the limited, highly stylised, simplified or boiled down choices between

- the owned service or traditional IT model on the left of the table, versus
- one of the three shared rental service models on the right of the table.

These choices are characterised, underpinned or based on the arbitrarily assumed "technology stack" or engineering break points shown in the lower rows of the table.

This is a gross and vague distortion and simplification of the actual decision making involved in the dynamically evolving market for the acquisition and supply of CSPP, and of the outcomes of that decision making, as many of the items in the stack are poorly defined and simplified and there are also probably gaps - as the CMA itself notes.

[35] CMA Competitive Landscape Report WP! page 21 para.2.1

The above table for example does not even capture a number of key high-level decision options already noted above. Including option3 (a) above where the customer and supplier agree to an exclusive rental contract for the acquisition and supply of CSPP. This option is obviously an overlay on top on the above table's three "cloud model" or non-exclusive sharing options identified on the right of the table. The decision making approach above also highlights in option 4b) that the owned service or traditional IT column on the left of the simplified table has an option where the owner shares or rents out the excess CSPP capacity they may buy and own.

The much simpler problems or questions the CMA addresses then is

- The extent to which the three simplified "shared rental" products" identified on the right of the above table are in the same market. On this, as noted, the CMA claims they are all in separate markets – or that there are separate markets in each "shared rental "products.
- Whether the limited alternative IT model on the left of the above table is in the same market(s) as the three shared rental products. The CMA's claim on this is that it too is in a separate market.
- Whether the exclusive rental option (what the CMA wrongly calls the private cloud) is in the above market. Again the CMA claims on this that it too is in a separate market.

These seem to be the wrong questions and the wrong answers. It is not been possible to identify and answer the right questions in the time available, and it is no doubt premature to even try, given the information available and the speed and extent to which the CSPP markets are evolving, especially with the developments in Generative AI (Gen AI). One can however draw on lessons from analysis of more mature markets in the past to see where and why the CMA seems to be going wrong.

Two basic points that we have learnt from more mature markets like the real estate market are that

- The rent or buy decisions are typically made in the same market, and
- The furnished or unfurnished real estate decision is also made in the same market.

How is this relevant to the CSPP market and the CMA's working papers?

Basically it is hard to believe that the decisions to buy or rent CSPP are in different markets in CSPP when they aren't in real estate, automobiles, energy, communications etc. When we acquire or supply real estate we need to decide whether to rent or buy. Renting or buying is simply an ownership structure choice in relation to the acquisition of a specific house, service or product.

Similarly as with furnishings in real estate, IaaS PaaS and SaaS all just look like furnishings. In real estate one might ask is the house interior painted or wallpapered? Does the house have a carpet? A washing machine? A fridge? A security system? Sounds much like the question does the CSPP come with certain "infrastructure", "platform", or software features included? Or do I have to pay a rental for IaaS, PaaS and/ or SaaS to establish the true market price?

Iaas, Paas and SaaS are just components or characteristics of the final CSPP product or service. They are rented and shared components of the final CSPP service. The ultimate final CSPP product however still competes with other CSPP products with different ownership and rental components and characteristics in the same market. Thus Iaas, PaaS and SaaS are all part of the same final market decision choice, as characteristics of the final CSPP product bought by consumers, and therefore compete vertically with

other final CSPP products and services with different ownership/rental mixes. This is in part why the CMA analysis that IaaS, PaaS, and SaaS are in separate markets seems in error. Iaas and PaaS compete vertically in the final product market with the own suppl or "traditional IT" compute decision option and the exclusive and shared rental options as ownership/rental mixes.

If one applies a yes/ no decision tree to the ownership/rental decision on each of the CMA's three IaaS, PaaS, and SaaS "tech-stack" product decision structure there are eight (= 2^3) possible final CSPP products each with distinct mixes of ownership. These 8 options are thus competing to be part of the final product mix in the final product market – and this source of competition should be included in the analysis and in the same market.

As input options, or in their input markets CMA's IaaS, PaaS and Saas also compete horizontally with the ownership option/ traditional IT compute decision option, and the exclusive rental option. So as decision options they compete horizontally in their "input" market with the ownership option or the traditional IT compute decision option the exclusive rental option, and vertically in the final product market with mixes of the ownership option or the traditional IT compute decision option and the exclusive and shared rental options. That is a lot of competitive pressure.

Applying an economic model of decision making over IaaS, PaaS and SaaS, they could be interpreted as inputs or factors of production. They come together to produce CSPP for a final consumer. Like capital and labour. In any production process a price rise (SNIP) in one input however (e.g. labour) induces substitution to (increased intensity in) the other complementary input (e.g. Capital) in order to minimise costs, and maximise production of the output. Similarly it seems with IaaS and Paas. Complementary inputs can be used together in production of CSPP in different combinations, depending on relative prices.

With CSPP the bigger picture even using the "technology stack" approach adopted by CMA is that CSPP can be produced and delivered by

- Three categories of components, or elements of computing systems the CMA calls
  - Software.
  - Platform and
  - Infrastructure,

  These are identified at the top the table below in the first row in the last three columns, and

	Infrastructure	Platform	Software
Exclusive Ownership	EOI	EOP	EOP
Exclusive Rental	ERI	ERP	ERP
Shared rental	IaaS	PaaS	SaaS

- Each of these three categories can themselves however be acquired and supplied using three different contractual options - namely
  - Exclusive ownership (what CMA calls traditional IT)
  - Exclusive rental (what CMA calls private cloud) and
  - Shared rental (or what CMA calls "cloud" or " as a Service").

These contractual options are identified in the first column on the left of the above table, in the last three rows.

This gives 9 products identified in the interior cells of the table. These products can be used as substitutes and compete with each other to produce CSPP as inputs. The nine products identified in the above table using acronyms, include those used by CMA IaaS, PaaS and SaaS, in the last row but also six others namely the exclusively owned Infrastructure (EOI), exclusively rented infrastructure (ERI), exclusively owned platforms (EOP), exclusively rented platforms (ERP), exclusively owned software (EOS), and exclusively rented software (ERS). If one applies a decision tree with three branches including exclusive ownership (EO)/exclusive rental (ES)/ shared rental choices for each of the CMA's IaaS, PaaS, and SaaS "tech-stack" components decision structure there are 27 (= 3^3) possible final CSPP products each with distinct mixes of ownership.

IaaS thus faces substitution on two fronts,

1) From PaaS and SaaS (in the same way capital and labour are substitutes)
2) From EOI and ERI (in the same way owned and rented cars are substitutes)

Thus the two options cited by the CMA of full service traditional IT and private cloud are not the only substitutes or alternative means of acquiring the same value from services such as IaaS, PaaS and SaaS as claimed by CMA. There are at least 27 in total choices. A final user might for example be using more IaaS, e.g. more storage than needed if it is cheap, but if there were a 5-10% price rise (SNIP) and it became more expensive at least some if not all consumers would use less, and rely more on EOI and/or ERI and/or PaaS/EOP/ERP, and/or SaaS/EOP/ERP. It would be irrational to continue as before at the previous price, given there are so many alternatives, and switching is easy at the margin, and the market is competitive.

The fact that in such a competitive market one or a few options may become dominant for efficiency reasons, including economies of transaction costs and production costs is a good outcome both for competition and consumers. To threaten to and/or regulate and thereby interfere in that process, because of the success of one option or the outcome, would have an adverse effect on competition ex ante and ex post, distort the market's evolution and be to the detriment of consumers today, and in the future.

Failure to use an Appropriate Market definition model

It is my view that the CMA fails to define an appropriate CSPP market for two reasons

- Poor product definition for reasons outlined above, but then
- A poor and inconsistent application of the appropriate market definition methodology

This leads CMA to identify three separate shared rental markets that are too narrowly defined.

The CMA in its guidelines notes that

> 137. In defining a market it is important to ensure that the pool of products identified as effective substitutes for the relevant product(s) is not unrealistically small. If the market is drawn too narrowly there is a risk that a party is incorrectly viewed as holding significant market power,[36] whereas in reality that position is undermined by constraints from alternative suppliers

[36] The CMA footnotes a comment here that "Unilateral market power is discussed in paragraphs 178–184" of its Guidelines see page 32 footnote 79

that should be included in the market. (Conversely, defining a market too widely carries the risk that market participants, in seeming to be in weaker positions, are inferred to have less market power than they
actually enjoy.)

138. The hypothetical monopolist test (HMT) is a tool which can be used to identify effective substitutes and to check that the market is not defined too narrowly. The principle behind it rests on defining a market as a product, or collection of products, a sole supplier of which could hypothetically impose a small but significant non-transitory increase in price (sometimes referred to as the SSNIP test). The test can help to identify the constraints that would prevent a hypothetical monopolist from exercising market power. In practice it may often be used, not quantitatively, but as a conceptual framework. [37]

Theoretically or conceptually the CMA's claims that

- "there is a relevant product market for the supply of IaaS"
- "PaaS is not part of the same relevant market" and,
- "there is a relevant product market for the supply of PaaS" and
- "substitutability between PaaS and SaaS is mixed and limited."

These claims in turn together imply the CMA believes there are three separate markets for SaaS, PaaS, and SaaS which seems theoretically incorrect.

The CMA does not formally, nor consistently derive the CMA's conclusion that there are separate markets, using economic theory or the required SNIP and HMT methodology. Yet the CMA however notes itself that these "products" are all theoretically close substitutes and are part of the same market. Given the CMA either does not consistently even apply the HMT or SNIP test, or if it is mentioned it does so without sound evidence, or formal empirical testing, the conclusion the focal products are not close substitutes, and not in the same market are therefore hard to understand and in all likelihood flawed for purposes of later competition law analysis.

As a result the CMA fails to identify key constraints that would prevent the exercise of market power in any of the assumed separate markets. This leads the CMA to later overstate the extent of market power of firms supplying CSPP, and the potential for its abuse by for example negotiating anti-competitive egress fees and discounts discussed later. The CMA's narrow market definition then leads CMA too readily to the unreliable conclusion that firms supplying CSPP in the market hold significant market power.

The CMA's hypotheses that there are three separate markets can be tested empirically, but has not been however, and cannot be tested by asking people questions about their beliefs or preferences in relation to the three CMA predetermined narrow products (IaaS, PaaS and Saas) in a survey for the purpose of defining markets, as has been done by the CMA. Such an approach assumes the products exist and adequately and fully describes consumer choices. It borders on being like asking people do they beat their partners often? In any event, all three of these terms (IaaS, PaaS and SaaS) are however very vague, impossible to define, and of very little, if any use for the purpose of market definition over time as further innovation occurs. It plucks market definition out of the air.

[37] The CMA notes in its Guidelines page 32 footnote 80 that "In these Guidelines, references to the 'use' of the HMT applies to its use both quantitatively and as a conceptual framework."

There is no market that can be defined without clearer and better grounded product service definitions in the first place. Of particular concern is the notion that one can simply distinguish between infrastructure, platforms and software, and that any complexity in this regard does not matter for market definition. There is no clear reason for these distinctions between infrastructure, platforms and software that is relevant to the derivation of a market definition. For example it is hard to imagine an infrastructure or platform service that does not involve software; nor infrastructure that is not a platform, and vice versa.

The distinction between IaaS and PaaS versus SaaS is also clearly meaningless, unless by the terms IaaS or PaaS one is referring to "bare metal" or hardware sold without software. But a "bare metal" option is best thought of as a fourth service model that could be added to the columns to the left of the above Technology stack table, with bare metal or hardware assets added and listed in new rows on the bottom of the table - highlighting a gap in the above "service model" or technology stack.

Software as a service is simply ubiquitous in the cloud not just in the "top of the stack" SaaS stage. Categorisation of relevant software would lead to an endless list of software with various "first names". The software that makes interaction between a user and machine possible, and that manages the resources is "system software". "Operating system software" is software that communicates with your computer hardware and provides a place to run an application There is virtualization software (e.g. for Windows, Linux, or macOS) and applications software (e.g. for accounting, communications or gaming) etc. The software list clearly goes on.

The demand side of the market is also simply invisible in the market definition analysis of CMA. The fundamental point here is that the customer is deciding on what computer storage and processing power (CSPP) to buy. That is the market to focus on - the market for CSPP. This offers a better and more appropriate way to frame market definition. The fundamental decision on the demand side as noted is whether to make and/or to buy CSPP and if so how. This can lead to a number of different outcomes in the same market as noted.

The consumer thus can be understood to be standing at the top of the above table choosing between the three options identified by CMA but also other mixed product options and mixed provider options. The criterion the customer will use to make choices will vary by customer. A for-profit firm will be seeking to maximise its profits. Their focus would therefore be on a contribution to profit or net benefit row entered at the bottom of the above table that will be used to evaluate options, as if it were a cost benefit table. The three product options would thus be substitutes in the same market theoretically. The customer may have other, or mixed objectives, if the customer is a non-profit. A final consumer will seek to maximise their wellbeing or utility from the choice. In any event the customer has a budget constraint and must make a choice between the range of CSPP product options available, each offered at different prices and other contract terms – and each offering different performance relative to objectives as a result.

A customer's choice may be between or include the three products identified by CMA, but theoretically, it will also include other options including mixed patterns and multiple providers. Thus a customer may of course choose a CSPP product which is similar to the one the CMA describes as SaaS –in which case however, in effect they would also at the same time according to the above table be buying what the CMA describes as PAAS, and IAAS. They may also not even be aware whose PaaS, or IaaS, the SaaS application is

hosted on. It may not be the same provider. They may even work through intermediaries, particularly more so in the future, and not even know or care who the SaaS provider is. They will in short only be interested in their objective, product reviews and testing. The products listed in the table and other mixes and multiple providers are all substitutes theoretically.

The problem with the CMA's framing or identifying services provided in a market using a technological map for a particular industrial process is that although technological maps can be used by engineers to describe a production process, they cannot simply then be used to directly define markets. The technological components of production, or a technology map or engineers design plan do not provide a reliable basis to define a market.

The production components in such a technology map or engineering plan may of course be used to produce a service. But the service is not defined by the technological components. Services are provided in markets by combining labour and capital together in technologically feasible ways – again in markets. The technological possibilities and components of a production process are relevant then to production, but not to the exchanges that occur in a market which are determined by the terms of exchange found in contracts entered into by the provider with the customer who have very different even conflicting needs but who can gain by co-operation.

We have highlighted above how using a technology map seems to have led the CMA and/or those surveyed to mistakenly conclude the three services were different, and in different markets because they used different technological components. An obverse problem or false positive problem can also arise where a technological map can identify the same technological components in two different production plants that produce two different services. Reliance on a technology map to define markets can thus risk a false positive, or wrongly concluding two plants provide the same service to the same market when they don't, simply because they have the same technological components.

This obverse or false positive problem in misidentifying markets using the CMA's approach to defining markets based on a technology map and common engineering language or metaphors can perhaps be more easily understood by illustration using an existing industry, where differences in services but similarity of technology map or engineering design are more familiar and can be better understood. One cannot for example define markets for chemicals by using technological maps or engineering design plans of production components of chemical plants. The reason why is that other kinds of plants have similar technological or engineering designs or components, such as polymer, pharmaceutical, food and beverage production facilities, power plants, oil refineries or other refineries, natural gas processing and biochemical plants, water and wastewater treatment, and pollution control equipment.

The problem is production processes like chemical plants, and other plants like those listed can use similar or the same specialized equipment, units, and technology in the manufacturing process - such as fluid systems and chemical reactor systems – yet generate different outputs and services. Some would thus consider an oil refinery or a pharmaceutical or polymer manufacturer to be effectively a chemical plant, yet the good or service they produce are traded in different markets.

Concepts like infrastructure services, platform services, and software services defined by reference to technological components are simply too vague and unhelpful concepts to form the basis for market and competition law analysis. To provide a list of technological components in each purported service (IaaS, PaaS and SaaS) does not help.

One has to start with an analysis of property rights, contract terms, transaction costs, production costs and supply functions, and customer valuation and demand functions. Then test actual substitution behaviours between "contract offers" in price changes (i.e. apply a SNIP test). The CMA has not done this. As a result the rest of the CMA's analysis in working papers 1-3 and it's Issues papers is fundamentally flawed as we shall see.

The CMA's Use of the Cloud Metaphor

The CMA's further frames its market analysis, and names its services and markets using the "Cloud" metaphor. As noted earlier is important however not only to avoid resort to vague and unhelpful engineering categories or technological components as the basis for defining and naming services and markets, but also vague metaphors like the "cloud" for market definition analysis. Quite simply it is not clear what relevant economic or legal "feature" or "combination of features" (property right or contractual right structure) the term "the cloud" refers to (e.g. "shared rental" "exclusive ownership" or "exclusive rental" or whether the assets are accessed through the internet) and therefore how it adds value. Metaphors are simply confusing and distracting clutter. It is better to be more clear and precise using technical economic and legal terms, theories and concepts.

It is easy to understand however where the **cloud metaphor** originated from, and why it resonates and took hold in the computing lexicon. Where a user decides to own or rent, and share or exclusively use a group of networked computer assets or resources that are not accessed locally, but instead are accessed via the internet, all the data (inputs, instructions, outputs, messages etc.) transferred across the Internet as a result will travel across the internet in packets. Each packet can carry a maximum of 1,500 bytes. Each of these packets in turn has a wrapper that tells the networked computers what kind of data is in the packet, how it fits together with other data, where the data came from and the data's final destination. But the different packets from the same "message" then don't have to follow the same path over the internet (cable, wireless, satellite, microwave etc). They will travel separately by various means from one machine to another until they reach their destination. As the packets arrive, the computer receiving the data assembles the packets like a puzzle, recreating the message. If one pathway becomes clogged with traffic, packets can go through a different route. This is different from the traditional phone system, which creates a dedicated circuit through a series of switches.

In short the Internet, or online remote use rather than local uses using the above system of globally networked computers readily evokes a "cloud" metaphor to capture the seemingly diffuse, dynamic and intangible yet dense nature of the observed and apparently new phenomenon of the internet. Provider owned, hardware and software (property rights or assets) networked and managed by the provider, and accessed and used by users (by contract) all through the internet online on a shared basis as above can readily be imagined, or thought of metaphorically as accessed via an amorphous "**cloud"** - hence the "cloud computing metaphor" and the "cloud stack metaphor".

The **cloud metaphor** however is not a useful a term for basing or conducting competition law analysis - it is simply too elusive and unhelpful, distracting. Competition law analysis must instead start with a more micro-analytic law and economic approach that focuses on exchange involving an analysis of the underlying property rights and contracts, that set the terms governing relevant exchanges, and therefore define the relevant markets that are the subject of competition law analysis. In this regard the relevant property rights and contract rights structure are the proper unit

of analysis, and they need to be looked at in their entirety, as a change in one property right, or contract term or feature (e.g. discounts or egress fees) may be compensated for by a changes in other contract terms. This needs to be supplemented with an analysis of transaction costs, and production costs and associated relevant demand and supply side analysis of actual behaviour, to generate market definition hypothesis, that can tested using the SNIP test of actual behaviours. This should be done without assuming the market is uncompetitive or monopolised. Rather the null hypothesis or assumption should be the market is competitive and contestable until it is proven otherwise with sufficient evidence. The burden of proving that is on the CMA, or the regulator. Ofcom failed in this task. The CMA should not.

The CMA's evidence on Customers stated beliefs and Preferences

Turning to the third problem, or the CMA's use of surveys of consumers "stated beliefs" or "preferences" or "recalled behaviour" provided in response to CMA's questions that were framed using the technology stack and metaphoric license. The CMA claims to base its market definition on evidence. The response of those surveyed to CMA's questions does not however provide reliable evidence for market definition for at least two reasons.

1. First as noted the customers were asked questions that were framed by reference to a technological map, that defined selected combinations of engineering elements of production, and named them metaphorically as products, which is not very useful for defining products, or markets. This was a fundamentally flawed approach to framing a customer survey and does not enable one to test market definitions.
2. The second problem is that the customers are being asked "stated beliefs" or "preferences". Stated beliefs and preferences on even properly framed questions do not provide reliable evidence for market definition. To define markets one needs to survey of consumer's actual behaviour and analyse substitution behaviours to a 5% price rise. CMA does not have reliable data and has not done the empirical analysis required to conduct market analysis and test its hypothesis on market definition or that there are three separate markets for IAAS, PaaS, and SaaS.

Geographic Market Definition

The CMA View

The CMA outlines its approach to geographic market definition as follows

> 4.82 Our guidelines state that geographic markets can be defined based on the location of either suppliers or customers by considering the degree of substitutability, ie the extent to which suppliers can switch their areas of supply and the extent to which customers in one area may be served in another area.
>
> 4.83 The Terms of Reference in this case concern the supply of public cloud infrastructure services in the UK. As noted above, the market definition(s) used by the CMA need not always correspond with the relevant market(s) described

in the Terms of Reference; specifically the CMA may conclude that the market definition goes wider or narrower than those goods and services.

4.84 In that context, in this section we consider whether the market for public cloud infrastructure services is national or whether it should be expanded to Europe-wide (ie UK and EEA) or global basis.

The CMA later concludes

4.96 Overall, the evidence we have seen to date suggests that the relevant markets are wider than the UK, but not as wide as global for the following reasons.

4.97 First, it suggests that the markets are wider than the UK because:

(a) customers can theoretically choose data centres globally and do choose data centres outside of the UK;
(b) some customers identified that having data centres across their operating regions was an important factor when selecting a public cloud provider;
(c) the main cloud providers to UK customers (AWS, Microsoft and Google) are active globally and set their strategies globally; and
(d) most cloud providers said that UK infrastructure was not necessary to compete effectively for UK customers.

4.98 Second, some of the evidence suggest that it is not as wide as global because:

(a) certain customers require UK data centres for regulatory or security purposes;
(b) customers may prefer data centres that are located relatively close to reduce latency;
(c) customers rated the number and location of data centres and data sovereignty requirements were rated as important factors in selecting a cloud provider; and
(d) Alibaba, a Chinese provider, was universally rated as an ineffective alternative by customers.

4.99 Based on the evidence we have seen to date, our emerging view is that the geographic scope of the markets is more likely to be Europe-wide (ie UK and EEA). To the extent relevant, we will take into account non-European providers as

Comments

The CMA seems to not only adopt an overly limited product market definition (i.e. supply of public cloud infrastructure services - or IaaS), but also a highly limited geographic market definition (i.e. UK and EEA).

There are two main problems with the CMA's approach to the geographic scope of the market, and its conclusion that it is Europe-wide (i.e. UK and EEA).

i) First the CMA uses the location of physical infrastructure including data centres as defining the geographic extent of the market. It thus limits the extent of the market to data centres located in UK EEA. This seems incorrect. It is the location of existing global players with capability to supply infrastructure locally and who could respond to a SNIP that should define the market, not the location of existing infrastructure including data centres

ii) Second the CMA relies on supplier and customer stated beliefs and preferences, not actual behaviours to measure the geographic extent of the market. Consumer attitudes revealed from the survey however could be an outcome of a global competitive market, and are not evidence of actual behaviour in response to a SNIP or HMT. In other words at existing global competitive market prices, people may not switch and may not want to switch geography because it is simply not worthwhile at the market price, given transaction costs etc. They therefore don't express a preference for foreign suppliers because it is efficient to stay put - nevertheless exit and entry barriers are low, and the market is global and pricing is competitive, and prices are likely to continue to fall over time, and quantity and quality rise, as it has in the past. If they were faced with an actual SNIP of 5-10% or one of any of the many substitutes they face however they would seem likely to switch – but that needs to be test empirically using data on actual behaviour.

On the first point the physical location of data centres is not the issue - it is the physical location of the players/suppliers with capability to supply – these two dimensions are not co-terminus. For example Amazon, Microsoft and Google are US companies, but locate data centres in UK/Europe. The same behaviour is possible by the many other Global players, implying the market is global not UK EEA only.

As noted earlier substantial computer storage and processing power capacity at scale is readily and cheaply available and deployable at declining cost and increasing quality over time from around the world. Already today, there are at least ten owners and providers of computer storage and processing power (CSPP) capacity worldwide besides Amazon Web Services, Microsoft Azure, and Google Cloud Platform who are the focus of the CMA. These include Alicloud, Baidu, Bytedance, Huawei, IBM Cloud, Oracle Cloud and Tencent. There are also regional market players, like OVHcloud and Scaleway, and newer entrants, such as Nvidia and CoreWeave. Notably, CoreWeave was founded in 2017 to address the need for GPU computing, especially for generative AI technologies. Other global and European Independent Service Providers (ISP) or players could readily expand, or emerge to compete on CSPP in Europe.

The problem with the CMA's approach can be clarified by reference to its implications for a SNIP test. This replicates similar problems with CMA's two other purported uses of the SNIP test but in relation to product definition identified earlier. The CMA's implicit approach to the SNIP test is that one should start with very a narrow geographic market by only considering infrastructure physically located in that local geography as in the market. This implies one should start with infrastructure assets for example located in London and used to supply only customers in London. This also implies one should only consider suppliers to be in the market if they own data centres and supply customers in the narrow geographic location. The CMA then seems to implicitly posit a SNIP test where there is a hypothetical monopolist that owns all data centres located in, and supplying all customers in any given UK location, (e.g. London). The CMA's conclusion

then is that if one applied the SNIP test to that local service offered by that local monopolist in London (or any UK location), customers would ONLY switch to use infrastructure or data centres anywhere in the UK and EEA owned by other suppliers – not elsewhere. This would happen to such an extent that any local UK Market for infrastructure services should be expanded to include data centres in the UK and EEA more widely, with only the owners of those infrastructure assets should be included in the market. The CMA's focus on market definition thus seems to be directed at the likelihood and extent of imports of IaaS into London (or other UK locations), from data centres and by their owner/suppliers located in the UK and EEA

Thus only existing data centres in Europe and the UK and their owners are included in the CMA's market definition. Yet the extent of data centres and the extent of suppliers active in UK and Europe is clearly an endogenous matter, or an investment decision. A market player outside a location can make an investment to change their "location" and tailor their services to local needs either by expanding their production of IaaS using existing assets from offshore (including worldwide or not solely those located in the EEA), and exporting them to the UK from offshore, or by investing in infrastructure in UK or EEA, the cost of which is falling, or itself leasing infrastructure in UK and EEA in response to the SNIP.

From this point of view the extent of the market needs to be tested by examining the *behaviour* or responses of both customers in a narrow UK location, but also *all Global firms* already involved in the supply of IaaS globally and therefore with capability to supply to any narrow geographic location, in response to a local SNIP, from within the UK EEA or beyond it. The key issue is not the location of physical assets owned by a market player at a point in time then, as these can be purchased, or leased, but the geographic supply *capabilities* of firms who are actually already providing CSPP services anywhere in the world, and that may be headquartered in foreign jurisdictions, but may enter a narrowly define UK market in response to a SNIP. Their behaviour is highly relevant to any local jurisdiction and needs to be included in the market definition, even if their current assets lie outside that jurisdiction.

The only or main apparent limiting consideration to cross border trade in CSPP capacity that the CMA raises is **data Sovereignty** but this constraint is not clearly elaborated. Global players (e.g. firms from USA/China/India etc.) can physically locate infrastructure in the UK, and comply with local law in any location (e.g. UK, EEA). Thus the physical location of data centres is not the issue driving the geographic market definition - it is the physical location of the players/suppliers. Amazon, Microsoft and Google are US companies, but locate data centres in UK/Europe, and the same behaviour is possible by other Global players in response to changes in relative regional prices, implying the market is global not UK EEA. Data sovereignty does not constitute a barrier to entry so long as incumbents incurred the same cost to comply with the relevant local sovereign law as foreign companies do.

Turning finally to the second main problem with CMA's derivation of its geographic market definition, namely the evidence it relies on. Again CMA relies on a survey of the attitudes of those sampled – not a study of actual behaviour - in particular actual substitution behaviour (e.g. a SNIP test). The consumer attitudes revealed from the survey could be an outcome of a global competitive market. In other words people don't switch geography because it is simply not worthwhile, and don't express a preference for foreign suppliers because it is efficient to stay put at existing market prices - nevertheless exit and entry barriers are low, and the market is global and competitive, more so than it would be if it was regulated as seems to be proposed by CMA.

The recent and Likely Impact of AI

Recent developments in Generative AI has brought greater public attention to the potential impact of AI throughout society. It is useful to briefly mention the impact of the rapidly developing AI markets market on the market for CSPP, and its implications for the growth and innovation and enhanced competitiveness of the CSPP market, and ultimately the limitations this imposes on market power in the CSPP market.

CMA View

The CMA takes a very narrow view of the impact of AI developments on the CSPP market as follows

> 8.15 We have considered evidence of how cloud providers are competing to supply accelerated compute services. In particular, we have looked at how they are able to access the resources which are necessary to supply accelerated compute and, in particular, accelerator chips. [38]

The CMA thus does not fully consider the implications of AI for market definition of CSPP, and market power in CSPP in the foreseeable future. Rather it focuses on AI implications for the demand and supply of accelerator chips and comments inconclusively at the end

> c) We are still gathering and assessing evidence on this, which will enable us to judge whether the growth in AI workloads will allow smaller cloud providers to expand or whether it will result in a further barrier to entry and expansion. [39]

Comment

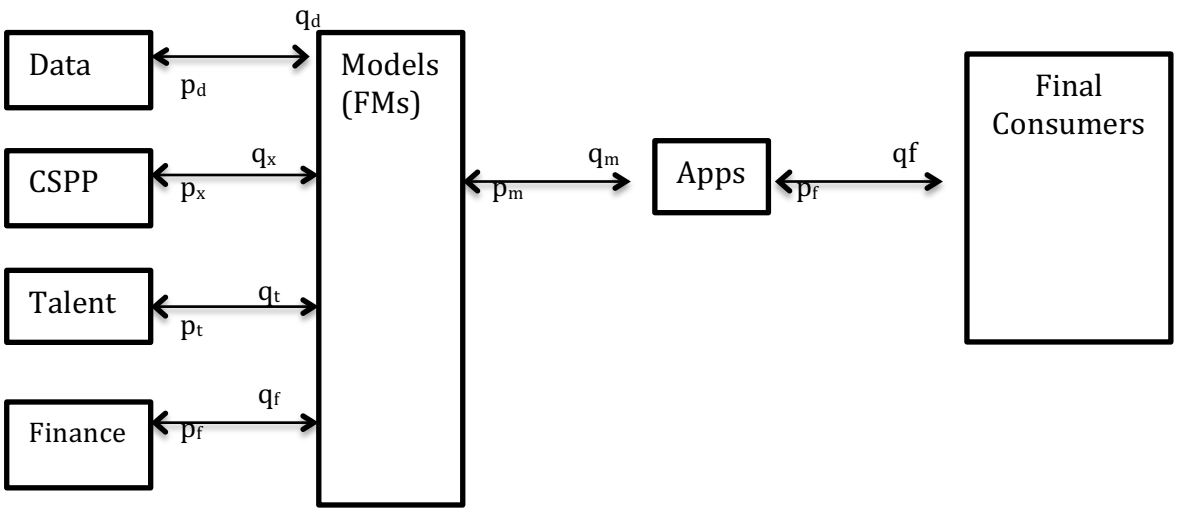
There is a vast array or set of existing, new, and potential, vertical and horizontal products, services and markets related to AI that will evolve and proliferate over time. All one can do at this stage is outline them broadly at a very high level. The relevant and more important emerging AI markets include:

1. Markets for AI inputs, including capital of various kinds (tangible and intangible) labour (human capital), and land, but the most important for competition appear to be
    a. Data content
    b. Computer Storage and Processing Power (CSPP) services
    c. Talent and expertise
    d. Finance
2. Markets for Foundation Models (FMs) - which combine the above inputs
3. Markets for Downstream products and services that use FMs, such as chat-bots and AI assistants, where competition occurs at the level of the individual application (app)

[38] Competitive Landscape P 148
[39] Competitive Landscape P 154

The diagram below provides a simple visual representation of the likely value chain and determination of relevant prices (p) and quantities (q) in the AI markets identified above in which relevant SNIP tests for market definition could be applied. The relevant market players' roles are shown in the text boxes from left to right, starting with initial input providers on the extreme left (data, CSPP, talent and finance) and ending with the final consumer on the extreme right. The likely market exchanges between relevant players at each stage in the value chain is then shown by two-arrows between the players representing the exchange of products and services (q) for a price (p) in each market.

Thus on the extreme left of the diagram four two-way arrows are used to represent the exchange in the three AI *input markets* of services (q) for a price (p) in each of for data (d), CSPP (x), talent (t) and finance (f) services that are required for training of foundation models (FMs) by AI firms involved in the
creation of FMs shown in the first tall thin textbox from the left, simply entitled Models (FMs).



The next two-way arrow to the right then represents the intermediate market exchange of Ai FMs services (q_m) for a price (p_m) between AI Model firms and AI Apps firms. While the final arrow on the extreme right represents market exchange between AI Apps firms and final consumers in the final consumer market.

The ultimate value driving competition is sourced in the final consumer markets. The final customer or consumer markets are ultimately the most important – but they are in the very early stages of development, and current investments in AI are based on guesswork about how they will evolve and respond.

Two things appear clear about the drivers of competition with AI currently.

a) First AI appears likely to create considerable value through out the economic system and considerable improvements in the living and working conditions of European citizens. This high expected value from AI is likely to mean all of the AI markets and in particular CSPP are and will be highly competitive for the foreseeable future, as more entry and expansion in the market is supported, has

occurred and is occurring rapidly. This growth in AI will have major upstream effects in the CSPP market.

b) Second AI markets are clearly global, as a simple SNIP in small AI market will generate substitution to and from other geographic market on both the demand and supply side. The markets for Data, CSPP, talent, FMs and Apps are all clearly global and therefore highly competitive. The important role of global competition highlights the need to ensure competition policy is not used to protect local domestic "champions" or "industry" from foreign competition

These two facts alone (high value and global competition) mean AI markets for the foreseeable future are likely to be very competitive. These facts are clouded by the CMA's focus on such narrow markets like IaaS, PaaS and SaaS in the UK and EEA, and their need for regulation.

To understand the extent of value at stake as a key driver of competition in CSPP it is critical to first better understand the fundamental source of value in AI markets, and not just assume it will be the same as other in "digital markets". The source, nature and extent of value in AI clearly drive the prospect of vigorous competition in AI markets including CSPP for the foreseeable future. In this regard we still have a lot to learn, as it is early days. But the best way to analyse AI and its economic impact is probably to use that proposed by Agrawal A., Gans J., and Goldfarb A. [40] (Agrawal et al) who recast the rise of AI more generally as a drop in the cost of prediction.

AI in one sense is just an advance in the statistics of prediction. But AI takes previous statistical methods to a new plane. AI models substantially reduce the costs of predictions. This includes the costs or making predictions at scale, and the cost of error from predictions. When AI is framed as cheap prediction, its extraordinary potential becomes clear. A AI system is just an AI system that is able to produce new content, such as texts, images or other media using low cost prediction based on the training of foundation models of large databases of content, such as texts, images or other media. Prediction is at the heart of making decisions under uncertainty. Business and personal lives are riddled with such decisions. Value adding decisions also depend on access to content, such as texts, images or other media. As the training of models using large datasets develops new models and applications for prediction, AI's and AI's impact will potentially be across an increasingly wider domain (smart phones, transport, health, energy, food production environmental management etc.).

The impact across all markets appears likely to be threefold

- Allocative efficiency. AI Prediction tools enable resources to be better allocated to their highest values uses. AI will enable human talent generally to be focused more on judgement and human creativity in the production and distribution of new content, such as texts, images or other media.
- Productive efficiency. AI Prediction tools increase productivity— inventory management, logistics, operating machines, handling documents, communicating with customers etc. and in the production of produce new content, such as texts, images or other media.

[40] Ajay Agrawal, Joshua Gans and Avi Goldfarb, Published in 2018 "Prediction machines: the simple economics of artificial intelligence" Harvard Business Review Press, ISBN:978-1-633695672

- Innovative Efficiency - Better prediction creates opportunities for new innovations in products, services, production, distribution, business structures and strategies to compete, including in in the production of produce new content, such as texts, images or other media.

The competition to realise these values will be great, and it will occur across all markets including CSPP. There will be economies of scale and scope in AI that as they are achieved will release enormous value, and investment over time.

The amount of potential value at stake means that competition is currently intense and has a long way to increase yet. Consumer markets have recently shown rapid growth amongst early adopters, this still leaves considerable scope for more growth, competition and new entrants later.

Finally once one moves away from defining specific AI input or functional markets at a high level, and considers geography, it is clear that *each of the AI markets are global including CSPP* This means the extent of competition is commensurately global - and therefore highly intense. What is more if one considers time, the extent competition in the market will only increase and competition become more intense over time with new innovations in FM's and in apps and entrants and global population, income and wealth.

The emerging markets in AI and the markets that support it like CSPP are highly competitive. They simply do not exhibit the characteristics of markets that require antitrust intervention or supervision. Markets that competition authorities should be investigating are those characterised by poor performance slow growth, low productivity and low innovation - not ones characterised by very big increases in productivity and innovation like AI related markets and CSPP. To a significant extent then it seems the CMA is focusing it's anti trust investigative powers on the wrong markets. The focus should be on trying to make poor performing markets perform better by tackling the legal barriers to entry, and inefficient regulation they suffer from.

With AI, CSPP and digital markets generally, we're looking at probably the most productive part of the economy. Innovation or progress in CSPP with AI in many cases appears exponential rather than linear. Already the progress in a wide range of applications (e.g., vision, natural language, motion control) over the last 12 months was faster than in the 12 months prior. The level of investment is increasing rapidly. The quality-adjusted cost of sensors is falling exponentially. And the amount of data being generated is increasing exponentially expanding demand and scope for competition expansion and entry in the CSPP market. CSPP quite simply is not in need of regulatory attention, even if some competitors or users would like to get a better deal through regulation than they can get in a competitive CSPP market.

VII. Market Power

Having broadly defined the relevant markets - what is the theory and evidence to refute the null hypothesis that the market is competitive? What is the relevant theory and evidence as to the existence of market power in the relevant CSPP market(s)?

I summarise the relevant Statutory provisions in Appendix One, but in summary to be subject to CMA regulation under the Enterprise Act the CMA has to prove or show that there is a "feature, or combination of features of a relevant market"[41] that have "an

[41] section 134(2)

adverse effect on Competition"[42] (AEC) "or a detrimental effect on customers or future customers."[43] – not offset by "any relevant customer benefits of the feature or features" [44] that are "unlikely to accrue without the feature or features concerned"[45] "within a reasonable period" [46]

In working papers 2 and 3 the CMA focuses on egress fees and discounts, but for any feature or combination of features like these to have an AEC, or prevent, restrict or distort competition, or have a detrimental effect on customers or future customers, depends on the prior question whether there is market power - or whether the market is sufficiently competitive to prevent AEC effects and sustainable anticompetitive behaviour.

Agreements or contracts creating egress fees and discounts could not for example substantially lessen competition if there are no barriers to entry to new entrants, nor to the expansion by the parties' rivals ex post. Even if the parties sought to substantially lessen competition they would fail, as consumers would avoid any such effects if there were low barriers to entry and expansion.

This prior and more primary requirement to refute the hypothesis that the market is competitive and show or prove market power implies all relevant competitive conditions (including barriers to entry and expansion) need to be addressed first before proceeding to consider egress fees or discounts. Whatever the details of the agreements one has to ask whether the parties to any of the agreements have relevant market power, or can through the agreements create market power that enables them acting together to substantially lessen competition. To answer this question as noted one must consider the likely behaviour of parties other than those directly involved in the agreement. Having defined the markets one then needs to evaluate the markets' key competitive conditions and whether there is sufficient indeed strong evidence of any market power.

In what follows I

a) First outline the CMA's position on the source and existence of market power and its implications namely
    i. High Market shares
    ii. Significant barriers to entry and expansion
    iii. Profitability of AWS and Microsoft
b) Second comment on the CMA's position discussing in turn
    i. In market rivalry
    ii. Substitution possibilities for consumer's and/or suppliers
    iii. Barriers to entry, including a definition of barriers to entry
    iv. Counter-veiling Consumer power
    v. Counter-veiling Supplier Power

In order to outline the CM's position I draw on the CMA's Competitive Landscape working paper.

[42] section 134(2) of the Act
[43] s134(4) of the Act
[44] s134(7) of the Act
[45] s134(8)(b)(ii) of the Act
[46] s134(8)(b)(i) of the Act

CMA Position

The CMA summarises its position as follows

> One of the main purposes of the analysis set out in the CMA Competitive Landscape working paper, alongside our other working papers, is to inform CMA's assessment of whether one or more cloud providers hold significant market power. In this regard the CMA has concluded that
>
> 9.24 Based on the evidence we have seen to date, our emerging view is that there are indicators of significant market power being held by the largest two providers, AWS and Microsoft. This is because:
>
> (a) They both have high market shares and the collective share of all other providers in these markets is falling;
> (b) Potential rivals face significant barriers to entry and expansion, including high levels of capital investment and economies of scale and scope; and
> (c) Whilst assessing current market outcomes is complex given the current stage of market development, our profitability assessment indicates that AWS and Microsoft have both been generating returns above their cost of capital. [47]

Comment

In what follows I comment on the CMA's claims about market power. To do this I organise my discussion around the five key determinants of market power or key drivers of competition and competitive conditions

- In market rivalry
- Substitution possibilities for consumer's and/or suppliers
- Barriers to entry, including a definition of barriers to entry
- Counter-veiling Consumer power
- Counter-veiling Supplier Power

On all counts I shall that the CSPP market is competitive.

As we shall see the key drivers of competition relevant to competition law regulation are <u>not</u> to be found in an analysis of the characteristics of the competitors in particular successful players like their size. Thus it is problematic that the CMA focuses so narrowly on specific large firms like AWS and Microsoft. The relevant drivers of competition are instead characteristics of the market – in particular competitive conditions in the market. It is features of the market - market competitive conditions - not the features of a particular company that drives competition. The CMA should thus be concerned with the characteristics of competitive conditions in a market – not the characteristics of individual successful firms e.g. that they are large incumbent tech firms.

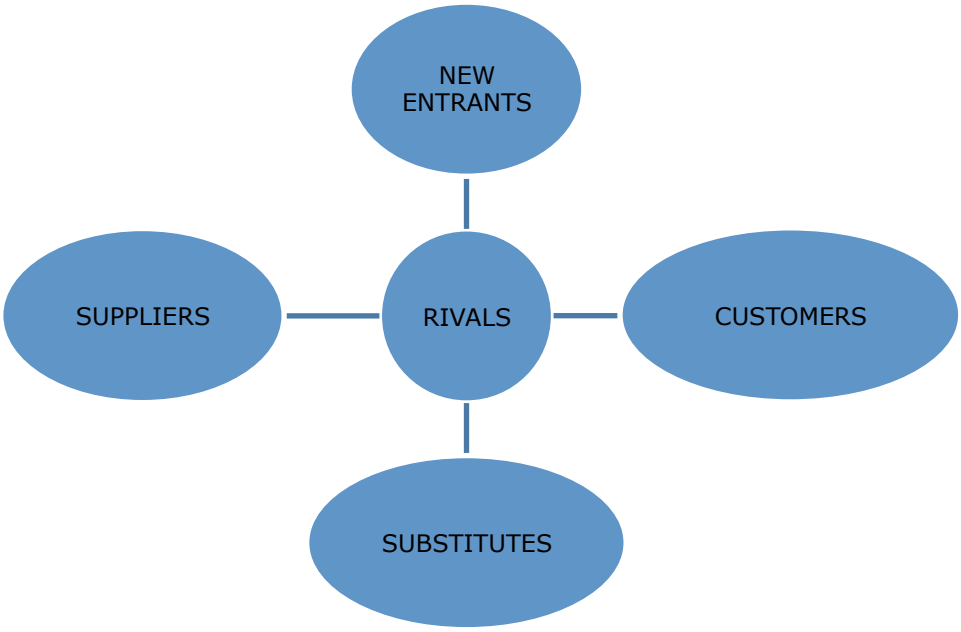
In a competitive market typically the characteristics of a successful player for example that they are large, <u>can</u> be replicated over time and their determinants are well known.

[47] Competitive Landscape WP 1 page 159

Successful players in a competitive market are those that are most efficient in meeting the demand of their customers compared to their competitors. In a competitive market then the most efficient firms will succeed as a result of the competitive process. The drivers of competition of concern to regulators however thus do not lie in characteristics of a successful player or incumbent company that can be replicated in response to competitive conditions.

As noted there are five competitive conditions or factors that drive the state of competition in any market and therefore the competition risks that need to be proven as substantial listed above, these can be summarised using the diagram below as follows.

- First "in market" rivalry as shown in the middle circle of the diagram;
- Second substitution possibilities for consumers, and suppliers shown on the bottom;
- Third barriers to entry facing new entrants, shown at the top;
- Fourth customer, or buyer countervailing market power shown to the right; and
- Fifth supplier countervailing market power shown on the left.



I discuss each in turn.

In Market Rivalry & Market Shares

There is clearly intense within market rivalry. Substantial computer storage and processing power capacity at scale is readily and cheaply available and deployable at declining cost and increasing quality over time from around the world. On current market players already today, there are at least ten owners and providers of computer storage and processing power (CSPP) capacity worldwide besides Amazon Web Services, Microsoft Azure, and Google Cloud Platform who are the focus of the CMA. These include Alicloud, Baidu, Bytedance, Huawei, IBM Cloud, Oracle Cloud and Tencent. There are also regional market players, like OVHcloud and Scaleway, and newer entrants, such as Nvidia and CoreWeave. Notably, CoreWeave was founded in

2017 to address the need for GPU computing, especially for generative AI technologies. Other global and European Independent Service Providers (ISP) or players could readily expand, or emerge to compete on CSPP in Europe.

"In market" rivalry shown in the middle of the above diagram is then traditionally measured by market shares analysis. Thus after reviewing the CMA's discussion of switching I will then turn to review and discuss the CMA approach and analysis of market shares briefly. But market shares can only be used as a first step for screening if markets may require further assessment. The reason is that one firm may be dominant simply because it is the most efficient,[48] but that firm is nevertheless constrained by the other four competitive conditions identified in the diagram above.[49] So in a sense this section is only a preliminary step towards assessing whether the market is competitive.

Given our discussion on market definition above, until relevant markets are better defined, it is in fact impossible to calculate markets shares. Nevertheless we shall discuss the CMA's approach and analysis of market shares briefly. The key point though is that market shares do not in any event constitute reasonable ground to conclude the market is not competitive, and continue with the market investigation, One has to look at the other competitive conditions especially barriers to entry that determine market power and the scope for its abuse and refute the null hypothesis that the market is competitive.

The CMA View

The CMA discusses market shares at length in section 5 of the Competitive landscape report

> 5.1 In this section we consider the structure of the markets based on our shares of supply analysis. We have calculated shares of supply using various metrics to give an overall picture of the market structures and an indication of how those structures are likely to evolve over time.
>
> 5.4 In our analysis we have calculated shares of supply based on three different metrics: (i) shares by revenue; (ii) shares by capacity; and (iii) shares based on the flow of new business.

The CMA then goes on to elaborate its considerable research over 14 pages.

On shares of revenue it claims that

> 5.6 High and stable or increasing shares of supply can be a strong indicator of market power,

Which is not true at all that stable or increasing shares of supply it a strong indicator of market power that is relevant to regulatory decision making. This outcome may reflect

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[48] This may be due to economies of scale in production or consumption. These may lead to one firm dominating a market or typically three or four firms if there is product differentiation and market segmentation. There is heterogeneity in the products and services firms may offer, and in consumers demand. To the extent there is a corresponding heterogeneity in consumers demand then there can be "matching" and multiple firms can succeed and match with different consumers.

[49] Standard market share analysis may need to be adapted slightly for two sided or multi sided platforms Lougher and Kalmanowicz (2016), *supra* note 4, at 97

an efficient market with high economies of scale and scope in production and consumption, and in which it is best for consumers if there are high market shares, to prevent wasteful duplication of fixed costs, wasted investment and lost economies of scale and scope, and foregone lower prices, less supply, and lower quality products as a consequence.

For the purposes of this analysis, CMA defined UK Revenues as revenues generated from UK Customers in the UK, and defined UK Customers as Public Cloud Infrastructure Service customers that are operating or trading in the UK. In other words it adopted its own very narrow and market definition. The CMA also defined Annual Revenues as revenues generated within a calendar year from AWS, Microsoft, Google, Oracle, and IBM.

On shares of capacity the CMA claims that

> 5.25 Shares by capacity … show us the relative strength of each provider in terms of their production capability. … the greater a firm's capacity the greater the constraint it can impose on rivals by competing for business.

Once again this is an interesting notion, but this statistic can't be used to refute the legal presumption or null hypothesis that the market is competitive. Excess capacity may just provide a valuable option for expansion in the future with expected market growth from AI and be of benefit to all consumers in the repent and the future. Excess capacity may just alternatively reflect bad management or poor service quality that is not of interest to consumers. Or excess capacity may simply be a waste of resources that is not in the long run interest of consumers and may adversely effect competition, not positively affect competition as the CMA claims.

CMA describes how it estimated capacity

> 5.29 We calculated the shares of supply by capacity using data from AWS, Microsoft, Google, IBM, and Oracle on their datacentre capacity in megawatts (MW) within UK+EEA, globally, and in the UK.

On shares of flows of new business, The CMA comments that

> 5,37 …to... reflect recent changes in the relative competitive position of suppliers… it is useful to consider evidence on shares of supply on a 'flow' basis (eg shares of new customers or new revenues).

The CMA then discusses four measures of the flow of new business as follows

> 5.38 In this section we present the following shares based on the flow of new business:
> (a) Shares by new customers acquired
> b) Shares by revenue from newly acquired customers
> c) Shares by overall revenue growth
> d) Shares by new revenues from existing customers

We review its approach and results below.

Comment

To better reflect the wider CSPP market definition that seems more reasonable I focus on the revenue data share analysis using the widest market definition analysed by CMA, (that at least incorporates IaaS and PaaS). In general CMA's evidence is consistent with the hypothesis that the CSPP market is competitive. CMA comments

> 5.22 Our analysis shows the shares of supply in cloud services by revenue – that is IaaS and PaaS in combination. Our analysis shows that:
>
> (a) AWS is the largest provider of IaaS and PaaS and it share has remained broadly stable: its share was [30-40]% in 2019 and [30-40]% in 2022;
>
> (b) Microsoft is the second largest provider of IaaS and PaaS and its share has **increased** from [20-30]% in 2019 to [30-40]% in 2022 as it gains ground on AWS;
>
> (c) Google is the third largest provider of IaaS and PaaS …. has ["] **increased** its share from [5-10]% in 2020 to [(5-10]% in 2022;
>
> (d) For IBM and Oracle, shares have remained in the [0-5]% range from 2019 to 2022.[50]

Turning to shares of capacity as the CMA itself notes

> 5.29 …these shares do not include the capacity of other smaller IaaS providers and as such each provider's share is an overestimate across all providers and should be interpreted as an indicator of relative share between the largest cloud providers.

Implying that its estimates are unreliable. The CMA does not actually share the results of its analysis in its paper nor does it make clear how the results can be used to refute the reasonable hypothesis that the CSPP market is competitive

On shares of new business CMA notes that

> 5.39 The data available at present is at an aggregate level – this has important implications for interpreting the analysis as it means we cannot distinguish between
>
> (a) If the new customers a provider acquires are: (i) customers completely new to the cloud (representing competition for customers); (ii) customers that are only new to that provider and placing a new workload (representing competition for new workloads); or (iii) customers that are only new to that provider and switching an existing workload (representing competition for existing workloads).
>
> (b) If changes in a provider's revenue from existing customers is caused by: (i) some existing customers decreasing/increasing their spend on existing

[50] Ibid page 106

workloads without switching (eg cost optimisation, business expansion); (ii) some existing customers switching existing workloads to or from another cloud provider (representing competition for existing workloads); or (iii) some existing customers placing new workloads with that provider.

5.40 …. it means that we cannot identify the drivers of changes.

5,45 …. if new customers make up a significant proportion of year-on-year growth then competition is more likely to be determined by those new customers (although as outlined above the data does not allow us to fully disentangle the nature of that competition).

By the CMA's own admission the data is not that helpful. More fundamentally however, it is not that clear how this data can be used to refute the hypothesis that the market is competitive. It is simply not clear what evidence on shares of business acquisition, or change in shares of business acquisition could refute the hypothesis that the market is competitive. Constant and changing shares are consistent with competition depending on competitive conditions discussed further below.

There is a lot of evidence presented however consistent with the market being competitive that CMA mentions including

5.47 We have analysed UK shares of supply by year-on-year revenue growth of the largest UK cloud providers. Our analysis shows that:

(a) Microsoft has become the fastest growing cloud provider as of 2022: its share of revenue growth increased from [30-40]% in 2021 to [40-50]% in 2022;

And

5.49 …. new customers make up a relatively small proportion of year-on-year growth and thus competition is less likely to be driven by new customers. Rather provider level revenue growth is occurring either because existing customers are expanding their existing workloads, adding new workloads or switching workloads between cloud providers they already use.

And

5.55 We have analysed the shares of supply by new revenues from existing customers by provider. Our analysis has shown that: (a) AWS' share of increased spend from existing customers ["] from [40-50]% in 2021 to [40-50]% in 2022; (b) Microsoft's share increased from [30-40]% in 2021 to [40-50]% in 2022;

(c) Google's share of increased spend from existing customers fell slightly from [10-20]% to [10-20]% in 2022;

(d) Oracle's share of new revenue from existing customers remained in the [0-5]% range in 2021 and 2022.573

The CMA however doesn't really seem to acknowledge the above evidence is consistent with the market being competitive. As noted constant and changing shares are consistent with competition depending on competitive conditions discussed further below.

Substitution possibilities for consumer's and/or suppliers

The second major competitive condition to be examined is substitution possibilities for consumers, and suppliers. This is shown on the bottom of the earlier diagram in the middle.

As noted earlier in order to test market power, or refute the assumption that a market is competitive one first has to define the market. This is tested by the extent of substitution and switching in the market in response to price changes. The full extent of the substitution possibilities should thus have been made clear by the application of the HMT or SNIP test to relevant markets adopted by OfCom or the CMA. Neither Ofcom, who made the original reference, nor the CMA have conducted the requisite HMT or SNIP test for their chosen or relevant markets for two reasons. First they defined the products and therefore markets very poorly, preventing a proper inquiry. Second they have not and do not seem likely to acquire relevant data of actual behaviour to conduct such a test properly. Ofcom and the CMA thus does not adequately test the extent of the market using the SNIP or HMT test. They have not proven a lack of substitution ot competition to justify their narrow market definitions. A wider product and global geographic market offers extensive substitution possibilities for consumers and suppliers

Ofcom's Analysis

The current CMA working papers originate in a referral by Ofcom to CMA on 5 October 2023. The CMA published an Issues paper 12 days later on the 17 October 2023 that described the basis of this referral by Ofcom as follows

> 2. Ofcom had reasonable grounds to suspect that a feature or a combination of features of the markets for the supply of those goods and services in the United Kingdom prevents, restricts or distorts competition. *In particular, conduct which may create barriers to switching and multi-cloud.*

I have reviewed the Ofcom report(s) justifying this referral, and contrary to the above claim, for reasons I outline below, I have concluded that in fact Ocfom did not have reasonable grounds for making this reference for a CMA market investigation into the supply of public cloud infrastructure services in the UK. The Ofcom reference was clearly premature, and arguably unreasonable and ultra vires.

The reason is that Ofcom rested it decision solely on the claim that there *was "conduct which may create barriers to switching and multi-cloud."* There are three reasons why Ofcom did not have a reasonable grounds for a referral on this basis.

1) Switching and multi-cloud behaviour (that Ofcom basis its MIR on) both relate to only one of the five relevant competitive conditions for market power to exist that I have listed above – namely the "substitution possibilities for consumer's and producers" condition, which I am considering now. The problem with the Ofcom's MiR then is that
    a. Limited ability to switch and/or limited ability to acquire the same goods and services from multiple suppliers, and/or

b. limited observed switching behaviour and/or acquisition of the same goods and services from multiple suppliers

alone do not provide strong enough evidence of limited substitution possibilities, and more significantly of the existence of significant market power to justify a MIR. One has to consider the other four conditions, and the possible legitimate or efficiency reasons for limited switching or multi-clouding in the first place.

2) Evidence relied on by Ofcom that switching is not common, and/or that there are costs to switching is thus not strong evidence to refute the hypothesis that the market is competitive. As switching and the competitiveness of the market are not necessarily related in the manner posited by Ofcom and CMA. In a competitive market, firms deliver for their customers, and after an initial sorting and matching process, customers stay with the same provider, employer or local restaurant. In addition features like economies of scale (consumption and production) can lead to high market shares as outlined in the last section, and thereby limit the number of firms, and the scope for switching but yet all be results consistent with a competitive and efficient market, as we shall see. Switching is indeed not that common at any point in time even in competitive markets. Thus for example, in a normal labour market in any year relatively few employees actually switch firms. On average, the percentage of employees that changed firms each year ranged from between only around 4% in 2010 to around 8% in 2018 in the UK.[51]
3) Finally Ofcom quite simply provided no evidence on which it could reasonably base its claim. For example Ofcom's final report stated 'we remain of the view that switching levels are low in the cloud market', based on the evidence it had considered. However, it did not provide an exact estimated level of switching. [52] Nor did it provide a reasonable basis on which to determine what was an efficient level of switching and therefore make a judgement based on evidence it may have had.

I recognize that Ofcom claims that

> The Competition Appeal Tribunal has recently confirmed that Ofcom's discretion to make a reference is wide and, provided Ofcom has addressed matters sufficiently, that the "reasonable grounds for suspecting" threshold is low.[53]

However it is my view that even a very low threshold has to be reasonable and such a

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[51] This estimate uses data on those individuals who were in the Annual Survey of hours and Earnings (ASHE) sample in two consecutive years and drop the rest to create a continuously employed ASHE dataset. Movement of workers "between" firms is defined as those workers who are either in a different area of work compared with the year before, or they have changed the industry they work in, or are in a different occupational category. On average, around 9% of people changed jobs each year between 2000 and 2018; this ranged from a post-recession low of around 5.7% in 2010 to a high of around 10.9% in both 2017 and 2018.In 2018, 75.4% of job changers moved between firms, while 24.6% moved within firms. https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/compendium/economicreview/april2019/analysisofjobchangersandstayers#job-changers-and-stayers

[52] See paragraphs 4.58 to 4.61 of Cloud services market study final report (ofcom.org.uk)

[53] Ofcom makes the following further comment in a footnote to this claim "See the explanation of the Competition Appeal Tribunal in *Association of Convenience Stores v OFT* [2005] CAT 36, paragraph 7. See also more recently, *Airwave Solutions Limited & Others v CMA* [2022] CAT 4 at [9]-[10], [12] and [27] and *Apple Inc & Others v CMA* [2023] CAT 21 at [39] were the Tribunal referred to the trigger of that threshold as "low" and one that needs to "viewed in the round". "

threshold has not been met here. It was and still is still open to the CMA to reach the same conclusion that there are not reasonable grounds for the investigation, but it clearly has not in the time since the reference was made.

CMA View

In this section I focus on the lengthy discussion of switching and multi cloud in section three of the CMA Competitive Landscape report. In section three of its Competitive landscape report the CMA claims that

> 3.1 In this section, we set out evidence we have gathered to date on the switching process and types of multi-cloud. We also set out evidence on the prevalence of the use of multiple clouds and switching. [54]

In this section I first focus on the evidence on multi-clouding and then on switching. As noted earlier it seems to be me that the CMA seems to think that following Ofcom's reference the hypothesis to be refuted is that the market is not competitive and it has to then look for evidence that the market is competitive. It then assumes wrongly that evidence that switching and multi-clouding is uncommon enables the CMA to maintain the hypothesis that the market is not competitive and continue with its investigation.

Multi Cloud

CMA's evidence in fact shows significant multi clouding in Table 3.1 in that to quote CMA

> 3.74 Table 3.1 shows that based on our initial analysis:
> (a) approximately 7% of customers in the dataset use at least two of AWS, Google and Microsoft (unweighted); and
> (b) around a third of all spend is by customers that multi-cloud. [55]

These seem like big numbers and it is the marginal consumer that drives competition and prices at the margin. This data is thus strong evidence of multi-clouding, especially given the CMA itself comments:

> 3.76 However, we acknowledge that our analysis likely underestimates the true prevalence of multi-cloud due to the caveats in the methodology set out above. [56]

The CMA however latter seems to make a number of adjustments to the data based on faulty assumptions to conclude " that an integrated multi-cloud architecture is rare", which is a meaningless (and inconsistent) claim unless the multi clouds rates are compared with what is efficient on a reasonable basis, rather than expressed quite simply as a matter of opinion.

Nevertheless, the CMA concludes rather inconclusively

> 3.89 c) Our analysis indicates that there is some degree of multi-cloud, but it may be quite limited in scope and mostly found in larger customers. [57]

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[54] CMA Competitive Landscape WP 1 Page 48
[55] ibid Page 71
[56] Ibid Page 71
[57] Ibid page 74

In short there is insufficient evidence to refute the hypothesis that the market is competitive, and potentially even evidence that justifies an end to further investigation.

Switching

As noted in paragraph 9.6 of working paper 1 "The Competitive Landscape" the CMA comments on switching that

> "We have not seen strong evidence that switching between cloud providers is common"

The CMA thus seems to be starting with a presumption that the market is not competitive and that one needs strong evidence of a competitive market, to refute that hypothesis. It then appears to assume and that strong evidence that switching is common is necessary to refute the hypothesis that the market is not competitive otherwise one can continue to assume the market is not competitive and continue with the investigation.

As a result of its approach, if the CMA finds evidence that it believes shows switching is uncommon, then the CMA seems to maintain an assumption that the market is not competitive, and therefore continues with its' investigation, and continues to require strong evidence to refute the hypothesis the market is not competitive, Whereas, the CMA should be looking for reasonable, and strong evidence to refute the hypothesis that the market is competitive.

Why does one need to look for such strong evidence of switching being common? Strong evidence that switching is common does not refute the hypothesis that the market is competitive. One does not need strong evidence of switching, one needs strong evidence of market power or barriers to entry to refute the hypothesis that the market is competitive.

The reasons why I think Ofcom did not have reasonable grounds to make a market referral based on barriers to switching and multi-cloud are the same reasons why I believe the CMA is obliged to now end its investigation without further reports, and the three working papers this paper comments exhibit numerous weaknesses. As noted earlier switching and the competitiveness of the market are not necessarily related in the manner posited by CMA. In a competitive market firms deliver for their customers, and after an initial sorting and matching process, customers stay with the same provider, employer or local restaurant. In addition features like economies of scale (consumption and production) can lead to high market shares as earlier, and thereby limit the number of firms, and the scope for switching, yet this result is consistent with a competitive and efficient market. Switching is never that common at any point in time in competitive markets. For example in a normal labour market in any year on average, the percentage of employees that changed firms each year ranged from between only around 4% in 2010 to around 8% in 2018 in the UK.[58] This implies relatively few

- [58] This estimate uses data on those individuals who were in the Annual Survey of hours and Earnings (ASHE) sample in two consecutive years and drop the rest to create a continuously employed ASHE dataset. Movement of workers "between" firms is defined as those workers who are either in a different area of work compared with the year before, or they have changed the industry they work in, or are in a different occupational category. On average, around 9% of people changed jobs each year between 2000 and 2018; this ranged from a post-recession low of around 5.7% in 2010 to a high of around 10.9% in both 2017 and 2018.In 2018, 75.4% of job changers moved between firms, while 24.6% moved within firms.

employees actually switch firms in any year. Quite simply the same is true of CSPP customers perhaps few switch, because the market is competitive, not because it isn't.

Given the CMA's purpose and role, the fact it looks for strong evidence of switching being common, and therefore one presumes to refute a hypothesis that the market is not competitive seems ultra vires and for good reasons. In particular it seems to be a waste of resources including taxpayer's money to look for strong evidence a market is competitive when the obligation is look for strong evidence that the market is NOT competitive. Implying a requirement that switching should be common, and conducting an investigation into such a requirement is likely to signal the need for, and trigger wasteful rent seeking. It encourages wasteful rent seeking by those seeking to benefit from CMA regulation or extend their rights through regulation, and requires unnecessary expenditures by incumbent firms in providing unnecessary evidence to defend their rights. The above claim further risks signalling an implicit threat of regulation that can chill and distort investment and innovation.

Conclusion

I believe that the burden of refuting the hypothesis that the market is competitive to a reasonable threshold has not been met here. It was, and still is open to the CMA to reach the same conclusion, or conclude that there are not reasonable grounds for further investigation, but it clearly has not done that in the time since the Ofcom reference was made.

The CMA has not been able to provide reliable evidence on switching to justify further investigation - but notes

> 3.108 As set out above, AWS, Microsoft and Google provided customer datasets that identified customer names and annual spend on their respective clouds for 2020, 2021 and 2022. We are currently considering the extent to which these datasets could be used to identify switching between at least these three providers [59]

The CMA is thus proceeding with its investigation, and recently released more working papers to comment on. The reasons why I think Ofcom did not have reasonable grounds are the same reasons outlined above why I believe

- the CMA is obliged to now end its investigation without further reports, and
- the three working papers this paper comments on are flawed

In my view the CMA working papers only perpetuate and serve to compound the unreasonableness of the investigation for the reasons I have already discussed. Evidence on market shares and switching and multi cloud behavior alone do not justify inquiries and interventions in a market, and in any event evidence on market shares, switching and multi clouding do not justify an hypothesis or assumption that there is market power let alones its abuse. The evidence is either non-existent, unreliable or inconsistent with claims that there is market power.

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https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/compendium/economicreview/april2019/analysisofjobchangersandstayers#job-changers-and-stayers

[59] Ibid page 79

Barriers to Entry

The critical competitive condition however relevant to total consumer and wider welfare and for regulators to focus on in any market is the ability of new entrants (shown at the top of the earlier diagram) to enter the market to compete with incumbents that engage in anti-competitive behaviour with adverse effects. This depends on *barriers to entry* facing new entrants, which may create market power for an incumbent platform.

CMA's View

The CMA discusses barriers to entry and expansion in section seven of the Competitive Landscape commenting in the introduction that.

> 7.2 In this section we consider potential barriers to entry and expansion. To do this we set out evidence we have gathered to date and our initial analysis of:
>
> (a) whether larger cloud providers benefit from economies of scale when compared to smaller competitors;
>
> b) whether having a large portfolio of cloud services gives cloud providers strategic advantages over their competitors; and
>
> (c) regulatory barriers in cloud services.
>
> 7.3 This analysis is focused on the underlying structure of the cloud services market.

On a) economies of scale and b) economies of scope or portfolio effects the CMA's conclusion is as follows

> 9.19 In relation to barriers to entry and expansion, the evidence to date suggests that economies of scale (which include high levels of capital investment), the importance of the range of services, economies of scope and to a lesser extent network effects represent a significant barrier to entry and expansion in the public cloud infrastructure services market.

On c) regulatory barriers to entry CMA however concludes

> 7.81 …We … consider that there are no particular regulatory barriers to entry or expansion in the UK.

But notes

> 7.82 …. concerns about the impact that public sector procurement practises are having on competition in the market. We continue to gather evidence ..

Comment

Stigler has offered the best definition of a barrier to entry as the costs a new entrant has to incur that were not incurred by the incumbent. The key driver of competition then are the barriers to entry or costs facing new entrants to a market that were not incurred or are not faced by an incumbent, and that therefore blunt stronger competitive conditions or forces. As we shall discuss below

1) Economies of scale in production and consumption (including network effects) and economies scope (including portfolio effects) that are available to incumbents and new entrants do not create barriers to entry and expansion relevant to competition law analysis. They are relevant to analysis of the benefits of economies of scale, and the harm from proposed regulation, that takes the property rights and interferes in contracts of firms that deliver large economies of scale without compensation, and therefore deters the realisation of such economies, and encourages or supports higher cost smaller firms and new entrants and unnecessary duplication of fixed costs. Economies of scale deliver the benefits of lower unit costs per unit of output, greater productivity, greater output, lower prices and therefore wealth (including for consumer's pension fund investors) - they are not barriers to entry relevant to regulation. Regulation is meant to be designed for the benefit of consumers, yet regulation of the most efficient firms that have reaped the greatest economies of scale and scope, and that inevitably involves taking the property rights and interfering in contracts of these most efficient firms without compensation, will ultimately harm consumers. It is not clear why the CMA seems to think economies of scale are relevant barriers to entry – all incumbents and new entrants face the same scope for economies of scale.
2) An exclusive legal privilege or license granted to an incumbent by regulation and/or a subsidy, or tax concession granted to an incumbent, that is not available to a new entrant would constitute barriers to entry to new firms relevant to a regulator. A regulator should then be tasked or have a duty to ensure the incumbent beneficiaries of a subsidy, tax break or regulatory favour do not take advantage of this barrier to entry and abuse the market power or privilege this confers on them. The CMA's conclusion seems correct on this score or that there are no particular regulatory barriers to entry or expansion in the UK.

Economies of Scale and scope

Economies of scale (in production and consumption) and scope do not pose barriers to entry relevant to competition law analysis. They are interdependencies and effects that do not relate to barriers to entry, as they are available to all firms incumbent or new entrant. Thus the economies of scale in production the CMA focuses on due to high levels of capital investment required in IaaS, and economies of scale in consumption the CMA focuses on due to alleged indirect network effects between ISVs and customers boil down to the same fundamental and general phenomena long recognised in economics, and all best simply called scale economies, that may arise both in consumption and in production.

So too with economies scope, and portfolio effects, from supplying a range of services that the CMA focuses on. They too are simply interdependencies and effects that do not relate to barriers to entry or expansion, as they are available to all firms, incumbent or new entrant. They are not barriers that a new entrant faces that an incumbent didn't.

These interdependencies whether scale or scope economies have long been known in economics and may lead to it being efficient for a market to be served by one or a few firms. What is new is the transformation wrought by digital technology over the past 30 years, which has brought with it the inclination to introduce new terms, for old phenomenon like "network effects", "two-way effects", "direct network effects", "indirect network effects", "uni-directional effects" and "bi-directional effects. These are all simply interdependencies and whether due to economies of scale in consumption and production, or from economies of scope or portfolio effects, these interdependencies can be internalised by contract in markets, or through ownership.

Economies of scale and scope are fundamentally of value to consumers and society. Consumers can obtain lower prices or value or quality from firms who enjoy economies or scale and scope. Firms and therefore societies have to devote fewer scarce resources to production. Society benefits as there are fewer firms replicating costs to supply a market at higher average cost that can be achieved by fewer or even one firm. Economies of scale that leads to "tipping" "winner takes all, high concentration, lack of switching and lack of multi-clouding etc. therefore go primarily to an analysis of harm, or benefits and costs - not to an analysis of barriers to entry

The first point to note then is that economies of scale (in consumption or production) are beneficial, and contribute significantly to enhancing consumer benefits and the living and working conditions of people. Economies of scale contribute to what an economist calls "consumer surplus" (relating to living conditions) and "producer surplus" (affecting working conditions). Secondly these economies of scale may also mean it is efficient for one firm to serve all or a significant part of a market.

Depending on the extent of economies of scale and scope it may be efficient for there to be only 3-4 large infrastructure, platform, and software service providers perhaps differentiated in product offering and customer base (like most markets) and "less multi clouding". This may be efficient or due to lower unit cost and price paid, and better matching of product qualities to customer tastes. In an extreme outcome it may be efficient for all or most consumers to "single cloud" and one infrastructure, platform or software firm become extremely dominant, if not a sole-seller or a "natural monopolist".

The economies of scale (including "network effects") and scope, and a lack of switching and "multi clouding" highlighted by the CMA are thus simply the result of a competitive market and are more importantly efficient outcomes in markets that ultimately benefit consumers. The point then is that they are not technically sources of relevant barriers to entry that cause harm and justify regulatory action from a regulatory policy point of view – even though they may be described as barriers to entry in "pop-econ" terms by less efficient providers.

No doubt, where there is potential for significant economies of scale, or scope a small-scale single product firm will be relatively less efficient, and therefore less able to compete and deliver service at a lower price than an incumbent larger scale firm. The scale and scope economies of the larger more diversified firm may then be said to "deter the entry or expansion" of a rational small firm. But economies of scale is not a barrier to competition or a "barrier to entry or expansion" relevant to total societal welfare, or consumer welfare - or a competition regulator.

Simple economies of scale and scope are not relevant barriers to entry for competition law analysis. To realise economies of scale an incumbent would simply have had to invest enough to fully realise production cost economies, consumption or network

economies and/or scope economies and encourage consumers to happily "cloud" with them. But this is what a new entrant will have had to do to realise production cost economies, consumption or network economies and/or scope economies too. Both parties face this challenge. The challenge is not "unfair" or a relevant barrier - it is just a reality – given the fixed costs, network and scope economies of business.

To regulate to protect and enable a less efficient smaller scale less diversified firms expand or enter the market e.g. by requiring an incumbent to grant access to their assets below their efficient cost will only encourage excessive entry, and inefficient competition, lower beneficial network effects and production economies and lead to a waste of resources and lost opportunities and welfare. The purpose of competition law and regulation is to promote competition in order to promote social welfare – not to protect particular competitors (incumbent or a new entrant) that may be relatively higher cost or less popular.

Regulatory and Fiscal Barriers to Entry

If an incumbent was however granted an exclusive legal privilege or license under a regulation, and/or fiscal subsidy, and/or tax concession (as was BT), that is not available to a new entrant then those exclusive benefits conferred by regulations, subsidies, and taxes would constitute barriers to entry to new firms relevant to a competition regulator. A competition regulator should then be tasked or have a duty to ensure the incumbent beneficiaries of a subsidy, tax break or regulatory favour do not abuse the market power or privilege this confers on them, but rather delivers on the assumed purpose of the subsidy, tax break or regulatory favour – namely greater social or consumer welfare – rather than engage in conduct that adversely effects competition and unnecessarily and significantly harms consumers as a result.

As noted the CMA's conclusion seems correct on this score or that there are no particular regulatory barriers to entry or expansion in the UK. There is a need however to continue to monitor the use of state aids that may advantage some firms over others to the detriment of competition.

Misappropriation of Property Rights

Finally, it was noted by a judge in one of an early competition law case that the only limits to competition are the property rights of others.[60] Misappropriation of property (by a regulator, or by market player through theft, passing off, or breach of IP) can give rise to two competition problems:

a) Barriers to expansion by a rival due to misappropriation of property. Under this first problem misappropriation of the property of a rival, or a third party like a supplier will create clear barriers to a rival's expansion by legitimate means, and distort competition.
b) Barriers to entry by a new player, due to misappropriation of the property of a rival, supplier or other third party. Under the second problem an incumbents misappropriation of a supplier or other third party's property will clearly create barriers to market entry by new entrants

[60] Per Lord Halsbury Mogul Steamship Co Ltd v McGregor, Gow & Co [1889] LR 23 QBD 598

These effects may further occur upstream or downstream from where the misappropriation of property occurs. This is clear when one company steals the property of another company, and uses it to compete with that other company in any market. Similarly when a company misappropriates the property of third parties including suppliers, this may lead to distortion in competition in upstream or downstream markets.

The adverse effects of misappropriation of property on competition and market outcomes is one of the reasons why competition law regulators should be careful not to intervene with price controls, and/or regulation of other contract terms (like discounts and egress fees) generated in competitive markets without compensation. In doing so they would in effect be engaging in a state taking, or misappropriation of property rights, and interference in contract rights without compensation, burdening the market players who are regulated, and benefiting others, thereby distorting or adversely affecting competition, and ultimately harming consumers, and encouraging wasteful rent seeking.

Countervailing Consumer power

The fourth important competitive condition driving market power of incumbents is customer, or buyer countervailing market power shown to the right of the above diagram. The biggest users of CSPP tend to be large corporations (including digital platforms) and Governments that will have significant market power.

As the CMA itself notes

> 2.7 Customers also vary in terms of their size. Evidence from cloud providers shows that a small number of high-spend customers are responsible for a significant proportion of providers' UK revenue and a large number of low-spend customers are responsible for a small proportion of their revenue. In particular, the top 10% of customers account for a very large majority of revenues and the top 1% account for over half of revenues.
>
> 2.29 Large enterprise customers – classified by one provider as those with an estimated spend of over £1 million per year41 - generally procure cloud services through bilateral negotiations with providers.42 One provider said that this allows a range of customers, including those with higher spend rates to secure bespoke contracts tailored to their needs.43

This above statistics alone imply CSPP providers face considerable countervailing market power. Further adding to the conclusion that the major CSPP players (AWS Microsoft etc.) have very little market power and that the market is highly competitive.

This only increases the burden on the CMA to prove with strong evidence that the market is not competitive. At the same time this evidence on further weakens the CMA's ability to disprove the market is competitive, and maintain its theory of harm(s) hypothesis, as the strength of the evidence it can draw upon to justify further investigation of and intervention in the market further declines.

Countervailing Supplier Power

The fifth and final important competitive condition driving market power of incumbents is countervailing market power of suppliers shown on the left of eth above diagram. The

main CSPP providers clearly face significant countervailing market power from key suppliers. In particular Nvidia.

The CMA cites evidence that points to the importance of supplying accelerated compute.[61] NVIDIA has become the dominant player in this space. NVIDIA's leadership and countervailing supplier power is illustrated by the fact that in mid June 2024 Nvidia's market value rose past $3tn to overtake Apple as the world's second-most valuable company after Microsoft. As the CMA notes "Microsoft also said that NVIDIA has a 'virtual monopoly' on the accelerator chips " [62]As the CMA notes Nvidia itself said: '[O]ver the next 5 years … data centers across the world will be reconfigured as accelerated computing data centers, moving away from traditional hardware and software solutions towards an infrastructure that can also effectively deploy generative AI.'[63]

NVIDA's leadership does not however pose a barrier to entry. As the CMA notes "There has been entry by smaller, specialist cloud providers (ie specifically offering compute to AI developers), including CoreWeave, Lambda Labs, and a number of others, which provide access to Nvidia's market-leading GPUs"[64]

This above clearly implies however that CSPP providers face considerable countervailing market power from their suppliers. Further adding to the conclusion that the major CSPP players (AWS Microsoft etc.) have very little market power and that the market is highly competitive. This again only increases the burden on the CMA to prove with strong evidence that the market is not competitive, yet at the same time further weakens the CMA's ability to disprove the market is competitive, and maintain its theory of harm(s) hypothesis.

We have covered the key reasons why the CSPP market is competitive. In fact, the evidence the CMA could draw upon to refute the hypothesis that the CSPP market is competitive runs out at this point. The CMA however has one final and erroneous resort to measures of "profitability" as a "strong indicator of market power". As we shall see the "profitability" it reports on is clearly not strong evidence of market power in the CSPP market. Rather if anything it is strong evidence of the inflated new demand and therefore competition for capital relative to its supply in the new market, industry or innovation, - as well as the high degree of risk and uncertainty associated with the new innovation, market, or industry. In short the market is in fact competitive and contestable or open - but also innovative, young dynamic and fast evolving, and as result short on capital and high in risk and uncertainty justifying high rates of profitability –- as discussed in the following and last section on market power in the CSSP market

Profitability

The CMA claims that profitability can be a strong indicator of market power

> 5.6 (b) high profitability. Absent market power, rivals should typically be able to enter and compete for high profits until they have been reduced to competitive levels. We consider profitability in section 6 below; [65]

[61] WP1 page 147 para 8.14
[62] WP1 page 146 para c(ii)
[63] WP1 page 147 para 8.14 (a)
[64] WP1 page 153 para 8.33 b
[65] WP1 page 102 paragraph 5.6

In section 6 the CMA outlines the data it analyses as follows

> 6.35 We examined the global profitability of providers in our analysis due to (i) the global nature of the cloud services they provide, and (ii) the global nature of their financial reporting, asset base and capital investment.
>
> 6.36 We have analysed gross margins and earnings before interest and tax (EBIT) margins for cloud providers as indicators of financial performance.
>
> 6.37 We have also analysed and compared the return on capital employed (ROCE) for AWS and Microsoft's Azure and Cloud & Enterprise business segments, as these are the two largest providers in the UK market, to our estimate for the weighted average cost of capital (WACC) to assess their profitability. We do not include Google in our ROCE analysis as it has only recently (in 2023) reported profits597 and we are primarily interested in assessing the profitability of the largest incumbent providers in the market.598
>
> 6.38 We compare the ROCE for AWS and Microsoft's cloud businesses to the WACC, to assess the extent to which these providers earn a 'normal' rate of profit. Where firms persistently earn in excess of a normal return, this signals that there may be limitations in the competitive process.599
>
> 6.39 We benchmark margins as it provides useful context and insight into the comparative profitability of cloud providers, as well as trends in profitability over time, but note that this often has limitations when seeking to determine excess profits which makes other measures, such as ROCE, preferable where possible. [66]

CMA explains this focus as follows

> 6.30 In interpreting the results of our analysis, we take into account a number of factors. First, we recognise that at particular points in time the profitability of some firms may exceed what might be termed the 'normal' level. There could be several reasons for this, including cyclical factors, transitory price or other marketing initiatives, and some firms earning higher profits as a result of past innovation, or superior efficiency.592
>
> 6.31 Where firms have been generating profits above their cost of capital for a sustained period, this could indicate limitations in the competitive process. [67]

In Section Nine the CMA concludes that the profitability of AWS and Microsoft is an indicator of significant market power being held by the largest two providers,

> 9.24 Based on the evidence we have seen to date, our emerging view is that there are indicators of significant market power being held by the largest two providers, AWS and Microsoft. This is because…..:

[66] see WP1 pages 122-123 paragraphs 6.35-6.39
[67] see WP1 pages 121 paragraphs 6.30-6.31

> c) Whilst assessing current market outcomes is complex given the current stage of market development, our profitability assessment indicates that AWS and Microsoft have both been generating returns above their cost of capital. [68]

Comment

The CMA's analysis and conclusion on profitability in the CSPP market is fundamentally flawed given the nature of the market or subject being studied and its stage of evolution and rate of innovation. The CMA's approach is capture in the passing comment that there may be alternative explanations for high profit than a problem with competition (by implication a problem requiring regulation - or that regulation may solve)

In particular the CMA comments that

> There could be several reasons for … including cyclical factors, transitory price or other marketing initiatives, and some firms earning higher profits as a result of past innovation, or superior efficiency

The first two points are not relevant here cyclical factors, transitory price or other marketing initiatives and need not be mentioned any furher. the last point "some firms earning higher profits as a result of past innovation, or superior efficiency" this is the crux of the issue. This is indeed the null or working hypothesis about the state of competition in the CSPP market amongst aware of the state of the CSPP - it is replete with innovation and superior efficiency. It is this fact that ought to be at centre stage and the focus of the CMA's analysis

The problem is the CMA appears to be completely ignoring or belittling and side-lining the actual context of the CSPP market and the lessons of economic history. In history major value creating technological innovations and enhanced efficiencies like those we are observing in the CSPP market and the ICT and AI revolution more generally today or over the past 10 years and that are accelerating - innovations and efficiencies that transform the wider economy - are very rare. But where they occur the value generated by the innovation and greater efficiencies typically leads to high rates of profit for extended periods during the initial stages of the innovation. The high rates of profit do little more than reflect the high value being created and the urgency and extent of demand for the innovation and its application throughout the economy.

Innovation creates new demand curves for the new technology that reflects the expected value the technology can create. The new demand for the ultimate outputs or value created any the technology creates a high level of new derived demand for capital to in turn invest in the acquisition or employment of other inputs like land and labour and the creation of whole new production processes and downstream activities like marketing and distribution. The new demand for capital in short then faces a scarcity of the capital to invest in growth. Like anything this drives up the price of capital or rate of return offered or profitability required to attract capital and out compete demand for capital in other more mature industries.

Capital also has to be compensated at a higher rate of return to capital to compensate for the risk and uncertainty associated with a new innovation, and its associated new

[68] Competitive Landscape WP 1 page 159

industry, market(s), products or ways of doing business. There is no data to predict outcomes and there is inevitably considerable variance due to mistakes around an upward trend in realised value.

What may look like *supernormal profits* associated with a new innovation during an initial extended period of innovation and its application may in fact be just normal profits, once one adjusts for risk and uncertainty associated with the innovation and the markets growth and evolution. Normal profits are defined as profits above the opportunity cost of capital, or the returns that can be *earned elsewhere*. If one references normal profits to profits made in mature less risky and uncertain industries then this can overstate the degree of supernormal profits. What look like supernormal profits are often simply explained by the inflated new demand for capital relative to its supply in the new industry or market(s), and the high degree of risk and uncertainty associated with a new industry, market(s) or innovation.

A significant part of the perceived supernormal profits is simple compensation for the high levels of uncertainty and risk associated with new innovations, and therefore on an adjusted basis constitute, or are equivalent to normal profits in a less risky and more certain mature industry. Profits earned in a new, risky, uncertain, innovative technology and its associated market(s) with heightened demand for new investment may look highly profitable compared to returns earned in less risky uncertain, less risky, less innovative mature industry– but the high relative profits – or relative price of capital- do not correlate with weak competition in the new, risky, uncertain, innovative technology and markets. The new innovative market is on the contrary typically highly competitive - people are literally scrambling to succeed

The high rates of profit during the initial extended period of innovation, risk and uncertainty and inflated new demand for capital reflect the uncertainty, risk, strength scale and speed of the underlying value creation process driven by the new technology. Thus higher than normal profitability is just a signal of a healthy fast growing innovative industry and the higher than normal rate of return to capital compared to more certain mature industries just encourages the required capital to be invested in the new industry to facilitate its growth. Capital as a result moves from more mature markets where a lower profit is being made to the innovative new one where a higher normal one is being made.

In the long run as uncertainty and risk and the rate of innovation decline and more capital is reallocated to the new industry at the margin increasing supply of capital, and the profits earned are reinvested in growth, the profitability and rate or return falls – and the relative price of capital in the industry falls as it becomes more certain or mature.

High profitability in a new, risky, uncertain, innovative technology or way of doing business (etc.) and its associated markets like CSPP then is NOT evidence the CSPP market is not competitive, if anything its evidence it is highly competitive – that there is strong competition for capital. The high profitability can also be sustained by on going waves of innovation and efficiency including learning by doing.

VIII. Abuse of Market Power

In what follows I review the following two CMA Cloud services market working papers in turn covering.

1) Egress Fees or the CMA's "Egress Fees Working Paper" and
2) Discounts or the CMA's "Committed Spend Agreements Working Paper"

Egress Fees: The CMA's "Egress Fees Working Paper"

To comply with relevant statutory provisions of the Enterprise Act outlined in Appendix the CMA has to prove or show that there is a "feature, or combination of features of a relevant market"[69] that have "an adverse effect on Competition"[70] (AEC) "or a detrimental effect on customers or future customers."[71] – not offset by "any relevant customer benefits of the feature or features" [72] that are "unlikely to accrue without the feature or features concerned"[73] "within a reasonable period" [74]

The CMA's Egress fees working paper (WP1) issued on 23 May 2024 notes

> 1.5 Egress fees are charges to customers when they transfer data out of their provider's cloud, either to an end user or application, when moving data between the cloud and its on-premises data centres, when moving data between different cloud providers, either as part of a multi-cloud architecture, or as part of switching between two cloud providers.

Based on our earlier analysis the appropriate market definition is the market for the acquisition and supply of computer storage and processing power (CSPP). Based on our earlier analysis the working or null hypothesis also has to be that the CSPP market is competitive, and egress fees thus simply reflect the direct costs and opportunity costs (of various types) of suppliers (and customers), and how in a competitive market a CSPP firm passes through its direct costs and opportunity costs of egress, based on the other market determined terms of the contract, and the "going market" rate for egress in the particular circumstances of their customer and the firm.

The CMA therefore has to present a reasonable theory, and strong or reasonable evidence that refutes the above null or working hypothesis that the market is competitive and egress fees are set at competitive market rates - and thereby prove that egress free have an AEC and detriment to consumers current or future.

This is the context within which the CMA notes

> 1.1 This working paper presents our initial analysis of the potential impact of egress fees on competition in connection with the supply of public cloud infrastructure services in the UK, in particular, the potential impact on switching and multi-clouding.

The CMA summarises its theory of harm relating to egress fees, in particular justifying

[69] section 134(2)
[70] section 134(2) of the Act
[71] s134(4) of the Act
[72] s134(7) of the Act
[73] s134(8)(b)(ii) of the Act
[74] s134(8)(b)(i) of the Act

the CMA's investigation by the need to

> 1.6 … assess the extent to which egress fees may prevent, restrict or distort competition by creating barriers to switching and the use of multiple clouds, by contributing to the unpredictability of costs for customers, or by leading cloud providers to entrench their position.
>
> 1.7 Under this theory of harm, we are considering whether, and to what extent, egress fees may make it more costly and difficult for customers to choose the best value offers for them and may be deterred from switching or using multiple clouds.

To justify its investigation the CMA's then

1) First has to establish that it is theoretically possible that egress fees "may create barriers to switching and the use of multi-clouds" - and that this in turn "may prevent, restrict or distort competition" - or adversely affect competition (AEC), with a detrimental effect on customers, or future customers, not offset by any relevant customer benefits of the feature or features that are unlikely to accrue without the feature or features concerned within a reasonable period.
2) Second given the null hypothesis that the CSPP market is competitive, it then needs to present strong evidence that that egress fees make the CSSP market less competitive.

The CMA at times uses 'switching costs' as shorthand for costs associated with switching and the use of multiple clouds, so we will follow that convention in this section here as well.

In what follows

1) I briefly summarise the CMA's working paper and its conclusions. As we shall see the CMA does not provide strong evidence that egress fees have an AEC and/or any consumer detriment or harm.
2) I then turn to review and comment in more detail on the reasons the CMA theory of harm is fundamentally flawed, and that its proposed "remedies" would only impose costs and no benefits, compared to leaving it to the already clearly robust current competition in the CSPP market, and current common law of restraint of trade rules to ensure egress fees are efficient, and that egress fees do not have an AEC, or detriment on consumers.

The CMA View

The CMA then elaborates it's theory of the AEC and consumer detriment of egress fees switching costs as follows

> 1.9 …. The greater the switching cost, the more likely it is that customers will refrain from switching or using multiple clouds despite the availability of products that would otherwise represent a better overall offer in terms of price, quality, range of features/capabilities, etc...
>
> 1.10 Where switching costs limit switching (or the use of multiple clouds), the competitive process may be distorted. Customers may be harmed where they are deterred from availing themselves of attractive competitive offerings.

> 1.11 Switching costs may further harm competition in the long run where they make it more difficult for smaller rivals to expand, benefit from economies of scale, and compete with larger rivals on a stronger footing.
>
> 1.12 Switching costs may therefore reinforce or increase the level of concentration in a market. We are also more likely to be concerned where switching costs are present in markets that are more concentrated, especially when they are imposed by the larger providers in those markets. We consider the extent of economies of scale and the current level of concentration in the supply of cloud infrastructure services in the Competitive landscape working paper.

There are serious problems with this theory of harm that I shall outline in my comment below. There are further problems in relation to the evidence the CMA is required to present. In short the CMA needs to provide strong evidence of the above effects on competition and ultimately on consumers or prove that egress fees make the CSPP market less competitive to such an extent they have a detrimental net effect on consumers.

The only evidence the CMA presents however in its Egress fees working paper issued on 23 May 2024 is on the prevalence and magnitude of egress fees. On these two issues it says it has formed the following emerging views

First on the prevalence of egress fees

> 2.1 All UK public cloud customers have been subject to egress fees if they transfer data out of their provider's cloud, as long as the amount of data transferred does not fall within a cloud provider's free tier. These egress fees can vary based on whether a customer is eligible for additional discounts on egress fees but are structured similarly otherwise

and later

> 2.8 Our emerging view on the prevalence of egress fees is that, to date, they are common and widespread across all use cases. All UK public cloud customers are subject to egress fees if they transfer data out of their cloud provider infrastructure, unless the amount of data transferred falls within a cloud provider's free tier.

This does not prove that the Egress fees have an AEC. This evidence is consistent and more likely to show they are a legitimate business practise required to recover the direct and opportunity costs to suppliers of customer switching and multi-clouding - or supplier switching costs – and an outcome of a competitive market therefore that is efficient, and will benefit consumers over time.

On the CMA's evidence on the magnitude of egress fees and the role of egress fees on customers' choice two points are worth noting. First of all the evidence provided by CMA is not the strong evidence required by law. By the CMA's own admission

> 2.71 Our analysis on current spend on egress fees must be interpreted cautiously…
>
> 2.72 The data therefore serve only to set out some contextual information about

current levels of spending on egress fees.

Second the evidence tends to show that egress fees tend to be a small percentage of the total spend of customers on CSP.

> 2.73 In that context, a majority of the cloud providers' UK customers in the relevant data set paid egress fees of less than 1% of their annual spend on cloud However, a minority paid more substantial proportions.

This suggests large customers in particular could readily switch for less than 1%. This is unlikely to impose a significant switching cost. This then does not prove that the Egress fees have an AEC. This evidence is again consistent with, and more likely to show they are a legitimate business practise required to recover the direct and opportunity costs to suppliers of customer switching and multi-clouding - or supplier switching costs – and an outcome of a competitive market therefore that is efficient, and will benefit consumers over time.

For reasons outlined in my more detailed comment below relevant economic theory also clearly predicts that egress fees would not have an adverse effect on competition in the CSPP market. This indeed is the null or working hypothesis. Therefore, despite the CMA's own evidence being consistent with a competitive market, and the weakness of the evidence the CMA presents, it is not possible to claim the CMA has established even a prima facie case for continuing with its inquiry based on evidence, let alone theory.

This CMA's evidence - and its theory of egress fees as we shall see below - do not justify any further inquiry into the matter and especially not into potential remedies which would only further waste taxpayers money, encourage wasteful rent seeking by market participants and others and have a chilling effect of investment, a distortionary effect on market contracts, an adverse effect on competition in the market and as a result be to the detriment of consumers.

The concern is however that the CMA seems to draw a strong contrary conclusion as follows

> 2.70 Based on the evidence we have seen to date, our emerging view on the magnitude and role of egress fees on customers' choice is that egress fees can be relevant to customers' decision making when switching or using multiple clouds……

The implication of this statement is that the CMA believes it has strong grounds to believe egress fees have an AEC. Further confirming this implication the CMA proceeds in section 4 to discuss extensive interventions in the market, or what it calls "potential remedies" and invites comments on them as follows

> 4.1 In the event that we find that egress fees are a feature that gives rise to an AEC, we are required to decide whether, and if so what, remedial action should be taken to address that AEC. In this section we outline our emerging views on potential remedies relating to egress fees.

> 4.3 In our issues statement we set out and sought comment on four categories of remedies which we had identified as potentially relevant to our assessment in relation to egress fees, given the nature of the theories of harm under

investigation:

(a) Preventing cloud providers from charging egress fees, (ie a ban);

(b) Capping egress fees by reference to other fees charged by the cloud provider (eg ingress fees or other data transfer fees);

(c) Capping egress fees by comparison to the costs incurred by the cloud provider; and/or

(d) Increasing the visibility and understanding of egress fees for potential customers, potentially as part of wider requirements to improve the predictability and control spend on cloud.

4.4 Our issues statement also noted that we are considering the potential for cross-cutting remedies or a package of remedies which would combine to remedy, mitigate or prevent any AECs or their detrimental effects on customers.113 Our assessment will involve us reviewing potential remedies as standalone egress fee remedies or as components of a package of remedies, for which we would also need to consider any interactions between egress fees and the other components of the package.

4.5 There are also cross-cutting design elements which may apply across a number of the potential remedies we are considering, including for egress fees (eg, geography in scope for the purposes of any potential remedies). We will be considering such cross-cutting design elements in a later working paper on potential remedies.

Comment

There are three fundamental theoretical problems with the CMA's analysis and continued investigation into egress fees.

1 First Contracting in its entirety: The CMA's theory of harm fails to look at contracting in its entirety. If a contract includes egress fees then in a competitive market there is likely to be an adjustment in price, or other terms governing supply behaviour that compensates the buyer of CSPP for the net expected cost of Egress fees. In a competitive market if one charges egress fees above the going market rate one will lose customers, and or have to charge a lower "headline" price below cost, or offer other costly "compensating inducements" or other costly compensating terms that offer the customer a compensating benefit. The customer will then benefit from these terms up to the point of egress. All these compensating adjustments or inducements in the contract will be more costly than offering the market egress fee rate, and so will cost the CSPP firm upfront or in the short run. It is not clear why a CSP firm would do it then unless it is in the hope that they will be able to recoup these opportunity costs later by locking the customer in with the excess egress fee and exploiting that to earn above market prices or other terms later. It is not clear why a rational customer would not foresee this competitive risk, and require that other terms would then have to adjust to compensate further and commensurately as well - further disadvantaging the firm. The CSPP firm charging excess egress fees would have two opportunity costs up front. First the cost of subsidising or "paying" compensation, or an inducement in other terms of their contract to those accepting excess egress fees terms above market rates or above direct and opportunity costs to induce them to sign up. There is also the second cost of losing new customer flow involving those who rationally choose to stick with

market terms offered by other firms rather than incur the risk of the excess egress fee and lock in etc.

2 Second Recoupment. The CMA's theory of harm also falls foul of a recoupment problem that makes the "excess" egress fee behaviour both irrational and unlikely. The CMA's theory is that a CSPP provider could charge excessive egress fees, and incur the up front cost of compensating inducements and foregone new customers, in the hope the egress fees will lock the contracted consumer in, and enable the CSPP firm to later recoup the short run opportunity costs of the compensating inducements and lost new customers. The CSPP firm might charge excess egress fees the theory goes if they expect to be able to lock the customers in with the egress fees, and recoup the short run opportunity costs of inducements and losses by charging above market fees to contracted customers over time, as the egress fees lock them in. In the absence of other barriers to entry or expansion however (discussed above) the CSPP firm hoping to charge excess egress fees in the future will end up not able to recoup their initial opportunity costs. The reason why is that as soon as they try to recoup their inducement costs, contracted customers will simply switch to take up market contract terms from other providers having enjoyed the benefits of the inducements. They will not accept the added burden the CSPP firm seeks to impose on them in addition to the excess egress fees. They are likely indeed to just simply switch, and multi-cloud, without paying the excess egress, or perhaps part pay a "going market rate", and leave it to fee CSPP firm to sue for damages to recover the excess fee.

3 Third Contract enforcement. The third problem is that under the ancient common law doctrine against restraint of trade egress fees that are overly restrictive of competition and harm customers will not be enforceable contract terms. Such terms in contracts are not enforceable and can be severed by the courts. Thus the CSPP firm that seeks to negotiate excessive egress fees that restrain competition will find their contract term unenforceable. The contract terms will only be enforceable if the contract is self enforcing, or if in other words the above market egress fees are offset by other terms of the contract, and so there is no incentive for the contracted customer to switch or multi-cloud, and there is no barrier or lock in or scope for abuse of market power or AEC.

In short then theoretically egress fees cannot have an AEC, as the CSPP market is competitive and contestable. As discussed above there are no barriers to entry or expansion. New entrants only have to incur the same cost of entry as incumbents, and the cost of expansion of those in the market are the same for all. This means there is no scope for recoupment of the inducement costs of excess egress fees. The CSPP firm's upfront opportunity costs of compensating inducements, and new customer losses cannot be recouped by for example putting prices up above market rates later for contracted customers, as the CSPP firm's competitors will expand and new entrants will enter to take their customers off them, and customers will switch and avoid the AEC. In addition excessively burdensome egress contract terms are not enforceable under the common law doctrine of restraint of trade.

There is therefore no need for, nor benefit to CMA intervention or the potential "remedies" the CMA lists - only costs. The costs of the CMA proposed interventions or potential "remedies" (without any offsetting benefit) rise in the following ascending order of costs, and degree of AEC and consumer detriment of the remedy.

Information transparency remedies
Restricting the level of egress fees: price control remedies
Capping egress fees by reference to other fees charged
Capping egress fees by comparison to costs incurred

Banning egress fees

These potential remedies exhibit escalating costs because they give rise to uncompensated takings of property rights and will therefore seriously distort the market, , increasingly have chilling effects on investment, and innovation, distortionary effects on market contracts, increasing adverse effects on competition in the market and as a result increasing detriment to consumers, as well as increasing waste of taxpayers money, and increases in wasteful rent seeking by market participants and others. The CMA's evidence and its theory of egress fees as noted simply do not justify the cost of any further inquiry into the matter and especially not into potential remedies.

Discounts: the CMA's "Committed Spend Agreements Working Paper"

To comply with relevant statutory provisions of the Enterprise Act outlined in Appendix the CMA has to prove or show that there is a "feature, or combination of features of a relevant market"[75] that have "an adverse effect on Competition"[76] (AEC) "or a detrimental effect on customers or future customers."[77] – not offset by "any relevant customer benefits of the feature or features" [78] that are "unlikely to accrue without the feature or features concerned"[79] "within a reasonable period" [80]

The CMA's discounts, committed spend discounts (CSD) or committed spend agreements (CSA) working paper (WP2) issued on 23 May 2024 notes

> 1.1 Committed spend agreements/discounts (CSAs/CSDs) are agreements between a cloud provider and a customer in which the customer commits to spend a minimum amount across the cloud provider's cloud services over a period of years, and in return, receives a percentage discount on its spend with that provider during those same years.

Based on our earlier analysis the appropriate market definition is the market for the acquisition and supply of computer storage and processing power (CSPP). Based on our earlier analysis the working or null hypothesis also has to be that the CSPP market is competitive, and the CSDs thus simply reflect economies of scale (e.g. in production and consumption of various types), and how in a competitive market a CSPP firm will pass through such economies of scale charging lower prices as committed spend increases. The CMA has to present a reasonable theory and strong evidence to refute this and show that CSD have an AEC and detriment to consumers current or future.

The CMA therefore has to present a reasonable theory, and strong or reasonable evidence that refutes the above null or working hypothesis that the market for CSPP is competitive and CSD are set at competitive market rates - and thereby prove that CSD have an AEC and detriment to consumers current or future.

This is the context within which the CMA notes

[75] section 134(2)
[76] section 134(2) of the Act
[77] s134(4) of the Act
[78] s134(7) of the Act
[79] s134(8)(b)(ii) of the Act
[80] s134(8)(b)(i) of the Act

1.2 This working paper presents our initial analysis of the potential impact of these agreements on competition in connection with the supply of public cloud infrastructure services in the UK, in particular the potential impact on switching and multi-cloud.

The CMA's View

The CMA does not succinctly summarise its theory of harm relating to discounts , CSA, or CSD, in particular justifying the CMA's investigation. There however seem to be a few elements or foundation stones that are not clearly derived. As follows

First the CMA starts with an assumption that AWS and Microsoft may have significant market power. The CMA's assumption that AWS and Microsoft's size gives market power is simply incorrect, yet it runs through the paper. Thus the CMA notes

> 1.6 Throughout this paper, we focus mainly on AWS and Microsoft. We do so based on their position as the two largest providers of cloud services by some distance, as set out in the Competitive landscape working paper, which indicates that the two largest cloud players may have significant market power.

As we outlined above in our review of the Competitive landscape working paper, and comment in more detail below, this starting point focus on AWS and Microsoft is both inappropriate and unfounded and undermines their analysis. This assumption that AWS and Microsoft may have significant market power is simply incorrect. They face strong competition from each other and other in market players, from low barriers to entry and expansion, from plentiful substitutes and ease substitution on the demand and supply side, and from countervailing power on the demand and supply side. The CMA's assumption here basically assumes from the outset that the market is not competitive, and therefore that CSD can have AEC. It does not prove the market is not competitive and that CSD have AEC using clear theory of market power nor strong evidence.

Second the CMA relies on a hard to understand and weak theory, concept or assumption of "sticky demand" for which it presents no or weak evidence. The CMA claims that CSD involve a "conditional pricing structure" and then presents the following "sticky demand" "leveraging" theory of harm

> 1.10 ….a conditional pricing structure may raise competition concerns is as follows:
>
> (a) A customer has some of its demand met by a supplier, and the extent to which the customer can exercise effective choice over that demand is limited by factors such as lack of suitable alternatives or barriers to switching (we call this 'sticky demand'); and
>
> (b) the customer also has a portion of demand that is more contestable: the customer would be willing and able to place that demand with an alternative supplier (we call this the 'contestable demand'); but
>
> (c) the supplier of the 'sticky demand' imposes a condition such that the customer must place some or all of the contestable demand with them, or otherwise pay higher prices (lose a discount) on the sticky demand.

1.11 The concern under such circumstances is that the prospect of paying a higher price for the sticky demand deters customers from considering alternative suppliers for their contestable demand. The incumbent supplier leverages its strong position over one portion of demand into a new segment where it would not otherwise have enjoyed the same strong position. Competition may be harmed to the extent that the conduct:

> (a) reduces the ability and incentive of rival suppliers to compete for each other's existing customers; and/or
>
> (b) leads to the weakening or marginalisation of some suppliers, for example because they lose, or fail to achieve, economies of scale.

1.12 Any harm to competition may eventually lead to higher prices or lower quality for customers overall.

For reasons outlined below this is a very weak theory with poor logical foundations, that is not supported by evidence. The CMA has not made the theoretical case nor provided strong evidence for its ongoing investigation of CSD. As I show it has not elaborated a reasonable theory, nor provided strong or reasonable evidence that refutes the null or working hypothesis that the market for CSPP is competitive and CSD are set at competitive market rates - and thereby prove that CSD have an AEC and detriment to consumers current or future.

Comment

As noted the CMA's assumption that AWS and Microsoft's size gives market power runs through the paper. In effect the CMA targets specific players, which is inappropriate if not contrary to the rule of law, just by virtue of their size, not based on clear and sound theory and strong evidence. It also prejudges the CSD's AEC, and discards without evidence the efficiency or economies of scale explanation for CSD's outlined above. The claim that "By virtue of the positions of AWS and Microsoft in the market(s), as outlined above, we consider any impact on competition arising from their CSAs/CSDs is likely to be greater than any impact from CSAs/CSDs offered by smaller providers" does not follow in economic theory. The impact simply depends on other key market level conditions discussed above especially barriers to entry and expansion and so called Hicks Marshall laws, which includes "the importance of being unimportant". The more "important" AWS and Microsoft's are the less likely they will be able to "pass through" the costs of their anti-competitive behaviours, or have an AEC that adversely affects consumers. Most of AWS and Microsoft's revenues also come from large firms whose switching costs are less than 1% according to CMA itself. This means that it is easy for them to switch to competing CSPP firms and new entrants to discipline ant-competitive behavior. The large size of AWS and Microsoft's customers and suppliers also gives them countervailing bargaining power to enable them to negotiate efficient deals and counter or avoid CSP firm behaviours that have AEC, and detrimental effects.

Based on our earlier analysis the appropriate market definition is the market for the acquisition and supply of computer storage and processing power (CSPP). Based on our earlier analysis the working or null hypothesis also has to be that the CSPP market is competitive, and the CSDs thus simply reflect economies of scale (e.g. in production and

consumption of various types), and how in a competitive market a CSPP firm will pass through such economies of scale charging lower prices as committed spend increases. The evidence that the CMA cites confirms that the discounts reflect economies of scale: as follows

> 2.16 The evidence we have seen to date suggests that customers with a CSD represent a large share of each of AWS and Microsoft's total UK cloud revenues. It also suggests that while CSDs are not common across all users of cloud services, they are much more common for customers with higher spend.

The CMA has not presented a reasonable theory, and strong contrary evidence to refute the hypothesis that the CSPP market is competitive and CSD simply reflect economies of scale, and show that CSD have an AEC and detriment to consumers current or future.

Its advances an unclear and ill founded theory that CSP firms can threaten higher prices on sticky demand unless the customer place some or all of the contestable demand with them

> a) A customer has some of its demand met by a supplier, and the extent to which the customer can exercise effective choice over that demand is limited by factors such as lack of suitable alternatives or barriers to switching (we call this 'sticky demand'); and
>
> (c) the supplier of the 'sticky demand' imposes a condition such that the customer must place some or all of the contestable demand with them, or otherwise pay higher prices (lose a discount) on the sticky demand.

The first problem here is what is meant by "sticky demand" or what are its causes? This is not clarified other than to say "lack of suitable alternatives or barriers to switching".

The lack of alternatives is not necessarily a relevant competition law phenomenon. Scarcity is a fact that economic theory takes as given and attention focuses on decision making over a feasible set of choices with opportunity costs. As we have shown in the market definition section there are no lack of suitable alternatives for CSPP. We identified 27 different options in terms of product mixes for highly stylized versions of IaaS, PaaS and SaaS. There are also clearly low barriers to switching for most CSPP customers, with switching costs as low as 1%.

The problem with this sticky demand /contestable demand leveraging theory of harm (ToH) is the same as with the Egress fees theory.

1 Contracting in its entirety. The CMA's theory of harm fails to look at contracting in its entirety. To offer a discount is costly to the supplier so presumably there must be some gain to supplier. If a contract includes discounts then in a competitive market there is likely to be an adjustment in other terms governing demand or supply behaviour that compensates the seller of CSPP for the net expected cost of the discount. If a CSP firm offers a discount then of course a customer may be willing to adjust another term of a contract and for example agree to use more of the providers services. The gain to the supplier is the added profit from such sales, but also the infra-marginal gain from greater economies of scale. To offer a discount higher than the additional profit reaped from economies of scale would not

however make sense. The competitive risk and gain to the CSP that CMA seems to focus on from discounts is that they are greater than economies of scale and thereby weaken a competitor, and lead to future higher prices, and/or lower future quality than the terms available in the market otherwise. It is not clear why a rational customer would not foresee this future competitive risk however (were it real on which see below), and require that other terms would then have to adjust further to compensate commensurately for the competitive risk - further disadvantaging the CSP firm offering the discount. The CSPP firm offering CSD that don't reflect their direct and opportunity costs and in particular economies of scale, would then have two further opportunity costs. First the cost of subsidising or "paying" further compensation, as an inducement in other terms of their contract to cover the "leveraging" threat or risk facing those accepting CSD terms that hold the future prospect of above market rates, or above CSP direct and opportunity costs. There is also the second cost of losing new customer flow involving those who rationally choose to stick with market terms offered by other firms rather than incur the risk of the excess CSD and lock in etc. On the CMA's claim that the CSD may be used to hurt or weaken a competitor through lower prices, lower prices per se is not a relevant competition law concern. It is indeed one of the outcomes of competition in a market. Prices below production cost may just be a promotional or marketing cost. Competition law concern is concerned with competition - not with harm to competitors per se. It is then not clear how a CSPP would hurt competition in the long term by charging less than their costs, through discounts that are greater than the economies of scale reaped from increased spend. On the reason why we turn to the recoupment issue below.

2 Recoupment: The CMA's theory of harm also falls foul of a recoupment problem that makes the alleged excess CSD behaviour by CSPP firms both irrational and unlikely. The CMA's theory of harm is that a CSPP provider could offer discount fees below direct and opportunity cost including economies of scale, and incur the up front cost, in the hope the discount will leverage off the sticky demand and will lock the contracted consumer in, and enable the CSPP firm to later recoup the short run opportunity costs of the CSD and lost new customers because of the competitive risk it imposes. The CSPP firm might offer excess CSD the theory goes if they expect to be able to lock the customers in with the excess CSD, and recoup the short run opportunity costs of inducements and losses by charging above market fees and/or provide lower than market quality etc. to contracted customers over time, as the excess CSD have locked them in. In the absence of other barriers to entry or expansion however in the CSP market (discussed in an earlier section) the CSPP firm hoping in the future to charge contracted customers above market fees and/or provide lower than market quality etc. will end up not able to recoup their initial opportunity costs of the CSD. The reason why is that as soon as they try to recoup their excess CSD costs, contracted customers will simply switch to take up market contract terms from other providers having enjoyed the benefits of the excess CSD inducements. They will not accept the added burden the CSPP firm seeks to impose on them above what is available at market terms. They are likely indeed to just simply switch, and multi-cloud, leave it to the CSPP firm to sue for damages for breach of contract term perhaps.

3 Third Contract enforcement. The third problem is that under the ancient common law doctrine against restraint of trade CSD terms requiring committed spends on unreasonable terms, or that are overly restrictive of competition and harm customers will not be enforceable contract terms. Such terms in contracts are not enforceable and can be severed by the courts. Thus the CSPP firm that seeks to negotiate excessive CSD that restrain competition later will find their contract term unenforceable. The contract terms will only be enforceable if the contract is self enforcing, or if in other words the above market CSD are offset by other terms of the

contract, and so there is no incentive for the contracted customer to switch or multi-cloud later, and there is no barrier or lock in or scope for abuse of market power or AEC.

In short then, theoretically excess CSD cannot have an AEC, as the CSPP market is competitive and contestable. As discussed above there are no barriers to entry or expansion. New entrants only have to incur the same cost of entry as incumbents, and the cost of expansion of those in the market are the same for all. This means there is no scope for recoupment of the inducement costs of excess CSD. The CSPP firm's upfront opportunity costs of CSD and compensating inducements, and new customer losses cannot be recouped by for example putting prices up above market rates later for contracted customers, as the CSPP firm's competitors will expand and new entrants will enter to take their customers off them, and customers will switch and avoid the AEC. In addition excessively burdensome egress contract terms are not enforceable under the common law doctrine of restraint of trade. It requires a market with barriers to entry and expansion that do not exist for this sticky demand theory of harm behavior to arise or be feasible, rationale or possible. Competitors can compete across the board on the package of "sticky Plus contestable" elements so one can't price distort the competitive price relativities. The point is that one needs to think about product mixes and look at the customer's options. They can clearly threaten or counter offer to switch their sticky demand to a competitor unless the CSPP firm charges market price relativities.

The CMA however seems to fall foul of the assumption that economies of scale are barriers to entry and expansion relevant to competition law. They are not. The CMA quite simply seems to imply the economies of scale are a bad thing or can have bad effects at several points. For example paragraph 1.17(a) states "The rival may not have the ability to profitably compete …if the discount is such that the rival would have to price below its own costs." This implies that the competitor is less efficient and intervention banning discounts would subsidise the inefficient. Similarly in Para 1.18 18 "If the rival is small and the market is characterised by significant economies of scale, the incumbent's CSA might also lead to the weakening or marginalisation of the rival as the rival fails to win enough demand units and therefore loses, or fails to achieve, such economies of scale." This suggests we need to subsidise small firms to compete with large firms – this is a costly distortion and expensive – consumers would bear that cost. The last point on economies of scale just sounds like the limit price theorem – that any entrant is faced by the incumbent lowering their price to the limit their economy of scale permits to eliminate competition and deter entry. The new entrant or expander however only needs to recover costs during the pre-reaction period to make it worth their while – e.g. spot sales on an iterative "hit and run" basis. This would also discipline the incumbent in a tit for tat game.

The CMA's evidence and its theory harm from CSD simply do not justify the cost of any further inquiry into the matter and especially not into potential remedies. There is simply no need for, nor benefit to CMA intervention, or the potential "remedies" the CMA lists - only costs. The costs of the CMA's proposed interventions or potential "remedies" (without any offsetting benefit) rise in the following ascending order of costs, and degree of AEC and consumer detriment <u>of the remedy</u>.

Potential information remedies
Setting a maximum duration for any CSDs
Restrictions on the structure of any volume-related discounts

Banning the use of discounts based on commitments

These potential remedies in order exhibit escalating costs because they give rise to increasing harm to consumers by involving an uncompensated taking of property rights, and distorting contract terms, besides these distortionary effects on market contracts, and associated increasing adverse effects on investment, innovation and competition in the market and as a result increasing detriment to consumer, there is waste of taxpayers money spent on the MIR etc., increases in wasteful rent seeking by market participants and others. It is too premature to be considering remedies in relation to CSD. The CMA's evidence, and its "leveraged sticky demand" theory of harm from CSD do not justify any further inquiry into the matter and especially not into potential remedies.

IX. Harm

Is there adequate theory and evidence on the nature and extent of harm from the agreements? The CMA provides none. I have shown that profitability data presented by CMA is not relevant. Prices have fallen not risen - and investment and innovation and quality is rising.

X. Regulatory Failure

What are the relevant risks and costs of regulatory failure by the CMA? Even though markets may fail, it has to be recognised that regulation may contribute to that failure - or only make matters worse. There is no discussion of regulatory failure and regulatory risk and costs, yet this needs to be assessed to justify for the ITC in the first place. It appears the CMA assumes that so long as it can identify a restrictive contract term then of course the CMA can make matters better, and this justifies a MIR. It is assumed that inquiry into such matters itself has no adverse effect on competition. Regulatory failure is however well documented, likely if not inevitable and common, it's theoretical foundations are well established and empirical methods exist to test its extent - but the CMA does not seem to factor it into its analysis or do any work on it. The costs of regulatory failure need to be factored into cost-benefit decisions on whether to establish an inquiry, launch a MIR and/or otherwise regulate. Public choice theory, regulatory economics and the theory of bureaucracy clearly explain the key problems including interest group capture, information costs, incentive problems, median voter problems, regulatory creep, regulatory bias etc. Regulatory failure is often driven by protectionist motivations or justifications that in fact are most likely to contribute or cause problems like ""entrenched market positions" and "potential harmful competition behaviour" through premature and costly inquiries, and then adoption of harmful regulatory interventions that foreclose competition. The MIR will clearly stimulate interest group coalition formation, facilitate regulatory capture, and therefore exacerbate, and accelerate the risk of regulatory failure. This justifies not calling for contributions to the MIR at such an early stage, and ending the inquiries into competition in the CSPP market before they cause more regulatory problems and

harm to consumers than it has been proven it could ever actually avoid. A prima facie case that factors in the costs and risk of regulatory failure is required first.

XI. Conclusion

For reasons I have outlined in detail above the weight of theory and evidence on the CMA's hypothesis or theory of harm relating to egress fees and Committed Spend discounts (CSD's) is that these features of contract agreements

1) Have legitimate business, and efficiency rationales, and pro-competitive effects that benefit consumers, in that the terms (egress fees and CSD) better ensure prices approximate suppliers direct and incremental costs or efficient costs in the computer storage and Processing Power (CSPP) market
2) Can not have an adverse effect on competition (AEC) or detrimentally effect consumers for reasons outlined below in particular there are no barriers to entry and expansion, and any attempt to have an AEC would lead to punishing competitive responses from other incumbent firms and new entrants, and both customer and supplier switching and countervailing responses, with the parties to the agreements themselves reneging on any anticompetitive part to the deals or failing. Instead in fact the agreements are more likely to substantially enhance competition, and have legitimate business and efficiency rationales and effects as outlined above.

These conclusions appear obvious from the outset, and so a more fundamental point I make is that it is very premature for the CMA to be raising these specific "applied" or case related questions and conducting a public inquiry into competitive conditions in the CSPP market. Indeed the CMA decisions to continue its investigation and then issue these working papers in seem unreasonable, seriously unfounded and even ultra vires or beyond its jurisdiction. The CMA was not set up to investigate clearly competitive markets. The CMA's inquiries into the CSPP market is more likely to lead to a lessening of competition than the agreements being investigated.

To test the hypothesis posed by the CMA ITC however one first has to stand back and address a number of more fundamental or primary prior questions, and assess the evidence justifying the inquiry in the first place. In short the CMA's working papers beg a large number or prior and more primary questions that the CMA has not provided a satisfactory answer on and need to be answered to justify the ITC and any further action.

Appendix I Statutory Background

The Enterprise Act (2002) ("The Act") s 134 makes clear the CMA when considering a MIR must

> "decide whether any feature, or combination of features, of each relevant market prevents, restricts or distorts competition in connection with the supply or acquisition of any goods or services in the United Kingdom or a part of the United Kingdom." [81]

The decision is made by a group of independent members constituted from its panel, on behalf of the CMA. If the group decides that there is such a prevention, restriction or distortion of competition, it will have found an 'adverse effect on competition' (AEC) as defined in section 134(2) of the Act which states

> "for the purposes of this Part "there is an adverse effect on competition if any feature, or combination of features, of a relevant market prevents, restricts or distorts competition in connection with the supply or acquisition of any goods or services in the United Kingdom or a part of the United Kingdom."

Thus attention focuses on adverse effects on competition (AEC). If the CMA finds that there is an AEC, it has a duty to decide whether it should take action and if so what action should be taken, and/or whether it should recommend that others take action, to remedy, mitigate or prevent the AEC concerned

> "or any detrimental effect on customers so far as it has resulted from, or may be expected to result from, the AEC" [82]

Section 5) of the Act further clarifies that

> (5) "For the purposes of this Part, in relation to a market investigation reference, there is a detrimental effect on customers if there is a detrimental effect on customers or future customers in the form of—
>
> (a) higher prices, lower quality or less choice of goods or services in any market in the United Kingdom (whether or not the market or markets to which the feature or features concerned relate); or
>
> (b) less innovation in relation to such goods or services.

Section 7) of the Act further clarifies that

> (7) In deciding the questions mentioned in subsection (4), the CMA may, in particular, have regard to the effect of any action on any relevant customer benefits of the feature or features of the market or markets concerned.

[81] see Section 124)1) and (2) https://www.legislation.gov.uk/ukpga/2002/40/section/134
[82] As defined in section 134(4) of the Act

Section 8) of the Act then further clarifies that

(8)For the purposes of this Part a benefit is a relevant customer benefit of a feature or features of a market if—

(a) it is a benefit to customers or future customers in the form of—

(i) lower prices, higher quality or greater choice of goods or services in any market in the United Kingdom (whether or not the market or markets to which the feature or features concerned relate); or

(ii) greater innovation in relation to such goods or services; and

(b) the CMA or (as the case may be) the Secretary of State believes that—

(i) the benefit has accrued as a result (whether wholly or partly) of the feature or features concerned or may be expected to accrue within a reasonable period as a result (whether wholly or partly) of that feature or those features; and

(ii) the benefit was, or is, unlikely to accrue without the feature or features concerned.

S134 (3) then states that "In subsections (1) and (2) "relevant market" means" a market in the United Kingdom—

(i) for goods or services of a description to be specified in the reference"

This tends to imply the CMA has to stay with the Market defined in the reference

The CMA however in it's competitive landscape report claims the opposite, without citing relevant law permiting, instead relying on its own guidance, as follows in Paragraph 4.

> 4.5 The market definition(s) used by the CMA need not always correspond with the market for the goods or services described in the Terms of Reference ('relevant market(s)').[83] The CMA may conclude that the market definition goes wider or narrower than those goods and services.[84]

[83] Here the CMA cites its own Guidelines for market investigations April 2013 (CC3) paragraph 26.
[84] Ibid., paragraph 131.