



HM Government

# State of competition: Annex 2 – Existing competition indicators



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## Introduction

1. Competition, the process by which sellers compete for sales of goods or services from buyers, drives firms to provide consumers with better deals, incentivises firms to innovate, and drives productivity and long-run economic growth.
2. Over the past few years, several papers have sparked public debate by attempting to measure the level and direction of any changes in competition in the economy, and in particular whether competition across advanced economies is in decline.<sup>1</sup> These papers have put forward a set of hypotheses: competition is in decline due to markets becoming more concentrated (increasingly dominated by a few firms) and there has been a rise of a small number of 'superstar' firms who may have pulled ahead of their rivals and may no longer face sufficient competitive pressure.<sup>2</sup>
3. However, much of the existing evidence has centred on international as opposed to UK evidence, and the quality of competition indicators used across this research is vigorously debated.<sup>3</sup>
4. This Annex therefore sets out a preliminary survey of the available evidence for the UK to inform and motivate the CMA's expert state of competition assessments. In particular, we discuss new BEIS concentration statistics and mark-ups evidence from the literature in the context of what these indicators can and cannot tell us about recent trends in competition. For reasons explained below, we do not find clear evidence on whether competition is in decline in the UK. For consistency with previous releases, we have also published updated entry, exit and churn statistics alongside this paper, however further work on dynamic indicators would be required to offer clear conclusions.

## Indicators of concentration

5. Perhaps the most widely used of all competition indicators, the concentration approach looks at how much market share is held in the hands of the largest firms.
6. The core idea is that in a more concentrated market, firms face fewer effective rivals which could give them more power in setting prices and determining the quantity, range and quality of products offered to consumers.
7. Two measures of concentration are typically used:
  - Concentration ratios (CR) capture the combined share of turnover held by a leading group of firms in a market. A high CR indicates that the market is dominated by a single firm or a small number of firms. For example, a CR5 of 100% would indicate that five firms sell all the products in that market.

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<sup>1</sup> For example, in 2016 the US Council of Economic Advisers concluded there are some signs of lessening competition in the US economy.

<sup>2</sup> For example, see Autor et al (2017).

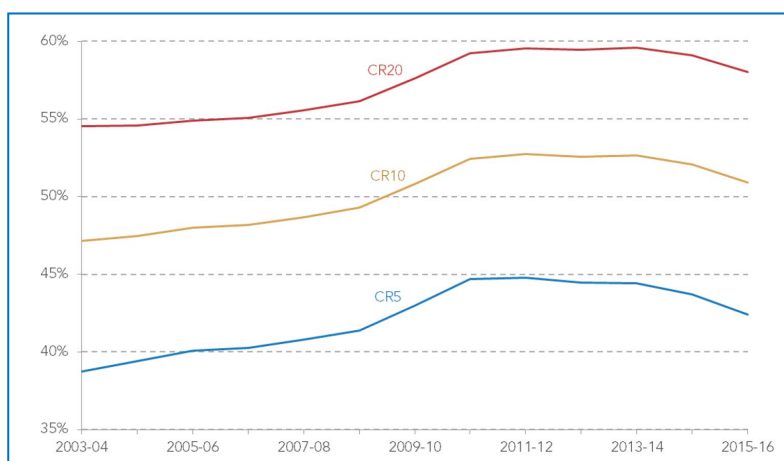
<sup>3</sup> For example, see Shapiro (2018).

- The Herfindahl-Hirschmann Index<sup>4</sup> (HHI) accounts for the concentration and symmetry of a market. In particular, the HHI approaches zero when a market is occupied by a large number of firms of relatively equal size and reaches its maximum of 10,000 when a single firm holds 100% of the market. Following definitions used by the CMA, we define a sector with an HHI exceeding 1,000 as ‘concentrated’ and exceeding 2,000 as ‘highly concentrated’.<sup>5</sup>
8. These two measures offer complementary insights. CRs are a more intuitive and straightforward measure to interpret. However, unlike HHI they do not capture the potential competitive pressure exerted by firms across the market.<sup>6</sup>
  9. While concentration measures have traditionally been used for individual markets, they can in theory be applied across multiple markets of the entire economy. However, it is important to note from the outset that due to data availability economy-wide measures typically use sector as opposed to market-level data. This is important because markets, where firms compete for consumers, represent the relevant dimension for competition policy. We discuss the implications of this after presenting the UK evidence.

## Are UK markets becoming more concentrated?

10. In 2018, the Resolution Foundation<sup>7</sup> published a concentration analysis looking across sectors of the UK economy. They found general increases in the combined shares of the largest 5, 10, and 20 firms in each sector between 2003/04 and 2010/11 (the CR5, CR10 and CR20). However, on each measure of concentration there was some fallback from this trend between 2010/11 and 2015/16. This suggests that the increase in the first half of the decade may not represent a general trend. This is shown in Figure 1 below.

Figure 1: Weighted average sector CRs, UK (2003-04 to 2015-16)



Source: Resolution Foundation (2018)

<sup>4</sup> The HHI is calculated by summing the squared market shares of the relevant group of firms.

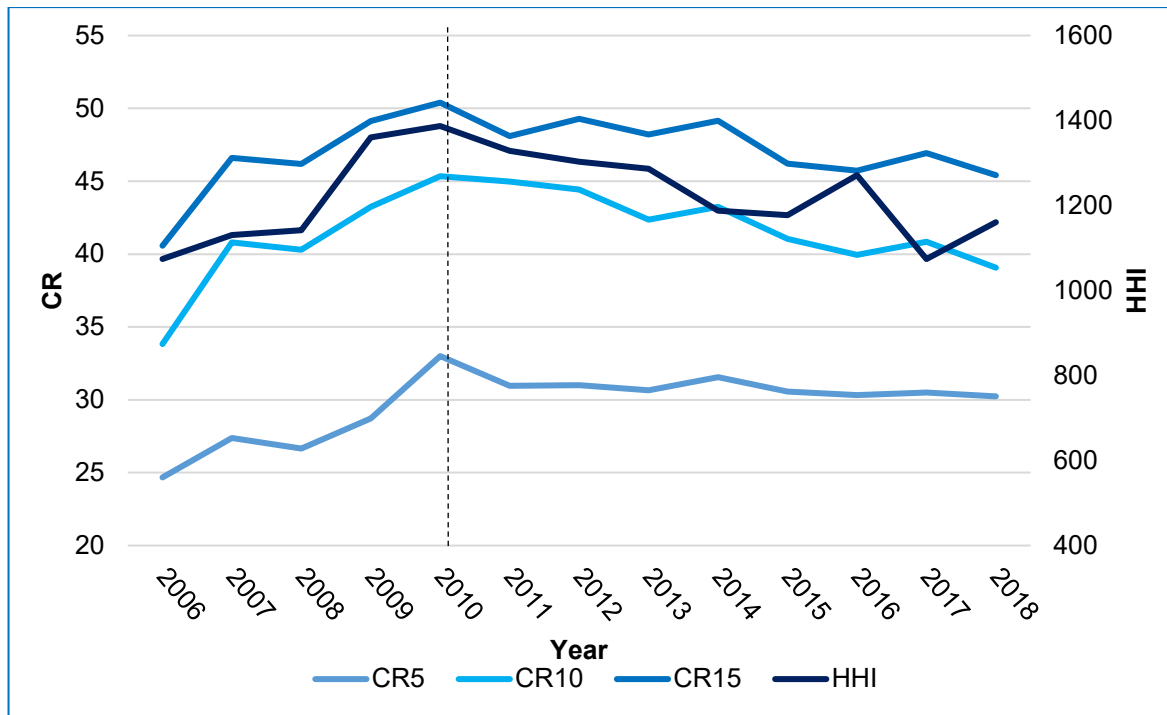
<sup>5</sup> OFT and CC (2010).

<sup>6</sup> OECD (2018).

<sup>7</sup> Resolution Foundation (2018)

11. BEIS’s own analysis of the Inter-Departmental Business Register (IDBR)<sup>8</sup> found similar headline results to the Resolution Foundation. As shown in Figure 2 below, the weighted average sector turnover accounted for by the top 5, 10 and 15 businesses increased between 2006 and 2010 before levelling off.<sup>9</sup> Over the full period the weighted average CR5, CR10 and CR15 increased by around 5 percentage points, however this was primarily before 2010 and doesn’t represent a clear upward trend. A similar trend is observed using the weighted average HHI measure. This again suggests there is no clear upward trend.

Figure 2: Weighted<sup>10</sup> average sector CRs and HHI, UK (2006-2018)



Source: BEIS analysis of the IDBR

12. However, these economy-wide patterns do not tell the full story. Both the levels and trends in concentration vary significantly across different sectors of the economy.
13. Figure 3, for example, shows that there is a consistent and substantial difference in the level of concentration between regulated<sup>11</sup> and non-regulated sectors. The average HHI for regulated markets is over twice as high as non-regulated sectors in 2018: 2,200 ('highly concentrated') compared to 900 in non-regulated sectors.<sup>12</sup>

<sup>8</sup> The IDBR holds data on all businesses in the UK, which are VAT registered or operating a PAYE scheme. The analysis uses data from 2006-2018 broken down into 44 industrial sectors. For consistency with the last release of this BEIS statistics, these 44 sector definitions are based upon but do not correspond one-for-one with standard ONS Standard Industrial Classifications.

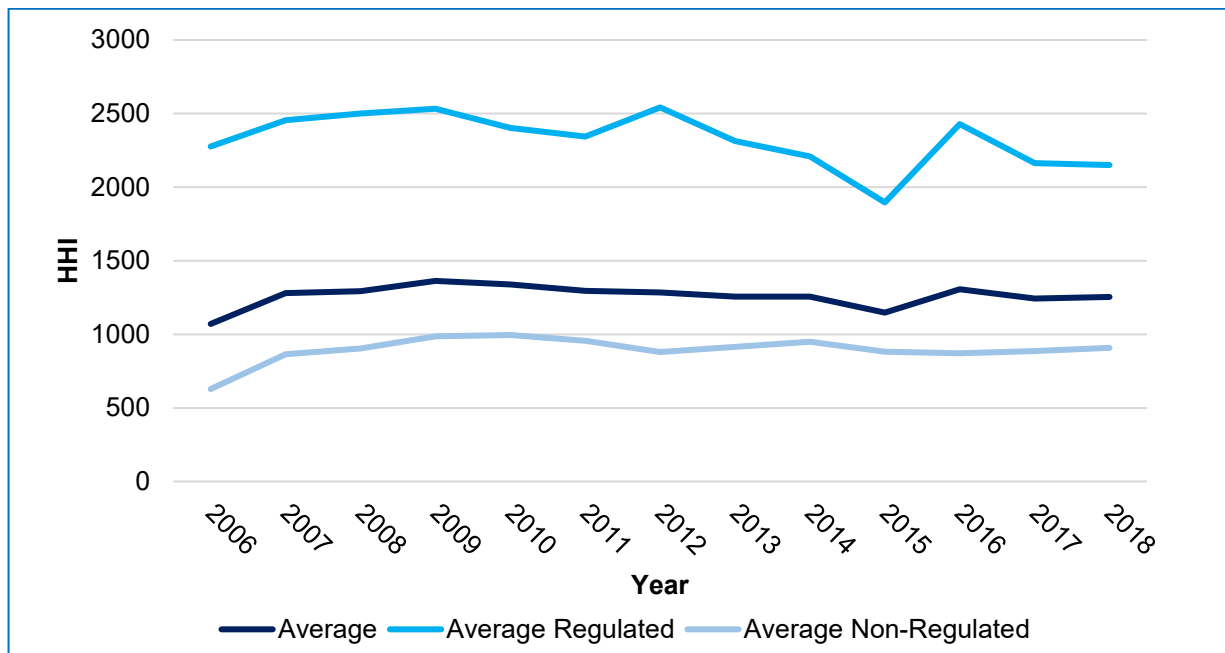
<sup>9</sup> We focus on the CR5, CR10 and CR15 for consistency with [previous BEIS analysis](#).

<sup>10</sup> The data has been weighted by the proportion of economy turnover accounted for by the sector in each year to reflect changes in the composition of the economy over time.

<sup>11</sup> We define regulated sectors as those who are under supervision of UK Regulatory agencies. Namely, we have classified the following as regulated sectors in this data set: Banking, Electricity distribution, Electricity generation and trade, Electricity transmission, Gas distribution, Gas generation and trade, Insurance, Oil and gas extraction, Other financial services, Postal/Courier, Rail transport, Telecoms, Water collection, treatment and supply.

<sup>12</sup> The figure and these averages have been constructed using the sectors for which data is disclosable in each year during the period (2006-2018).

Figure 3: Average HHI across the economy, regulated sectors and non-regulated sectors, UK (2006-2018)



Source: BEIS analysis of the IDBR

14. These results are not surprising – these sectors are regulated because they contain ‘natural monopoly’ features which mean the markets tend towards being more concentrated, providing a rationale for economic regulation.
15. More generally, the trend across sectors in the economy is mixed. Across both CR and HHI measures, around half of all sectors for which data is available in both years saw increases in concentration between 2006 and 2018, with concentration remaining the same or decreasing in the rest.<sup>13</sup>
16. Looking at sector concentration measures alone it is not possible to conclude what is driving such differences. A granular, market-level assessment that takes account of particular features of markets is needed to properly understand such trends. Such assessments are carried out by the CMA in their market studies and investigations in the event that a competition problem is suspected.

## What can concentration tell us about competition?

17. It is now widely recognised that the conclusions that can be drawn from economy-wide concentration analyses are limited.<sup>14</sup> This is for two key reasons. First, they generally rely on sectoral data, and sectors are not necessarily the same as economic markets. Second, and more fundamentally, there are limits to what even a perfectly measured concentration measure can tell us about competition. These are discussed below.

<sup>13</sup> Some information is missing here since statistical disclosure control methodology is applied to IDBR data. This ensures that information attributable to an individual or individual organisation is not identifiable in any published outputs. More information can be found in National Statistician’s Guidance: Confidentiality of Official Statistics and also on the Statistical Disclosure Control Methodology page of the ONS website.

<sup>14</sup> For example, see OECD (2018).

18. First, sectors are not necessarily the same as the relevant dimension for competition policy, economic markets. While sectors and economic markets may overlap, firms classified as being in the same sector may compete for consumers in different economic markets. This competition would not be well captured by sector concentration data. Box 1 illustrates this issue.

### **Box 1: Sectors differ from economic markets**

Concentration analyses typically uses data on firms that has been sorted into sectors. The BEIS analysis of the IDBR classifies the economy into 44 sectors. To be consistent with previous BEIS statistics, these sectors do not match up with standard ONS Standard Industrial Classifications (SIC) but are aggregated up from SIC 2007 codes.

SIC codes provide a framework to classify companies according to their economic activities which can be grouped into progressively broader industry classifications: industry group, major group and division. For example, a company producing cars belongs to the industry group of 'Manufacture of motor vehicles', the major group of 'Manufacture of motor vehicles, trailers and semi-trailers' and the division of 'Manufacturing'.

Despite the system's comprehensive approach to capturing the nuances of different economic activities, firms may be sharing the same code when they do not compete in the same economic market, i.e. for the same consumers. For example, a firm which produces sofa beds and a firm which produces garden chairs share the same SIC code, '31090 - Manufacture of other furniture'. Yet, those two firms are not competing for consumers in the same economic market.

This makes it difficult to draw clear conclusions on market concentration. For example, suppose that there is only one firm within the economy which produces sofa beds but there are fifty different firms producing garden chairs. When calculating the concentration metrics for the sector 'Manufacture of other furniture', the sector will not appear concentrated. However, in reality, the firm producing sofa beds does not have any direct competitors.

This limitation is amplified by the fact that in the IDBR firms are classified as being in one primary sector where the majority of their output is produced. This means that if a firm produces 51% of their output in one sector and 49% in a second, then their output will only be counted under the former sector even if they are one of the largest players in the latter. This is likely to be a particularly large limitation for concentration analyses since we might expect large firms are the most likely to operate across sectoral and market boundaries.

19. Sector concentration measures also fail to account for the geographic reality of many markets. Since the IDBR focuses on domestic production, the sectoral indicators do not fully account for the impact of imports. This is a substantial limitation given the significant competitive pressure that imports can exert in an open economy like the UK.
20. Further, the local nature of many economic markets is not accounted for. The implicit assumption in the existing sectoral indicators is that all national firms are directly competing with each other. This is likely to be a particularly important limitation in non-tradeable or service sectors where firms compete in very localised geographic areas.



21. More generally, it is also worth noting that SIC codes are based on traditional industrial classifications. This does not easily account for digital markets and emerging technologies.
22. Aside from these substantial data limitations, even if perfectly measured, high levels of concentration or any tendency towards more concentration does not necessarily indicate a competition issue.<sup>15</sup> Instead, high concentration could reflect the forces of competition in action whereby more market share is reallocated towards more efficient firms over time. In being an inherently static measure of what is going on at a particular point in time, concentration measures do not capture these crucial dynamic features of how competition happens and evolves in a market over time.
23. As a result of these limitations, the evidence on concentration is not conclusive. We next turn to a firm-level measure of competition, mark-ups, which have the advantage of not requiring an understanding of the market in which firms compete, but do not come without their own measurement challenges.

## Indicators of mark-ups

24. The mark-up approach to measuring competition looks at the extent to which the prices firms charge exceeds their production costs. The mark-up is the ratio of the price that a firm charges for a product to the incremental cost of producing it.<sup>16</sup> A mark-up of 1 means the firm charges a price that exactly covers their production costs, a mark-up of 1.5 means the firm charges a price 50 per cent higher than the production cost.
25. Economic theory suggests that if competition is working well, mark-ups should be close to 1 in the long run, because competition drives firms' prices down towards their incremental production costs. Higher mark-ups may, therefore, be an indicator of weak competition and markets that are not necessarily working in the interests of consumers.
26. In principle, mark-ups provide a more direct measure of firms' price-setting power than a concentration measure.<sup>17</sup> However, this does not come without challenge: mark-ups are notoriously difficult to measure as firms' fixed and marginal costs cannot be easily disentangled from one another.

## Are mark-ups increasing across the UK economy?

27. Recent research suggests average mark-ups have been increasing across advanced economies over the last four decades. De Loecker and Eeckhout (2018), for example, find that, on average, global mark-ups increased from 1.1 in 1980 to 1.6 in 2016. That

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<sup>15</sup> Shapiro (2018).

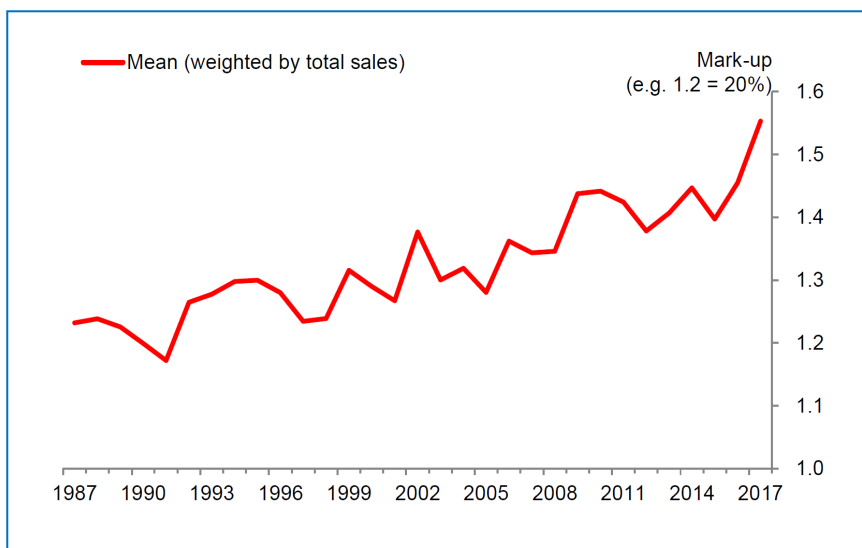
<sup>16</sup> The cost measured here is the marginal cost – the incremental cost of producing a given good or service. They contrast with fixed costs which are not incurred each time a firm produces a good or service. Profit measures account for both marginal and fixed costs, while mark-ups look at just marginal costs.

<sup>17</sup> Much of the recent research uses the so-called production approach following De Loecker and Warzynski (2012). Unlike earlier methods this does not require a model of how firms compete in a market. See De Loecker, Eeckhout and Unger (2018) pp.2-3 for details.

is, in 1980 average prices were 10% above marginal costs but by 2016 they were 60% above marginal costs.

28. The UK appears to follow a similar pattern: average UK mark-ups rose from around 1 in 1980 to around 1.7 by 2016, to a level slightly higher than the Group of 7 (G7) average but behind the US.
29. Other UK studies find similar trends. Looking over the last three decades, research from the Bank of England<sup>18</sup> finds a rise in average mark-ups of UK listed firms from around 1.2 to around 1.6 between 1987 and 2017. This is illustrated in Figure 4 below.

Figure 4: Average mark-ups of UK listed firms (1987-2017)<sup>19</sup>



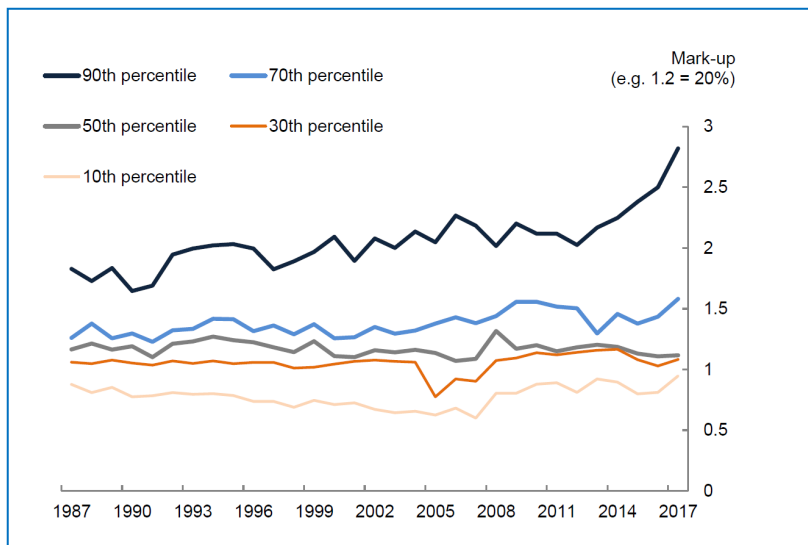
Source: Aquilante et al. (2019)

30. However, Figure 5 illustrates that the average by no means tells the full story. Rather, the documented rise in average mark-ups appears to be largely driven by a small group of firms. Mark-ups amongst the top quartile of firms rose by 50 percentage points on average in the 30 years between 1987 and 2017, while mark-ups of the other 75 per cent hardly changed.

<sup>18</sup> Aquilante et al. (2019)

<sup>19</sup> These estimates have been weighted by the firms share in sales in a given year.

Figure 5: Distribution of average mark-ups of UK listed firms (1987-2017)

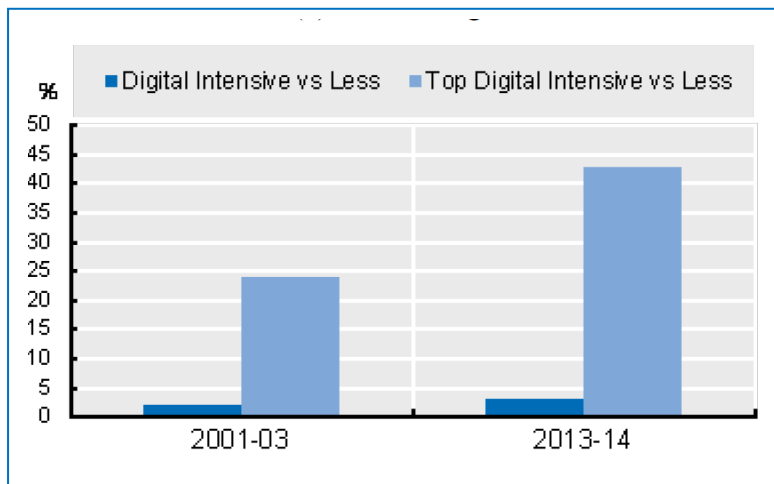


Source: Aquilante et al. (2019)

31. The IMF<sup>20</sup> found a similar story when looking across 27 countries. Economy-wide mark-ups rose by around 8 per cent on average between 2000 and 2015, but again these increases largely came from a small group of firms.
32. While a relatively small group of firms appear to be driving the documented increase in average mark-ups, they look to be spread across many sectors of the economy. The Bank of England, for example, found that mark-ups increased in all but two of the ten broad sectors they looked at.
33. Similarly, the IMF found increases across sectors but with greater increases in firms that used more digitally intensive technologies. This finding was also corroborated by Calligaris et al. (2018) who looked across 26 countries and found mark-ups to be higher in more digitally intensive sectors. Further, they found that mark-up differential between more and less digitally intensive sectors has increased significantly between 2001-2014. This is illustrated in Figure 6 below.

<sup>20</sup> IMF (2019)

Figure 6: Average percentage differences in mark-ups between firms in less digitally intensive and more digitally intensive sectors (2001-2014)



Source: Calligaris et al. (2018)

34. Mark-ups also appear to have risen substantially more for firms that were selling predominantly to foreign markets than those selling predominantly in the UK. In particular, Bank of England research finds the increase in mark-ups among firms selling to predominantly foreign markets was 60 percentage points, compared to 15 percentage points for those mainly in domestic markets. This corroborates findings from the international literature.<sup>21</sup>

## What do these indicators of mark-ups tell us about competition?

35. As with measures of concentration, there are a number of limitations associated with the mark-ups evidence. Some of these limitations relate to the extent to which even perfectly measured mark-ups reflect how well competition is working, while others relate to challenges in estimating mark-ups.
36. First, increasing mark-ups do not necessarily imply firms are able to exert increased market power. This is because firms not only face marginal costs of producing each extra good or service sold, but they also face fixed costs that do not vary with the amount they produce or sell. Over time, it is possible that firms fixed costs have increased, for example, to finance investment in new technologies. Mark-ups only capture marginal costs, while profits capture both. This means firms market power may not have actually increased, but rather mark-ups may have increased to offset any increase in fixed costs. De Loecker, Eeckhout and Unger (2018) find this is not the case for the US: they note that profits have also risen, albeit to a lesser extent than mark-ups, though they do not explore the UK position on this. As with measures of sector concentration, mark-ups are therefore limited by their nature as an inherently static measure that does not fully reflect how firms compete over time.
37. Second, as documented above, mark-ups are significantly larger for exporting than domestically operating firms. As a result, the extent to which the mark-ups associated

<sup>21</sup> For example, using Slovenian data, De Loecker and Warzynski (2012) find that mark-ups for exporting firms are significantly higher.

with those firms are also exported is unclear. This is an important avenue for further research in determining whether any increases in mark-ups affects UK consumers.

38. Third, the types of firms used in this research is typically limited to a sub-set of the economy. For example, the Bank of England research focuses on publicly listed firms. This means it is unclear whether the findings are replicated across other firms in the economy.
39. Finally, whilst prices are easy to observe, firms' marginal costs of production are difficult to disentangle from their fixed costs. This may mean that mark-ups are not being measured properly and instead could reflect technology-driven changes to cost structures, for example increases in the ratio of fixed to marginal costs, although this debate remains live in the literature.<sup>22</sup>

## Conclusion

40. Recent research has stimulated welcome debate about the health of competition in the UK and other economies. This Annex has set out our preliminary assessment of the picture emerging from two of the most commonly used competition indicators:
  - Over the last decade, there has been a moderate increase in sectoral concentration across the UK economy. This was primarily around the financial crisis and appears to have since levelled off.
  - However, existing sector data does not match up well with the markets in which firms compete, limiting what these indicators can tell us about competition.
  - Over the last few decades, mark-ups appear to have increased across advanced economies, including the UK. This appears to be driven most dramatically by a small group of exporting and relatively digitally intensive firms, and there is also substantial debate surrounding the measurement of mark-ups.
  - The static nature of both measures substantially limits what they can tell us about the dynamics of how competition happens in a market. Further research should explore the feasibility of producing more dynamic measures that go beyond the entry, exit and churn statistics published alongside this release.
41. The picture emerging from these indicators is therefore not clear, as they all have limitations and require considerable nuancing. They do not provide clear evidence on whether or not competition in the UK economy is in decline.
42. Further assessment of these indicators, and the potential development of new indicators would be valuable.
43. That is why we have commissioned the CMA's detailed and expert assessments to improve our understanding of competition across the economy.

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<sup>22</sup> See Traina (2018) and De Loecker, Eeckhout and Unger (2018) for discussion on both sides of this debate.

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## Annex 2 – Existing competition indicators



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