



Wider Benefits of Competition Policy and Enforcement

CMA Microeconomics Unit
literature review

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1. Executive Summary

- 1.1 The work of competition authorities has direct impacts in markets where action is taken, and also improves competition elsewhere through deterrence. The combination of these direct and indirect effects can benefit innovation, productivity, and economic growth. We estimate the direct impact of the CMA's work via our annual Impact Assessment, but are also interested in understanding deterrence and the wider effects of our activities.
- 1.2 We have previously published reports looking separately at the evidence on the relationship between competition and productivity (CMA 2015), and the deterrent effect of competition authorities' work (CMA 2017). This literature review should be read alongside those reports. In this review, we synthesise key insights from studies published since these previous reports on the wider impacts of competition authorities' work. We have summarised 17 papers focusing on the deterrent effects of competition policy, and the impacts on prices, mark-ups, profitability, innovation, productivity and welfare.

Deterrent effects are a substantial benefit of a competition authority

- 1.3 Our previous review described evidence that the deterrent effect of competition authorities' work is substantial, with academic research focussed on deterrent impacts in cartels and mergers. Estimating deterrence impacts precisely is challenging, but evidence indicates that deterrent effects are a multiple of the direct impact of competition enforcement - including merger control and enforcement against illegal anti-competitive conduct.
- 1.4 More recently produced academic research adds to the evidence that the review and prohibition of anti-competitive mergers through an effective regime also deters other potentially anti-competitive mergers from being proposed.
- 1.5 Other research shows that, although the presence of a competition authority has a beneficial impact across all sectors, impacts tend to be largest in non-tradeable goods sectors, since firms in these markets are not subject to the additional pressure from international competition that limits market power. Impacts are smaller (though still important) in tradable good sectors.

Competition and competition authorities have a significant positive impact on innovation, productivity, and welfare

- 1.6 Our previous report set out a strong body of empirical evidence that competition can drive greater productivity. This includes both within- and cross-country studies and positive impacts of deregulation over time.

Evidence suggests competition places pressure on firms to become more efficient, ensures more productive firms gain market share and drives innovation. It also highlighted empirical evidence that competition policy itself had a positive impact on economic growth and productivity.

- 1.7 There is now further evidence that increased competition leads to improvements in innovation diversity and technological advancement, highlighting the positive effects of increased competition on innovation.
- 1.8 Other research adds to the evidence of significant productivity gains from effective competition enforcement, although cross-country studies suggest the gains in productivity growth are largest from establishing a generally effective regime and smaller (but still positive) from incremental improvements to already established and well-functioning systems.
- 1.9 Research into the relative strength of mechanisms through which productivity is impacted by competition is mixed. Some work emphasises the importance of within-firm effects. Others find that cross-firm selection effects are the most significant, and that there is an ongoing rise in high productivity, high market share firms dominating certain markets and industries that have benefitted from this selection effect.
- 1.10 Recent macroeconomic modelling has simulated the impacts of competition enforcement on economic growth. This indicates that competition enforcement and its deterrent effects increase GDP in the long run.
- 1.11 Despite robust findings, the research also points to the challenges in precisely measuring the wider effects of competition policies. An inherent difficulty lies in robustly assessing behaviours that do not happen (such as deterred behaviours). Another challenge lies in being able to meaningfully disentangle the effects of economic factors other than competition policy or enforcement, which may also have an influence on broader economic outcomes. As a result of these and other challenges and limitations, significant uncertainty remains around the precise scale of these wider impacts.
- 1.12 Nevertheless, the body of evidence reviewed points clearly towards competition enforcement having significant wider benefits, with the indirect impacts typically far surpassing the direct impacts that are often assessed following concrete interventions. Future research should continue to refine the methodologies for estimating these effects.

2. Introduction and summary of previous CMA reviews

- 2.1 The Competition and Markets Authority (CMA) is the UK's principal competition and consumer protection authority. We aim to promote the competition and consumer standards that can lead to high growth and productivity in an economy. Understanding the impact of a competition authority and its activities is a priority for decision makers both inside and outside the CMA. This report compiles the evidence on these impacts.
- 2.2 While we are responsible for consumer and competition enforcement, there is very limited research on the impacts of consumer policy on economic growth. For this reason, this review will be focussing specifically on the impacts of competition policy and enforcement. Most literature focusses on the impact of the specific actions by competition authorities, particularly merger control and enforcement against illegal anti-competitive conduct. Other papers take a broader view of the impact of the regime as a whole, which would also incorporate impacts such as the effect of private enforcement actions.
- 2.3 The work of competition authorities has direct impacts in the markets where authorities intervene, and in markets that are vertically related to these. For example, improving or protecting competition can lead to lower prices, higher quality, improved choice, and greater potential for future innovation.
- 2.4 Competition enforcement also has deterrent effects beyond the markets where intervention occurs, which we refer to as indirect impacts. For instance, it may deter anti-competitive behaviour in general, due to risks of future enforcement action.
- 2.5 There is also evidence suggesting that the work of competition authorities, through the combination of direct and indirect impacts, can have important wider impacts on GDP, productivity, and innovation, among other macroeconomic impacts.
- 2.6 Estimating indirect impacts is in general significantly harder than estimating direct impacts. Nevertheless, existing evidence suggests that indirect impacts can be substantially larger than direct ones, at least in some areas of competition enforcement.
- 2.7 This report summarises key findings from recent research on indirect and wider impacts of competition policy and enforcement. The introduction summarises our findings from two previous CMA reports on productivity impacts and deterrent effects respectively. The following two sections summarise relevant research that has emerged since. The first focusses on deterrent effects of competition enforcement and how they can be estimated.

The second considers macroeconomic impacts, and focusses on how competition policy (including its deterrent effect) can affect variables such as innovation, productivity and welfare. These macro impacts are largely a result of deterred behaviours, and so these chapters should be considered as two parts of the same story rather than separate effects.

We have previously identified substantial evidence of deterrent effects of competition authority activities

2.8 In 2017, we published a literature review ([CMA 2017](#)) on the deterrent effect of competition authorities' work. In this subsection we summarise the main findings from that review.

There is a large body of evidence of substantial deterrent effects from cartel enforcement

- 2.9 In relation to illegal anti-competitive conduct, deterrence is particularly important as detection rates for this conduct are low, and significant harm is done even in cases which are eventually detected.
- 2.10 The 2017 review summarised a number of studies that attempted to quantify deterrent effects using data. Some papers (such as [Vickers and Ziebarth \(2014\)](#), [Clark and Evenett \(2002\)](#) and [Warzynski \(2001\)](#)) take advantage of periods or regimes where enforcement was reduced or eliminated to statistically estimate the impact of deterrence. These do find some evidence that collusive behaviour increased during periods of reduced enforcement, or that prices or margins were substantially higher.
- 2.11 Another strand of literature looks at leniency schemes (which encourage cartel participants to provide information to competition authorities to avoid or reduce fines), on the basis that when they are in operation detection rates will be higher, and so deterrence greater. Economic experiments testing individual behaviour in controlled environments have found that prices are lower when leniency policies are in place, and that fewer cartels are formed (such as [Apesteguia, Dufwenberg and Selten \(2007\)](#) and [Hinlopen and Soetevent \(2008\)](#)). Examination of the introduction of the US Department of Justice (DOJ)'s leniency programme in 1993 found a short term increase in cartel prosecutions (to be expected as more cartel participants were incentivised to come forward), followed by a reduction to below pre-1993 levels, suggesting that the leniency policy strengthened deterrent effects ([Miller \(2009\)](#)). As a cautionary note however, [Pavlova and Shastitko \(2014\)](#) show how the introduction of a leniency programme in the presence of type-I errors – ie, false convictions – may lead to overdeterrence.

- 2.12 A number of papers consider the effect of previous enforcement action deterring firms in the same or similar industries ([Feinberg and Park \(2015\)](#), [Feinberg \(1984\)](#) and [Block, Nold and Sidak \(1981\)](#)). They generally find that previous action does have a deterrent effect and results in lower prices or margins at least in the immediate aftermath of enforcement action, and in some cases persist through time. The literature on deterrence effects on indicted firms is mixed, with some event studies of stock prices suggesting limited lasting deterrence effects feeding through to stock prices (see [Bosch and Eckard \(1991\)](#) and [Thompson and Kaserman \(2001\)](#)). Another study ([Zhou \(2016\)](#)) finds that enforcement in one market deters multi-product firms from joining cartels in other markets.
- 2.13 The review also summarised theoretical modelling ([Davies, Mariuzzo and Ormosi \(2017\)](#) and [Katsoulacos, Motchenkova and Ulph \(2016\)](#)) which shows, under plausible assumptions, that the scale of harm arising from detected cartels is lower as a result of deterrence, reducing the severity of cartel behaviour as cartels moderate their conduct to attempt to avoid enforcement. They also find that the harm from cartels that would have occurred without cartel law is likely to be a multiple of the harm detected by competition authorities, though the scale depends on model assumptions.

Evidence suggests merger control deters anti-competitive mergers

- 2.14 For merger control, an effective regime would detect and prevent the vast majority of anti-competitive mergers. The benefit of merger deterrence is therefore savings from avoided review of such mergers which are deterred at an early stage.
- 2.15 The 2017 review found relatively (though not uniformly) consistent evidence that the existence of a merger control regime creates a deterrent effect. It found some evidence that a more stringent merger control regime leads to a greater deterrent effect, but not in whether particular outcomes (e.g. remedies or prohibitions) have greater deterrent effects than others. (see [Salop \(2013\)](#), [Cosnita-Langlais and Sørsgard \(2014\)](#), [Barros, Clougherty and Seldeslachts \(2010\)](#), [Seldeslachts, Clougherty and Barros \(2009\)](#), [Clougherty et al. \(2016\)](#), [Duso, Gugler and Szücs \(2013\)](#), [Clougherty and Seldeslachts \(2012\)](#)).
- 2.16 Some of these papers (and others such as [Sørsgard \(2009\)](#), [Nelson and Sun \(2002\)](#), [Eckbo and Wier \(1985\)](#) and [Sokol \(2010, 2012\)](#)) suggest that some pro-competitive mergers are also indirectly deterred by competition authorities – for example where companies make incorrect assessments about the likelihood of prohibition. However, these negative impacts are relatively small, and the 2017 review concluded that overall impacts of deterrence are unambiguously positive.

Whilst precise quantification is difficult, evidence shows deterrence effects are substantial

- 2.17 The 2017 report drew particular attention to the difficulties in estimating the magnitude of deterrent effects. This requires the use of a counterfactual: an estimate of what would have occurred if no competition enforcement had taken place. It can be particularly difficult to precisely estimate deterrent effects because there is a limited set of comparable economies, most of which have some form of competition authority presence and all of which have many different drivers behind their economic outcomes, making effective and meaningful counterfactual comparison difficult.
- 2.18 Noting this difficulty in estimating deterrent effects, previous research has nonetheless provided a broad estimate of the scale of these impacts. The 2017 report found that the benefits from deterrence are likely to be many times higher than the direct benefits of intervention, as estimated in [Deloitte \(2007\)](#), [London Economics \(2011\)](#) and [Van der Noll et al \(2011\)](#):
- For cartel enforcement, the ratio of cartels deterred to cartel enforcement actions was estimated to be between 4.6:1 and 28:1.
 - With regard to mergers, it was reported that 4-18% of proposed mergers are abandoned and 2-15% are restructured due to anticipated merger control concerns.
 - Overall, the report finds that “at least 50% of potential harm is deterred by the threat of enforcement”, but beyond this there is large variance in the estimated amount of this deterred harm.
- 2.19 The evidence considered reinforces that even though estimates of the magnitude of deterrent effects are imprecise, we do know that they are positive and large.
- 2.20 The evidence base as it stood at the time of publication in 2017 focused only on the impacts of cartel enforcement and merger control, and there was limited evidence on the deterrence impacts of enforcement against other forms of anti-competitive behaviour, or in relation to consumer protection.
- 2.21 Also, much of the existing research focused on the US, and there was much less evidence from the European perspective.
- 2.22 We published another estimate illustrating significant deterrent effects in 2018. This reviewed the direct and deterrent effects of five CA98 decisions ([CMA 2018](#)), concerning retail price maintenance. It provided survey evidence that many of the firms that were in the same industry as the firms under

investigation were aware of the cases and familiar with competition law, as were some firms in adjacent sectors. It also found evidence of firms modifying agreements or commercial initiatives because of these cases. The report finds these deterrent effects to be several times greater than the direct impacts of the interventions, but again with the caveat that the impact estimates involve significant uncertainty.

In a previous review of the literature, we also found evidence of competition policy having a positive impact on productivity

2.23 Productivity is the major contributor to long run growth in real GDP per capita, and therefore improvements in living standards over time.

2.24 In 2015, we published a report ([CMA 2015](#)) summarising the relevant theoretical and empirical evidence on the relationship between competition and productivity. We reported that [Haskel \(1991\)](#), [Nickell \(1996\)](#), [Disney, Haskel and Heden \(2003\)](#), [Nicoletti and Scarpetta \(2003\)](#), [Bourlès et al \(2013\)](#) and [Tang and Wang \(2005\)](#) have demonstrated a positive relationship between strength of competition and productivity growth across sectors. [Pilat \(1996\)](#), [Maher and Wise \(2005\)](#), [Boylaud \(2000\)](#), [Alesina et al. \(2005\)](#), [Olley and Pakes \(1996\)](#), [Gort and Sung \(1996\)](#), [Jamasp et al \(2004\)](#), [Fabrizio et al \(2004\)](#), [Haskel and Sadun \(2011\)](#), [Cincera and Galgau \(2005\)](#) and [Holmes and Schmitz \(2010\)](#) all study the impact of deregulation or some other exogenous change in competition, and find that increases in competition lead to productivity improvements.

2.25 Economic theory suggests that competition can drive productivity in three main ways:

- Within firms, competition acts as a disciplining device, placing pressure on the managers of firms to become more efficient.
- Between firms, competition ensures that the more productive increase their market share at the expense of the less productive. These low productivity firms may then exit the market, to be replaced by higher productivity firms.
- Competition drives firms to innovate, coming up with new products and processes which can lead to step-changes in costs or quality, or opening up new markets.

2.26 Studies have investigated all three of these channels, and we summarised these in our 2015 report. Several empirical studies indicate a positive relationship between competition and firm efficiency (see [Bloom and Van](#)

- Reenen (2010), Nickell, Nicolitsas and Dryden (1997), Griffith (2001), Bloom et al (2012, 2015)). These focus on various ways in which competition boosts management quality, by eliminating badly managed firms and pushing incumbents to improve managerial effort and therefore increase productivity.
- 2.27 There is also extensive evidence for between-firm effects, or ‘market sorting’ as more productive firms outcompete less productive rivals and gain market share (see Syverson (2004), Arnold et al (2011), Harris and Li (2008), Disney, Haskel and Heden (2003), Baldwin and Gu (2006) and Scarpetta et al. (2002)). This includes evidence that more competitive markets tend to have a smaller tail of less productive firms. Some of these studies have suggested that between firm effects account for a substantial share of productivity impacts.
- 2.28 A wide range of empirical studies have attempted to explore the links between competition, innovation and productivity (such as Cameron (2003), Geroski (1990), Blundell et al (1995), Griffith et al (2010)). The evidence points to the complexity of the relationship, but the general result is that increases in competition increase innovation, particularly in markets which are already concentrated. The seminal Aghion et al (2005, 2009) papers show an inverted-U relationship between competition and innovation: in industries with low levels of competition, increases in competition increase innovation. At lower levels of concentration, in highly competitive industries, competition may be detrimental to innovation. However, these are not the types of market that typically concern competition policy. Another interpretation of the inverted-U relationship is that different industries lie on different points of the curve. This means that competition enforcement in some industries, primarily those with high entry barriers, could improve the state of innovation, while in other, more competitive industries, it may not.
- 2.29 This framework is well known in the theoretical literature, and has been widely extended to account for various market structures by other researchers (e.g. Schmutzler (2013) and Vives (2008)).
- 2.30 In addition to this evidence of a general link between competition and productivity, a number of studies focus specifically on the role of competition policy and competition authorities. Several studies have found that the existence and effectiveness of competition policy can have a positive impact on economic growth and productivity (such as Buccirossi et al. (2013), Peterson (2013), Gutmann and Voigt (2014), Clougherty (2010), Voigt (2009), Ma (2011)). There is another body of literature that identifies the negative impacts of anti-competitive behaviour, such as cartel formation, on productivity, and the positive effects of competition enforcement actions (such

as Broadberry and Crafts (2001), Symeonidis (2008) and Petit, Kemp and Van Sinderen (2015)).

3. Deterrence

- 3.1 Competition enforcement can have a deterrent effect on anti-competitive behaviours if firms and agents fear that the threat of discovery and punishment or remedies outweighs the potential benefits of anti-competitive actions. These deterrence impacts through changing firms' behaviour across the economy can be significantly bigger than the direct impacts of interventions in individual markets (Nelson and Sun, 2002; Clougherty et al., 2016).
- 3.2 Deterred actions (actions that would have been taken in the absence of a competition authority's actions) might include a firm's decision not to form cartels with other firms, not to engage in an anti-competitive merger, or not to employ unfair pricing techniques or foreclose rivals. These actions are deterred either because of the perceived threat of anti-competitive behaviour being detected by a competition authority, or because of a belief that other potential colluding partners may have an incentive to defect from the anti-competitive arrangement.
- 3.3 The benefits of increased competition are felt through lower prices, higher quality or greater innovation. In markets where competition authorities take action, it is easier to attribute direct impacts on these outcomes, as we do in our annual impact assessment.
- 3.4 Deterrence will have similar effect on competition in markets where enforcement action has not been taken, but attributing these impacts is more complex as deterrence is not perfect (i.e. not all firms will be aware of competition enforcement risks and adjust their behaviour accordingly). This means existing research has not identified a comprehensive and robust way to precisely quantify deterrence impacts, though some approaches have produced indicative measurements of the scale of these effects.
- 3.5 This chapter summarises research published on the deterrent impacts of competition enforcement since our last update in 2017. These publications further reinforce evidence of a substantial deterrent effect from competition policy and enforcement.

Merger Deterrence

- 3.6 Our 2017 literature review of deterrent effects found that cartel deterrent effects were the most studied, while the deterrent effects of merger control were less well-researched.

- 3.7 Two recent papers have been published which examine mergers in the US and shed some light on deterrence through the operation of the merger scrutiny threshold.
- 3.8 [Wollmann \(2019\)](#) considers the increase of the merger exemption threshold in the US, and the resulting increase in mergers between firms that would previously have been scrutinised, as a ‘natural experiment’ through which to explore the deterrent effect of merger control.
- 3.9 In the US, prospective mergers must be submitted for prospective review if the transaction reached a specified transaction value threshold. In December 2000, the threshold was raised from \$15m to \$50m, meaning that fewer more potential mergers would now be required to submit a review. The authors use difference-in-difference analysis¹ to compare changes in merger activity before and after the change in threshold.
- 3.10 The number of merger-related investigations for firms under the new threshold fell from around 150 per year (investigations which were mainly triggered during the pre-merger review) to practically zero, whilst mergers between competitors below the new threshold rose sharply. This indicates that prior to the threshold change there was a substantial deterrent effect, the removal of which spurred an increase in merger activity. The paper does not directly look into the impacts on prices or markups, but does note that many of these undisclosed mergers under the new, higher notification threshold involved firms that had previously been investigated and fined for anti-competitive behaviour resulting in high prices.
- 3.11 [Cunningham et al \(2021\)](#) focus on so-called ‘killer acquisitions’, where incumbent firms may acquire innovative targets solely to discontinue the target’s innovation projects and pre-empt future competition. This paper includes a finding that such acquisitions disproportionately occur just below the exemption threshold (primarily with deal sizes just 1% below). The authors suggest this pattern shows acquisitions seeking to avoid regulatory scrutiny. Though not the focus of the paper, this nonetheless supports the notion that being potentially subject to merger review has a deterrent effect.

¹ Difference-in-difference is an econometric method that compares changes in a variable of interest of an impacted treatment group to the changes experienced by a control group unaffected by a policy intervention or economic event.

Deterrence and Profitability

- 3.12 [Besley et al. \(2021\)](#) is a recent contribution to the academic research on the impact of competition policy and enforcement on firm profitability.
- 3.13 The paper quantifies the effectiveness of competition policy based on assessments of competition law made by legal experts and practitioners, and assigns an index value to a wide variety of countries (as in [Hylton and Deng, 2007](#)).
- 3.14 The study then uses firm level sector and profit margin data to examine the impact that those competition regimes have on firm profits. This impact can be thought of as measuring the combination of direct and deterrence effects. The paper focuses on 20 sectors across 90 countries over a period of ten years, using data on 20 million firms, 82% of which operate in non-tradeable sectors. This classification of tradeable and non-tradeable sectors is done at a sector level, so may not capture more granular differences between markets. The paper uses accounting profits and concentration as measures of market power, which are informative but have some limitations relative to direct measures of economic profit (or markups).²
- 3.15 The authors find that an effective competition regime has a significant downward impact on profit margins in non-tradable markets (i.e. those sectors that are not subject to international competition, generally in the service sector). They find a smaller impact on tradable markets, since firms in these markets are more likely to be subject to additional pressure from international competition that limits market power.
- 3.16 To give an example: the authors find that if China were to have the same competition policy index value as France, we could expect a 19% fall in the average profit margin of firms operating in non-tradeable sectors in China. This shows that competition authorities can have a very large impact on profit margins, and by extension consumer prices, in a large subset of the industries in an economy even where they do not take direct action.

² Markups measure the extent to which firms are able to price above marginal cost, as a direct measure of market power. Accounting profits can include other fixed costs. Competition can be fierce even in markets with high concentration (for instance, if their products are undifferentiated) or sluggish even in markets with low concentration ((for instance, if consumers do not travel far so that each firm has a local monopoly).

4. Macroeconomic Impacts

- 4.1 The previous section discussed recent evidence indicating the presence of deterrent effects, and the immediate impact these can have in stronger competition putting downward pressure on prices, improving quality or promoting innovation. In aggregate, these effects can have macroeconomic impacts by promoting innovation, productivity and economic growth. In this section, we review recent research on this topic.

Innovation

- 4.2 Innovation at the firm level takes place when firms attempt to produce a new product or process, boosting their productivity in order to gain an advantage over competing firms.
- 4.3 There is a lot of research on the relationship between competitive pressures and the incentive to innovate, which we discuss in Section 2. Most empirical studies find that greater competition spurs more innovation (summarised in [Shu and Steinwender \(2019\)](#)). However, there are a few examples (mainly US case studies) that find evidence of the opposite relationship (e.g. [Autor et al. \(2020a\)](#)).
- 4.4 The following papers are more recent attempts to quantify the impact of interventions increasing competition on innovation outcomes, both within and beyond the market of initial interest.
- 4.5 [Watzinger and Schnitzer \(2022\)](#) consider the breakup of the Bell System by the United States' Department of Justice (DOJ) and its effect on US innovation following the decision in their discussion paper. The Bell System was a major provider of US telephone services, the largest private company in the US by employment, and there was strong evidence of anti-competitive business practices. The breakup of the Bell System in 1984 is the only enforced breakup on competitive grounds in the US in the last 100 years.
- 4.6 The authors use patent grant data to measure the level of innovation, which is a common method in innovation research. They primarily utilise difference-in-differences analysis. Here, counterfactuals are set up using related industries, and they compare each telecommunications-related technology group to another untreated technology group as a control. As a robustness check, they also consider R&D spending as a measure of innovation as well as patent filing rates, both of which give similar results.
- 4.7 The paper finds evidence that the observed increase in innovation could be attributed to the Bell breakup and not some other unrelated shock. They also

found that the strengthening of competition in a market can improve innovation diversity, even where a monopolist has access to the best research and development resources in the world. The study illustrates that competition enforcement can have a significant impact on innovation, leading to both increased diversity and scale.

- 4.8 [Poege \(2022\)](#) studies the impact of another breakup on innovation: that of German company IG Farben in 1952. This breakup was unique in that it was not enforced due to competition problems, but rather for political reasons. IG Farben was one of the most innovative German companies, responsible for around 6% of all patents in the country. However, the company had been so instrumental to the German war effort during the Second World War that the Allied forces subsequently broke it up roughly into its constituent companies.
- 4.9 Again, patent data is used as a proxy for innovation in this paper. The authors use advanced techniques, including image processing, pattern recognition, and machine learning, to extract information from historical patent documents and product catalogues regarding both the quantity and quality of patents, and introduce measures to gauge the significance of the patented inventions. Additionally, the study examines which technology areas companies specialised in over time. The author considers patents from between five years prior to the mergers forming IG Farben and ten years after its breakup. Difference-in-differences methodology is used to measure the impacts on firms with a higher exposure to the breakup compared to other less exposed firms. Breakup exposure is defined by the change in concentration post breakup in a given market (measured by HHI³). The higher the change in concentration, the higher the exposure. The analysis also distinguishes between domestic and foreign patents, and finds increases in the number of patents filed for both. The results are robust to checks related to the historical context.
- 4.10 The paper finds evidence that innovation in technologies exposed to the breakup of IG Farben increased strongly, and there were further benefits from spillover into the wider chemical industry, including firms unrelated to IG Farben. IG Farben's direct successors also increased their patenting activities, and their patenting became more specialised relative to the pre-breakup period. The paper shows that even when a large dominant firm is a

³ The Herfindahl-Hirschman Index (HHI) is a common measure of market concentration and is used to determine market competitiveness. The HHI is calculated by squaring the market share of each firm competing in a market and then summing the resulting numbers. It can range from close to 0 to 10,000, with lower values indicating a less concentrated market.

prolific and successful innovator, a strengthening of competition in the market can still result in positive innovation outcomes.

- 4.11 Both these papers offer good evidence of the positive impact that stronger competition can have on innovation in an economy, exploiting firm breakups to measure the effect of increased competition.

Productivity

- 4.12 Productivity refers to how much output can be produced with a given set of inputs. Two of the most commonly studied measures of productivity are labour productivity and total factor productivity (TFP). Labour productivity considers output per unit of labour input, and can be measured as output per worker, or output per hours worked. TFP considers the output from all factors of production. An increase in TFP implies that more output can be produced at a given level of labour and capital as well as other inputs. Real economic growth refers to the increase in the production of goods and services in an economy, adjusted for price inflation, and is achieved through increases in productivity.
- 4.13 The UK has experienced sluggish productivity growth since the Great Recession of 2008, and the reasons behind this stagnation are widely debated. Achieving productivity growth is a priority for UK policymakers, and as previously discussed there is a significant body of research supporting the role of competition and competition enforcement in improving productivity.
- 4.14 Since our 2015 report on productivity, there has been further research on this topic. The research generally takes one of two approaches: industry-level studies that assess the channels through which competition affects productivity, and macro studies that consider the overall impacts of competition policy on measured productivity. Both approaches are valuable: the industry-level studies help policy makers to better understand the mechanisms through which their decisions will have impacts, while the macro studies help to quantify the overall benefit of a competition authority.
- 4.15 [Benetatou et al. \(2019\)](#) find evidence that the productivity gains from increasing the quality of competition policy are mainly reaped by countries where there is greater scope for improvements to product market competition and regulation. The study differentiates between countries with greater experience in enforcement and with significant resources at their disposal (so-called 'Leaders') and countries with less enforcement experience and weaker product market competition (so-called 'Laggards'). They find that the impact of competition policy on labour productivity growth for the Laggards was about three times higher than the aggregated effect measured across the ten

countries studied, while the effect was statistically insignificant for the Leaders.

- 4.16 The paper builds directly upon the work of [Buccirossi et al. \(2013\)](#), which was a paper considered by the previous CMA report on productivity. Buccirossi et al. assessed the quality of competition policy in 12 countries between the years 1995 and 2005, and then estimated the impact of these policies on TFP growth, finding the impacts to be positive and significant. The paper by Benetatou et al. considers nine European countries from the original study, with the addition of Greece. A similar method is implemented, though the authors use labour productivity as TFP data is not available for all countries. They find evidence of higher competition policy scores having a positive and significant impact on labour productivity, supporting the findings of the previous study. However, these benefits are again only found to be significant for the five “Laggard” countries in the sample of ten.
- 4.17 The study’s authors judge that the UK has a relatively long-standing and effective competition authority in the CMA, and so qualifies as a “Leader” for the purposes of the study. This paper argues that the greatest productivity gains of competition-enhancing policies are achieved in Laggard countries with weaker competition. This means that Leader countries with established effective regimes are already experiencing significant productivity benefits from their competition regimes, although incremental gains from further improvements may be smaller for these countries.
- 4.18 New research by [Reed et al. \(2022\)](#) also finds evidence that competition enforcement has a positive impact on productivity. This paper offers evidence that enforcing laws against anti-competitive behaviour, like cartels, not only improves productivity within individual firms but also contributes significantly to the wider economy in terms of economic growth. Additionally, the study indicates that competition enforcement can lead to a reduction in the concentration of industries, and that this increased competition leads to lower markups. A key insight is that improvements in productivity are primarily due to all firms becoming more efficient (i.e. improved TFP in the average firm), rather than just a few firms seeing productivity changes, indicating improvements in competition drive performance across firms.
- 4.19 The study uses difference-in-difference estimators to estimate the impacts of competition enforcement on TFP for both firms and the relevant industry. The paper exploits the unique reporting rules for Mexico’s competition authority to suggest a novel method of establishing a counterfactual. Their control group is defined as those firms that were suspected of anti-competitive behaviour, but that were not found to have breached competition law. The treatment group are firms that were found to have acted anti-competitively and were

targeted with sanctions. The idea behind this is that there may be certain behaviours that attract the attention of competition authorities, and having a control group with similar behaviours may result in a more reasonable comparison group than simply considering other firms in the same industry that have never been investigated.

- 4.20 In essence, this study demonstrates how competition enforcement can play a significant role in boosting productivity and, consequently, economic growth. It also calls for future research to explore in more depth how exactly competition enforcement influences productivity, including the role of market power and pricing strategies.
- 4.21 [Babina et al \(2023\)](#) find that antitrust enforcement leads to sustained increases in economic activity, business formation and wages in industries where enforcement action is taken. They argue this is indicative of long-lasting improvements in competition via increases in the quality of output and decreases in prices, as production inputs increase with a proportionally smaller (and statistically insignificant) increase in sales.
- 4.22 The authors use data on US DOJ antitrust enforcement and economic outcomes at an industry-state-year level. The analysis is focussed on non-tradeable industries, to allow states where action is not taken in a particular industry to serve as a counterfactual. The analysis controls for common changes using a set of fixed effects, and uses an event study and difference-in-difference approach.
- 4.23 [Backus \(2020\)](#) focusses on studying the mechanism through which competition impacts productivity. The author finds evidence that the correlation between competition and productivity comes mainly from within-firm effects and that, in practice, selection effects do not seem to drive productivity changes. Within-firm effects refer to the reduction of inefficiencies in a firm due to competitive pressures, while selection effects occur when demand is reallocated from unproductive to productive firms, causing the least productive firms to leave the market.
- 4.24 The author considers the US ready-mix concrete industry in the years 1982, 1987 and 1992. The main contribution of the paper is to propose a method to test how competition affects productivity. The author uses variation across markets in the ready-mix concrete industry, and considers the covariance⁴ of

⁴ Covariance is a measure of the relationship between two random variables. It evaluates how much variables change together. A positive covariance means that the variables tend to increase or decrease together, while a negative covariance means that the variables move in opposite directions. A zero covariance means that the variables are independent and have no linear relationship.

plant-level productivity estimates and the level of competition in the market. This allows for both the within-firm and selection effects to be measured separately, and so facilitates a deeper understanding of the mechanisms that lead to productivity growth.

- 4.25 It is important to note that only a single industry is considered. Ready-mix concrete is an interesting and widely studied industry because it has several desirable features, such as the product being essentially homogeneous and the market being very localised, since ready-mix concrete can only travel so far before it hardens. These facts make establishing market definitions very intuitive, but the drawback is that this industry could already be much more competitive than most other markets. Homogeneous products and the high level of entry and exit we see in this industry imply that competitive pressures are very high, and so extrapolating the effects of achieving greater competition in this market may not be representative of what we might expect to see in the economy as a whole.
- 4.26 On the other hand, [De Loecker, Eeckhout and Unger \(2020\)](#) find evidence that productivity gains are very much driven by selection effects, and that increases in concentration in the US economy since 1955 have been accompanied by higher levels of productivity among the largest firms, while prices and markups have also increased dramatically. This finding is also backed up by the paper by [Autor et al. \(2020b\)](#). A lot of the current aggregate markup research aligns more with these papers.
- 4.27 Overall, the studies above show that there is strong evidence that competition and the actions of competition authorities have positive impacts on productivity.

Economic growth

- 4.28 The European Commission produces an annual report where it simulates the macroeconomic impacts of its competition enforcement activity ([European Commission, 2024](#)). This is modelled through changes to markups arising from both direct and deterrence effects of competition enforcement. The model then simulates the impact of these reductions in markups on GDP and consumer prices. A key aspect of the European Commission's simulations is modelling the deterrent effects of competition enforcement. The paper by [Dierx et al. \(2023\)](#) contributes this modelling methodology to the annual report.
- 4.29 In addition, the paper considers the interconnectedness of different industries while estimating these impacts. There is significant variability across industries in how important cross-industry spillover effects are compared to

the total price impacts (spillover effects can account for between 30% and 50% of the total price impacts). Industries with extensive downstream linkages - such as finance, insurance, business services, resource extraction, the energy sector, basic manufacturing, and certain transportation components - serve as crucial nodes within the supply chain, amplifying the impacts of competition enforcement not just within the target sector but across the economy. This secondary finding underscores the strategic importance of industry prioritisation in policy enforcement.

- 4.30 The authors simulate the impacts of markup reductions resulting from competition policy interventions, and find evidence that the interventions led to a decrease in the steady-state markup across the economy. Their model suggests this would translate to an increase of real GDP relative to the baseline in the range of 0.6% - 1.1% in the medium to long term, as well as a 0.3% - 0.7% reduction in the price level.
- 4.31 While the paper offers a robust methodology and indicative quantifications of the potential scale of benefits arising from competition enforcement, it rests on certain assumptions about the magnitude and duration of avoided price increases, which might not universally apply. For example, it is assumed that, in the event of a price reduction, producers will entirely pass on the ensuing cost savings to their customers. Also, there are assumptions regarding avoided price increases, and about the duration and importance of deterrent effects.
- 4.32 Making these kinds of assumptions is common practice when performing impact assessments of this kind, and we use similar practices in our own direct impact assessments.

Welfare

- 4.33 Welfare is generally defined as the sum of consumer and producer surplus. Consumer surplus is the difference between the price paid for a good and the value a consumer derives from it (a consumer will only purchase a good if the perceived value exceeds or is equal to the price). Producer surplus is the difference between the price of a good and the marginal cost of producing that good (similarly, producers will only sell a good if the price is higher than the cost to produce it).
- 4.34 If prices are higher than is competitive, then there is a reduction in overall welfare though a dead-weight-loss (the potential consumer and producer surplus from the consumption of goods that would have occurred at the efficient price, but do not occur at the higher price). At a very basic level, this

would suggest that competition interventions to reduce anti-competitive pricing should in theory result in welfare gains in an economy.

- 4.35 There have been some recent attempts to understand the relationship between competition enforcement and welfare. Welfare is linked very strongly to prices and markups, as high, uncompetitive prices result in consumers being unable to consume as much. As such, some of the papers covered in this report that touch upon prices and markups can be extended to represent changes in welfare as well. The following papers, however, go beyond this and attempt to explicitly estimate the consumption-equivalent welfare gain of competition intervention.
- 4.36 [Cavenaile et al \(2021\)](#) build a theoretical model showing that reduced competition enforcement leads to a reduction of welfare, and that, conversely, strengthening competition enforcement leads to notable welfare gains and increased innovation. The model suggests the dynamic effects of competitive enforcement on welfare, linked to innovation, are an order of magnitude larger than their static effects. This emphasises the importance of considering dynamic competition.
- 4.37 Unlike predominantly static models in the existing research, this model captures ongoing innovation, and the resulting dynamic competition as firms seek to capture market share. It also introduces the concept of entry and exit of superstar firms and the prevalence of a competitive fringe of small firms, which are critical for understanding long-term market concentration.
- 4.38 The authors also assess existing concentration-based rules (HHI) for detecting anti-competitive mergers. They find that these rules are limited in effectiveness, especially when considering mergers involving small but innovative targets. They suggest the need to identify and challenge such mergers to further enhance economic growth and welfare.
- 4.39 The working paper by [Moreau and Panon \(2022\)](#) studies cartel characteristics using cases investigated by the French Competition Authority and finds that the breakup of cartels can have a significant positive impact on the welfare of an economy.
- 4.40 First, they find that most cartels have few members, the median being four colluding firms. Second, cartels are widespread and found in almost all sectors of an economy. Third, cartel members tend to be the largest firms in a market. Finally, the firms that make up cartels tend to be similar in terms of productivity and sales. All of these characteristics combine to make cartels a significant drain on aggregate welfare and productivity.

- 4.41 The authors conclude that the breakup of all cartels in the French economy would increase aggregate productivity by 2%, and increase welfare by 3.5%. These numbers reinforce the importance and large impacts of cartel enforcement by a competition authority, especially in improving aggregate welfare in an economy.
- 4.42 Both papers discussed in this section support the fact that competition interventions can have a positive and significant impact on welfare in an economy.

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