

Productivity and competition

A summary of the evidence

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Executive Summary

This report outlines the theoretical and empirical evidence on the relationship between competition and productivity. The Competition and Markets Authority (CMA) has produced it because it is keen to understand how competition policy interventions might generate productivity improvements and thus contribute to long-term economic growth.

The evidence reviewed here addresses two separate but related questions: first, does stronger competition between firms lead to higher levels of productivity; and second, does competition policy and enforcement lead to stronger competition and hence higher productivity?

There is a strong body of empirical evidence showing that competition can drive greater productivity. Within-country studies demonstrate a positive relationship between strength of competition and productivity growth across sectors. Similarly, cross-country studies suggest that countries with lower levels of product market regulation, enabling stronger competition, tend to have higher levels of productivity growth.

There is also an extensive literature examining the impact on productivity of changes in competition over time, including as a result of deregulation. These studies show generally strong positive effects on productivity in sectors where deregulation has occurred, including transport and utilities.

The evidence suggests that competition drives productivity in three main ways. First, within firms, competition acts as a disciplining device, placing pressure on the managers of firms to become more efficient. Secondly, competition ensures that more productive firms 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. Thirdly, and perhaps most importantly, competition drives firms to innovate, coming up with new products and processes which can lead to step-changes in efficiency.

In addition to this evidence of a general link between competition and productivity, a number of new studies focus specifically on the role of competition policy and competition authorities. While there are strong theoretical arguments to suggest that competition policy should have a positive impact on productivity, there was relatively little empirical analysis of these effects until recently. However, several studies have now examined cross-country data on the existence and effectiveness of competition policy, and found that this can have a positive impact on economic growth and productivity.

This new evidence sits alongside evaluations of the impact of different types of competition intervention. For example, studies have shown that the formation and presence of cartels can restrict productivity growth, as well as leading to significant price increases for consumers. Historic studies of the introduction of anti-cartel legislation in the UK also suggest that this had a positive impact on productivity.

Overall then, the evidence set out in this survey suggests that effective competition policy can improve productivity, which in turn benefits consumers. This points to three possible implications for the CMA.

First, the CMA should be alert to sectors where low productivity, combined with other indicators of harm, might indicate weak competition in markets. Competition enforcement should not exclusively target low-productivity sectors - the evidence suggests that an important factor driving productivity is effective enforcement of competition policy across all sectors, particularly in light of the deterrent effects of interventions which can go beyond the narrow sector or market being examined. However, to the extent that the CMA has discretion to choose the markets it intervenes in, improving the effectiveness of competition in low productivity sectors can be expected to improve productivity and thus benefit consumers and the wider economy.

Second, the evidence suggests that government activity can play an important wider role in influencing the conditions of competition. For example, the evidence on product market regulation and deregulation suggests that removing regulatory barriers can strengthen competition and hence enhance productivity. This points to the importance of the CMA's statutory role in advising and recommending on the impact of policy on competition and markets, and the use of market studies and market investigations to examine and seek to lower or remove barriers to competition.

Finally, the evidence suggests that while productivity improvements should always lead to benefits to consumers in the long run, the speed and timing of this pass-through can vary. Therefore it is important for the CMA to think about long-term consumer impacts of its interventions, and consider wider benefits across markets, rather than simply assessing the direct monetary impact on consumers in a particular case.

1. Introduction

- 1.1 This report summarises the theoretical and empirical evidence on the relationship between competition and productivity.¹ It builds on and updates previous Office of Fair Trading (OFT) reports on *Productivity and Competition* (2007) and *Competition and Growth* (2011).² It also highlights more recent literature, including studies which have attempted to estimate the macroeconomic impacts of competition policy, and draws on recent surveys by the Organisation for Economic Co-operation and Development (OECD) (2014) and World Bank (2012).
- 1.2 The main motivation for the CMA in reviewing this literature is to understand how competition policy interventions might generate productivity improvements. Ultimately we want to target our resources where they can have the greatest impact. Since increasing productivity is a key determinant of long-term economic growth, we want to better understand how competition policy can contribute to this goal.
- 1.3 In addressing these issues, it is important to distinguish between the impact of competition as a process, and the role of competition policy and other interventions intended to strengthen competition. The evidence reviewed in this report addresses two separate, but related questions:
- Does stronger competition between firms lead to higher levels of productivity?
 - Does competition policy and enforcement lead to stronger competition, and hence higher productivity?
- 1.4 While there is a strong body of theoretical and empirical evidence suggesting a positive relationship between competition and productivity, the evaluation of competition policy is less well developed. However, as described in this report, recent studies suggest that competition policy can have an important positive impact in driving growth and productivity. This is in addition to the evaluation of particular competition policy interventions showing positive market-specific impacts.
- 1.5 The report is organised as follows:
- Section 2 gives some brief context on the productivity position of the UK

¹ For definitions of concepts used in this report, including 'productivity' and 'competition', see Annex A.

² OFT (2007a), OFT (2011b).

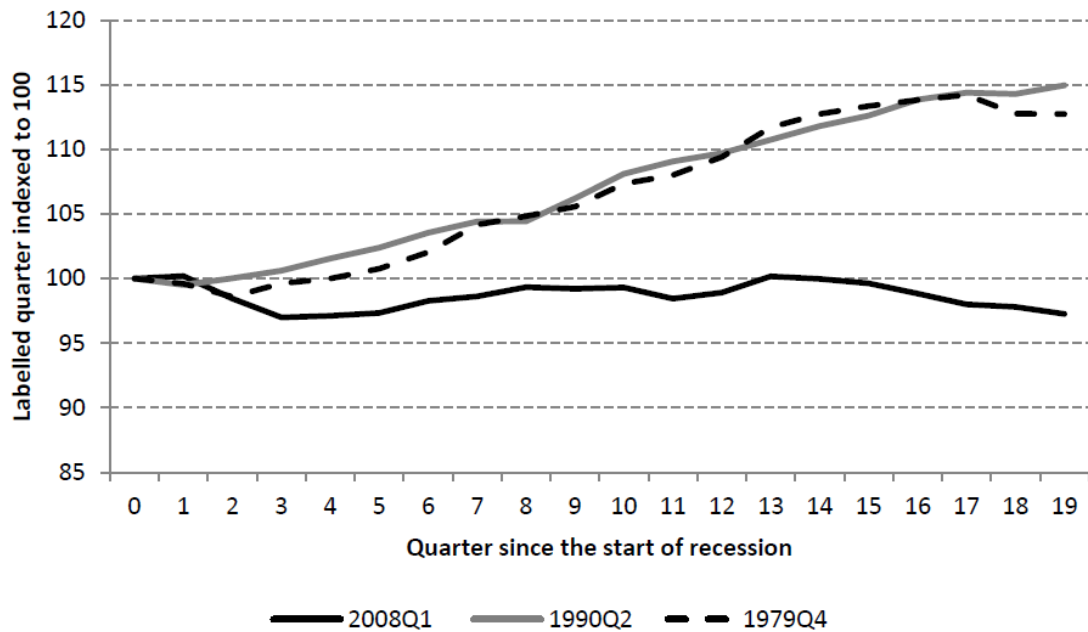
- Section 3 summarises evidence on the relationship between the strength of competition in a market and levels of productivity. It refers to studies looking at the empirical relationship between indicators of competition and levels of productivity. It also considers the mechanisms by which the process of competition might drive productivity.
- Section 4 covers literature on the impact of competition policy. It begins by considering attempts to estimate the impact of competition policy on macroeconomic productivity indicators. It then considers more specific evidence on the impact of different competition policy interventions.
- Section 5 sets out some thoughts on possible implications for the CMA of the evidence on competition and productivity.

2. The productivity position of the UK

- 2.1 Before considering the relationship between productivity and competition, this section sets out some brief context on why productivity matters and why there is a particular current focus on productivity in the UK.
- 2.2 At its simplest, productivity is a measure of an economy's ability to produce outputs (goods and services) from a given set of inputs. The more productive the economy, the more value it is able to generate, either through more efficient allocation of inputs, greater productive efficiency in converting inputs into outputs, or through innovation – coming up with new products and processes. Achieving sustained economic growth ultimately depends on an economy's ability to increase its productivity over time, so improving productivity should arguably be a key long-term goal of economic policy.³
- 2.3 The current focus on productivity in the UK begins from this long-term perspective, but also reflects the UK's recent productivity performance. During the 1990s and the first half of the 2000s the UK's aggregate productivity improved compared with other similar countries, closing the previous 'productivity gap'. However, since the start of the recession in 2008, the UK's aggregate rate of labour productivity has remained largely flat, as shown in Figure 1. This contrasts with historic performance following previous recessions, which saw relatively strong increases in labour productivity.

³ Increasing total factor productivity (TFP) is particularly important in this context, rather than labour productivity. See paragraph 2.6. Growth can also be driven by other factors such as investment.

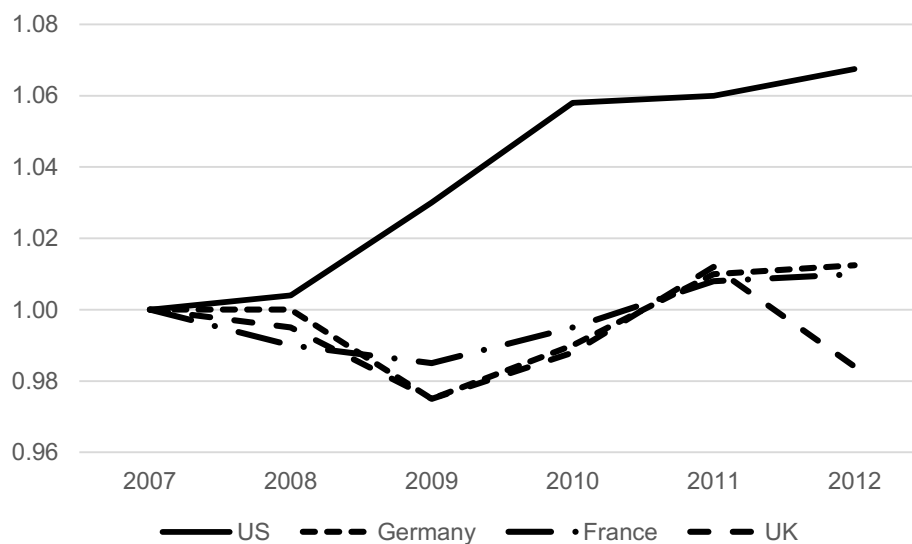
Figure 1: Labour productivity trends (real output per hour) following previous recessions



Source: Blundell et.al (2014).

2.4 The UK’s labour productivity growth has also been significantly lower than that of the USA since the start of the current recession, and slightly below that of France and Germany, as shown in Figure 2.

Figure 2: Trends in real GDP per hour in the UK, USA, France and Germany



Source: Blundell et.al (2014).

2.5 Recent UK statistics on international comparisons of productivity tell a similar story. Output per hour in the UK was 17 percentage points below the average for the rest of the major G7 advanced economies in 2013, the widest productivity gap since 1992. On an output per worker basis, UK productivity

was 19 percentage points below the average for the rest of the G7 in 2013.⁴ This suggests that the UK's recent productivity performance is not simply a result of global economic factors, but also has UK-specific causes.

- 2.6 An extensive literature has developed trying to explain possible reasons for this productivity performance.⁵ It is important to note that the comparisons described above relate to labour productivity rather than total factor productivity (TFP), and part of the explanation for differences between countries may relate to differences in capital intensity rather than to differences in overall efficiency.⁶
- 2.7 Finally, there is also increasing interest in identifying differences in productivity performance between different sectors of the economy. Recent evidence indicates that the UK's relative productivity performance varies significantly between sectors, as shown in Figure 3.⁷ This in turn suggests that sector- or market-specific factors may be important in explaining the overall productivity picture. This is particularly relevant in considering the potential impact of competition on productivity, since conditions of competition can vary widely across different markets both within and across sectors.

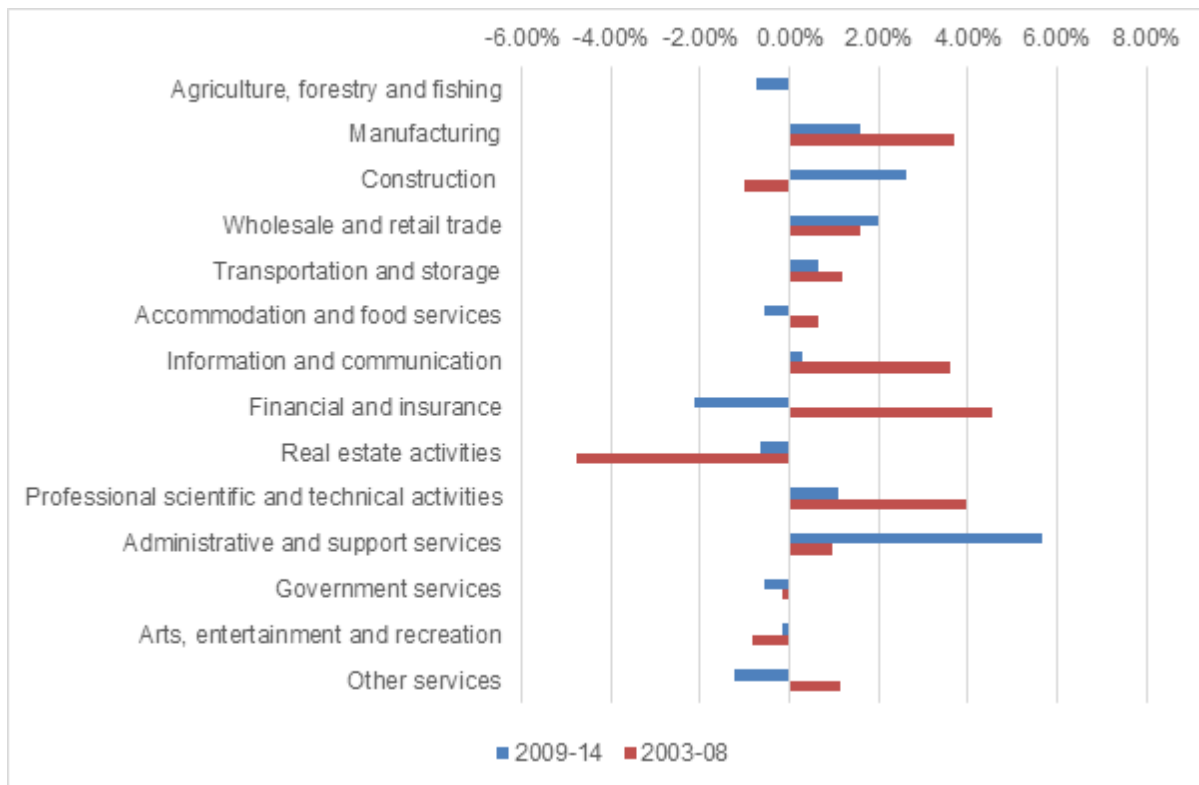
⁴ Office for National Statistics (2015), '[International Comparisons of Productivity - Final Estimates, 2013 | 20 February 2015](#)'.

⁵ For example, see Blundell et al (2014), Pessoa and Van Reenen (2014).

⁶ More background on alternative measures of productivity is given in Annex A. Labour productivity measures output per employee or per hour worked. Total Factor Productivity (TFP), measures how inputs from all factors of production (both labour and capital) are converted into outputs.

⁷ See also The Economist (2015), '[The productivity puzzle, Under the bonnet](#)' and IMF (2015).

Figure 3: Average annual change in output per hour worked by sector for 2003-08 and 2009-14



Source: CMA calculations based on ONS data
 Note: Excludes production sectors.

3. The impact of competition on productivity

- 3.1 This section summarises evidence on the relationship between the strength of competition in a market and levels of productivity. It first summarises some of the empirical literature indicating a positive relationship between levels of competition and productivity. It then considers in more detail the possible mechanisms by which competition might drive productivity, focusing on evidence of within-firm effects, between-firm effects and innovation.

Evidence of a relationship between competition and productivity

- 3.2 Competition can be defined as a process of rivalry between suppliers that takes place either in the market or for the market. Firms compete to attract customers by offering lower prices, higher quality of products or services, or more innovative products and services. When competition is working effectively, the market will send clear messages to firms (for example, in the form of the prices they can charge and the profits they can earn) about which goods and services consumers want to buy. Efficient firms offering the products consumers want at low prices will prosper, and inefficient ones will not.⁸
- 3.3 There is a strong body of empirical evidence showing that competition enhances productivity. This evidence falls into two broad groups:
- First, studies which use micro-level data to examine the relationship between competition and productivity across product markets. This literature aims to assess whether markets with higher levels of competition tend to exhibit higher levels of productivity.
 - Second, studies looking at changes in the level of competition in a market over time, either following deregulation or where there has been some other exogenous factor leading to a change in the level of competition.

Evidence of competition effects across product markets

- 3.4 Haskel (1991) provides one of the first studies to exploit UK micro level data to explore the effects of competition on productivity. He uses UK panel data from 1980 to 1986 to investigate the role that changes in the product market have on productivity growth. He finds that high levels of market concentration and market share have an adverse effect on total factor productivity.

⁸ For example, see Vickers (1995).

- 3.5 Nickell (1996) employs a dataset of the published accounts of 700 British manufacturing companies between 1972 and 1986 to measure how firm level productivity varies with different measures of product market competition.⁹ He finds that high rent firms (ie firms that are able to earn profits beyond a competitive level) had consistently lower productivity growth than low rent firms (ie firms with a competitive level of profitability). A 10% increase in price mark-ups above cost resulted on average in a 1.3 to 1.6 percentage point loss in TFP growth. This demonstrates a negative relationship between market power and productivity.
- 3.6 Disney, Haskel and Heden (2003) find similar results using a much larger dataset, from 143,000 UK manufacturing firms between 1980 and 1992. The comprehensiveness of their data allows them to capture the effects of exit. They point out that basing a study exclusively on either surviving firms or large firms biases the results, since it misses the contribution of small, usually low productivity firms, and firms that exit. The results demonstrate that past reductions in profits and in market share have the effect of increasing both current productivity levels, and productivity growth.
- 3.7 Rather than looking directly at measures of competition, other studies use indicators of product market regulation (PMR) as a proxy for the level of competitive pressure. Nicoletti and Scarpetta (2003) find that PMR slows down the rate at which countries with a lower level of productivity catch up with the best performing countries. Specifically, aligning the regulatory stance in European countries with the most liberal OECD country would raise TFP growth over ten years by up to 1.1 percentage points. Arnold, Nicoletti and Scarpetta (2011) compare the time periods 1995-2007 and 1985-1995 and find a statistically negative correlation between the level of product market regulation and the change in TFP across the periods.
- 3.8 More recently, Bourlès et al (2013) consider the impact of competition in intermediate goods markets on productivity downstream. The authors analyse data on a panel of fifteen OECD countries and twenty industries between 1985 and 2007, and use industry product market regulation data as a proxy for the level of competitive pressure. They find evidence that anticompetitive upstream regulations have significantly curbed TFP growth over the past fifteen years, particularly for firms that are close to the productivity frontier (ie those firms that are the most productive in their sector). The results suggest

⁹ Product market competition is measured using industry concentration, import penetration, market share, and returns to the owner of the company in excess of costs including the cost of capital ('rents').

that increasing competition in upstream sectors by eliminating anti-competitive regulations could increase TFP growth by 1 to 1.5 percentage points per year.

- 3.9 Tang and Wang (2005) employ a different technique by using a survey-based approach, asking firms to report on the intensity of competition they face. As a result, they avoid issues in defining competition according to market structure where only a few firms might compete intensely or in terms of firm profitability which is difficult to measure and draw meaningful cross-firm comparisons from. Using perceptions of competition in a sample of firms in Canada, they conclude that 'firms – especially medium-sized ones – that perceive a higher degree of product market competition tend to have higher productivity levels.'

Evidence from events: impacts of deregulation and changes in competition

- 3.10 Rather than looking at differences in competition and productivity across a panel of different industries, an alternative approach is to look at the impact of changes in competition resulting from deregulation or other external factors.
- 3.11 Pilat (1996) argues that it is the effects of deregulation which have revealed most clearly the effects of competition on productivity. Griffiths and Harrison (2004) provide an overview of studies which explore this connection. Specific examples of sectoral productivity impacts include:
- Maher and Wise (2005) estimate that the liberalisation and regulatory reforms which introduced competition into the UK electricity, gas, and water industries resulted in 'phenomenal rates' of productivity growth: over 10% a year across the 1990s.
 - Boylaud's (2000) analysis of the liberalisation of the road freight industry in OECD countries, and Olley and Pakes' (1996) survey of deregulation in US telecommunications, both identified productivity gains. Similarly, Gort and Sung (1999) were able to identify TFP growth rates between seven and 14 times higher in competitive US telecoms markets than in regional telecoms monopolies, during 1985 to 1991.
 - Alesina *et al.* (2005) find strong effects of deregulation on investment in utilities, transport and communications from 1975-98. The results suggest that if Italy had PMR similar to the USA, investment would have been around 3% higher in the late 1990s.
- 3.12 Jamasb et al (2004) summarise existing studies on the impact of electricity reform across a range of countries, giving evidence of productivity impacts following both privatisation and liberalisation. Fabrizio et al (2004) attempt to disentangle the impact of competition from that of ownership using data from

US energy markets. They find that private generators facing competition had 20% higher productivity than publicly-owned utilities facing no competition, and 5% higher productivity than privately-owned generators facing no competition.

- 3.13 Similarly, Micco and Serebrisky (2004) analyse the impact of changes in air transport regulation on productivity and efficiency. They find that improvement in the quality of air transport regulation led to a reduction in transport costs of 14%. Introduction of 'open skies' agreements to foster competition were found to reduce transport costs by 8%.
- 3.14 Rather than considering the impact of deregulation, Haskel and Sadun (2011) look at the impact of introducing new regulations in the retail sector in the UK. They look specifically at the impact of a 1996 regulatory change that increased the costs of opening large stores. They argue that a fall in average shop size following the change lowered TFP growth by about 0.4% per annum between 1997 and 2003. More generally, Cincera and Galgau (2005) find that entry-d discouraging regulation in European markets has raised mark-ups and lowered labour productivity growth.
- 3.15 Holmes and Schmitz (2010) summarise evidence from a range of studies of industries which have seen a change in their competitive environment – typically leading to an increase in competition. Nearly all of the studies they review find that increases in competition led to increases in industry productivity. Many of the studies also showed that firms facing stronger competition made substantial investments to raise productivity.

Why might stronger competition lead to higher productivity?

- 3.16 The empirical studies described above suggest a positive relationship between competition and productivity. However, they do not necessarily explain how competition creates this positive effect. Understanding the mechanisms by which competition might lead to higher productivity could help competition authorities and government think about the types of interventions that are more likely to have positive productivity effects.
- 3.17 There are three main mechanisms described in the literature which explain how stronger competition could lead to higher productivity.
- First, within firms, competition acts as a disciplining device, placing pressure on the managers of firms to become more efficient. This decreases 'x-inefficiency' – that is, the difference between the most efficient behaviour that the firm is capable of and its observed behaviour in practice. This is sometimes called the 'within-firm' effect.

- Secondly, competition ensures that higher productivity firms 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. This is sometimes called the ‘across-firm’ or ‘market-sorting’ effect.
- Thirdly, and perhaps most importantly, competition drives firms to innovate. Innovation increases dynamic efficiency through technological improvements of production processes, or the creation of new products and services.

3.18 These three mechanisms broadly reflect the impact of competition on productive, allocative and dynamic efficiency respectively.

Within-firm effects: reducing ‘x-inefficiency’

3.19 When there is strong competition, inefficient firms are unable to stay in the market in the long run. Managers should have a strong incentive to ensure there is no slack in the production process, and resources are configured effectively. In contrast, where competition is weaker, managers may be able to reduce their efforts without the same risk of going out of business. As the economist Sir John Hicks noted, ‘the best of all monopoly profits is a quiet life’.¹⁰

3.20 Several empirical studies indicate evidence of a positive relationship between competition and x-efficiency:

- Bloom and Van Reenen (2010) find that strong product market competition appears to boost average management practices through a combination of eliminating the tail of badly managed firms and pushing incumbents to improve their practices. Based on a cross-country survey of management practices covering more than 6,000 firms, they find a positive relationship between the strength of management practices which improve performance and a range of competition measures.¹¹
- Nickell, Nicolitsas and Dryden (1997) identify a mechanism through which competition drives x-efficiency by adopting the idea of competition as a form of pressure on managers (or ‘disciplining device’). Their empirical survey of 580 UK manufacturing companies demonstrates that competition is substitutable with other disciplining devices – financial pressure and dominant external shareholders – in terms of their effects on productivity.

¹⁰ Hicks (1935).

¹¹ These include import penetration rates and Lerner indices.

The marginal influence of competition on x-efficiency is weaker when it overlaps with one of these other disciplining devices.

- Griffith (2001) isolates the impact of competition on managerial effort by dividing her sample of UK firms into single establishments which are more likely to be manager owned (no principal-agent problem), and group establishments, which are likely to have a separation of management and ownership (principal agent problems). She finds that an exogenous rise in competition increased the productivity of the firms likely to have principal agent problems, but not that of firms without these problems.

- 3.21 Bloom et al (2015) suggest that similar mechanisms might apply in the provision of public services. They analyse the impact of competition on managerial quality and hospital performance in the UK. They find that higher competition results in higher management quality, and that this also appears to have a measurable impact on hospital performance (measured by survival rates).
- 3.22 Bloom et al (2012) finds that there is strong evidence that tough product market competition is associated with better management practices, within both the private and public sectors.

Between-firm effects: 'market sorting'

- 3.23 Second, competition ensures that more productive firms 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, with the subsequent positive cross-firm impact on productivity. This is sometimes called the 'across-firm' or 'market sorting' effect.
- 3.24 For example, Syverson (2004) finds that in a homogeneous industry in the United States (ready-mix concrete), more competitive geographic markets tend to have a smaller tail of less-productive plants. This lends support to the idea that competition tends to drive out less-productive firms. Where competition is strong, firms with low productivity are unable to survive.
- 3.25 Several studies have attempted to quantify the importance of this market-sorting effect. For example, Arnold et al (2011) suggest that productivity growth is largely driven by reallocation from less to more productive firms, rather than through within-in firm improvements in productivity. Other studies tend to support this finding:
- Harris and Li (2008) find that 79% of UK productivity growth arises from between-firm effects rather than within-firm effects.

- Disney, Haskel and Heden (2003) reviewed UK manufacturing from 1980 to 1992. They found that between firm effects ('external restructuring') account for roughly half of labour productivity and 80 to 90% of TFP growth.
- Baldwin and Gu (2006) conduct work on Canadian manufacturing over the period 1979–99. Their decompositions find a large role for between-firm effects in productivity growth. Around 70% of productivity growth is attributed to higher productivity firms gaining market share at the expense of the less productive firms. They argue that many other researchers inadvertently capture the effects of market share reallocation in their within firm estimates.
- Scarpetta et al. (2002), suggest that market sorting accounts for 20 to 40% of total productivity growth across ten OECD countries, for varying time periods in the 1980s and 1990s.

3.26 The relative importance of entry and exit in driving productivity can vary according to where a market sits on the product life cycle: entry and exit are more prominent, and have greater productivity-enhancing potential, at early stages of a product's life cycle. Entry and exit tend to have relatively lower effects on productivity in mature industries, and of the two it is exit that seems to have the more significant effect.

Innovation

3.27 The third mechanism through which competition might drive higher productivity is by encouraging innovation. Arguably this dynamic effect is the most important of all – product and process innovations have the potential to lead to a step-change in costs or quality, or to open up new markets. For example, Cameron (2003) finds that a 1% increase in R&D (closely related to innovation) by UK manufacturing firms raised TFP by 0.2 to 0.3%.

3.28 The relationship between competition and innovation is complex. On the one hand, in the presence of competition, firms will aim to innovate to gain a cost advantage, to differentiate their products or to bring new products to the market. Competition is, arguably, the strongest incentive for firms to innovate. On the other hand, the financial incentive for firms to innovate stems from the ability to generate positive returns from successful innovations, which suggests a need for ex post market power. Intellectual property rights and patents thus play an important role, alongside competition policy, in encouraging innovation.

- 3.29 A wide range of empirical studies have attempted to explore these links between competition, innovation and productivity. On the whole these set out a positive relationship between the three, for instance:
- Looking at 4378 major innovations in the UK between 1945 and 1983, Geroski (1990) finds evidence against the hypothesis that increases in competitive rivalry decrease innovativeness.
 - Blundell, Griffith, Van Reenen (1995) reveal a complex relationship between competition and innovation based on 375 firms listed on the London International Stock Exchange between 1972 and 1982. Specifically, they find that dominant firms tend to innovate more and that industry concentration dampens innovative activity. However, to the extent that growing dominance increases industrial concentration, the level of aggregate innovation will tend to fall.
 - Griffiths, Harrison and Simpson (2010) look at the effect of the introduction of the Single Market Programme in Europe in the early 1990s on innovation and thus productivity. They find that measures to reduce internal non-tariff barriers to trade and open up competition did have the effect of increasing product market competition. This, in turn spurred innovation. The authors also look at industry-level effects. For example, they find that the Single Market Programme increased R&D intensity by 1.2% in the UK metal products industry, which was associated with a 0.7 percentage point increase in TFP growth. Within an industry, the effect of increasing competition on innovation appears to be larger in countries that are closer to the global technological frontier.
- 3.30 Aghion et al (2005, 2009) find evidence of an inverted-U shape relationship between competition and innovation based on UK data. Where competition in a market is initially limited, an increase in the level of competition will tend to lead to an increase innovation. However, beyond a certain point, further increases in competition may have the opposite effect.
- 3.31 In theory, one might wonder if the existence of an inverted-U shape relationship between competition and innovation poses a question for competition authorities as to whether encouraging ‘too much’ competition could lead to detrimental effects on innovation. In practice however, it is unlikely that sectors where increasing competition would risk harming incentives to innovate would often come to the attention of competition authorities, since their interventions are targeted in markets where competition appears to be particularly weak.

- 3.32 In addition, recent literature has emphasised the importance of the interaction between competition policy and protection of intellectual property rights, for example through patents. For example, Correa and Ornaghi (2014) use a similar analytical approach to Aghion et al (2005), but apply this to US manufacturing data. They find a positive relationship (rather than an inverted-U shape) between competition and innovation. Patent counts are found to increase with more competition.¹² Similarly, TFP and labour productivity are found to continue growing as one moves from industries with significant market power to more competitive industries. The authors suggest that when there are well-defined intellectual property rights in a market, increases in competition will generally lead to greater levels of innovation which in turn leads to higher levels of productivity.
- 3.33 Aghion et al (2014) also provides evidence that strong patent rights may complement competition-increasing product market reforms in inducing innovation. They find that product market reform induced by internal market reform of the European Union in 1992 enhanced innovation in industries of countries where patent rights were strong, but not in industries of countries where patent rights were weak.
- 3.34 On balance then, the literature appears to suggest that competition can be an important spur to innovation, particularly when complemented by an effective intellectual property rights regime which allows firms to benefit from some of the gains of innovation. In turn, innovation can drive greater productivity.

¹² There is some controversy over the use of patent counts as an indicator of innovation, in part because of difficulties in comparing statistics between countries, and in part because of the recent growth in patenting activity. However, patent counts are still widely used in the literature on innovation.

4. Relationship between competition policy and productivity

- 4.1 The previous section outlined the strong theoretical and empirical evidence linking competition with productivity. However, until recently there has been less evidence on the impact of competition policy and actions by competition authorities in driving higher rates of productivity.
- 4.2 The aim of competition policy is to ensure that competition is working effectively in markets, and in particular that firms are not able to impede the process of competition by behaving anti-competitively. For this reason we might suppose that competition policy should have a positive impact on productivity. However, it is only relatively recently that the evaluation of competition policy has allowed some of these impacts to be properly assessed.
- 4.3 This section summarises two types of evidence on the impact of competition policy on productivity:
- First, cross-country studies of the relationship between the existence and effectiveness of competition policy and overall productivity indicators.
 - Second, assessments of the impact of different competition policy tools (for example cartel enforcement and merger enforcement).

Impact of competition policy on macroeconomic indicators of productivity

- 4.4 A number of recent studies have attempted to estimate a relationship between effectiveness of competition policy and economic outcomes, including productivity.
- 4.5 There are several challenges in carrying out these evaluations:
- First, it is difficult to measure 'effectiveness' of competition policy. Some studies (eg Peterson, 2013) address this problem by looking at the impact of introducing competition policy in a country. In others cases (eg Buccirossi et al, 2013), researchers have attempted to compile indicators of the effectiveness of competition policy constructed from a range of observable characteristics.
 - Second, there are challenges in isolating the impact of competition policy from other factors that might be driving TFP growth. For example, if the effectiveness of competition policy tends to be correlated with the strength

of other policy measures supporting productivity, then without controlling for these other factors there is a risk of overestimating the impact of competition policy. The papers described below have used different strategies for isolating these effects, such as the use of instruments (Buccirossi et al 2013), and through difference-in-difference estimation (eg Gutmann and Voigt 2014).

- 4.6 Buccirossi et al. (2013) estimate the impact of competition policy on TFP growth using a sample of 22 industries in twelve OECD countries between 1995 and 2005. The authors derive an aggregate competition policy indicator (CPI) based on features that they believe have the strongest impact on effectiveness – particularly those that influence the size of the sanctions, probability of detection and conviction, and probability of errors. They then estimate the relationship between CPI and TFP growth, controlling for factors which might be correlated with the introduction of competition policy (including product market regulation, liberalisation, privatisation and trade openness). They find that the aggregate CPI has a positive and highly significant effect on TFP growth.
- 4.7 Using more disaggregated CPIs, the authors attempt to isolate the effects of institutional and enforcement features and distinguish between merger control and antitrust.¹³ They find positive and significant impacts of all these indicators, though strength of institutions and effectiveness of antitrust enforcement appear to have the strongest and most significant impact on productivity growth.
- 4.8 Petersen (2013) takes a slightly different approach, looking at whether the introduction of competition laws in countries which previously did not have them has had an observable impact on outcomes over the following ten years. By using a ‘difference in difference’ approach across countries, he aims to isolate the specific effect of competition law from other factors which might be driving productivity and growth measures. Using data from 154 countries between 1960 and 2005, Petersen suggests that competition law does indeed have a positive effect on the level of GDP per capita and economic growth after ten years.
- 4.9 Gutmann and Voigt (2014), using the same dataset as Petersen (2013), also find that growth rates typically increase following introduction of competition law in a country. However, they do not find a statistically significant impact on TFP growth. They suggest that the impact of competition policy on growth

¹³ Antitrust relates to enforcement of competition law on anti-competitive agreements (eg cartels) and abuse of dominance. In the UK, antitrust policy is largely covered by provisions of the Competition Act 1998.

may be driven by increasing overall investment rather than through TFP growth, although they also note the measurement difficulties and suggest that a positive TFP impact might take longer to emerge.

- 4.10 Clougherty (2010) finds similar results to Gutmann and Voigt (2014). He uses funding to estimate a country's commitment to competition policy and finds that increased funding by one standard deviation (\$58.8 million) would be expected to increase economic growth by 0.84%.
- 4.11 Voigt (2009) analyses the relationship between indicators of competition policy effectiveness¹⁴ and productivity across a sample of 97 countries. The analysis finds firstly that there is a correlation between these competition indicators and TFP, supporting the idea that sound competition policy supports total factor productivity. However, the relationship is not particularly strong. Second, he finds that the overall quality of institutions implementing laws is a key factor in driving TFP growth.
- 4.12 Ma (2011) finds that in less developed countries, the introduction of competition laws appears to have had relatively little impact. He argues that this is because institutional frameworks for enforcing competition law are weaker than in more developed countries. This appears to support the conclusion which was reached by Voigt (2009) that competition laws are important but so is the quality of institutions implementing laws. Overall the research finds that a positive relationship between competition policy and productivity growth exists, but its strength depends on the competition culture shaped by other institutions.
- 4.13 In addition to these studies looking at cross-country comparisons, others have taken a more historic perspective, tracing the impact of competition policy changes over time. In the UK, Crafts (2011) argues that the reduction in competitive intensity in the inter-war period was a major cause of the relative decline of UK productivity which only turned around after pro-competitive reforms were implemented after 1979. In Australia, the Productivity Commission (2005) estimate that the introduction of a national competition policy added 2.5% to Australian GDP.
- 4.14 Overall, these recent studies of the impact of competition policy appear to offer support for a positive relationship with productivity growth. The strength of the conclusions varies between studies, and not all studies find a statistically significant effect on TFP growth. However, there appears to be agreement that competition policy can have a positive impact on a country's

¹⁴ The indicators attempt to reflect both quality of competition laws, and effectiveness of implementation.

overall economic growth. Some of the studies also suggest an important complementarity between competition policy and the wider effectiveness of legal institutions and frameworks.

Impacts of specific competition interventions

4.15 In addition to this general evidence of the impact of competition policy, some studies have also considered the impact of specific types of competition intervention. This section summarises some of the findings in relation to:

- antitrust policy – cartel enforcement and abuse of dominance
- merger policy;
- market studies and investigations; and
- consumer policy.

Cartel enforcement, agreements and abuse of dominance

4.16 The impact of antitrust policy on productivity is difficult to measure because productivity effects arise over a long period of time, and it can be hard to attribute changes in productivity to competition actions rather than other influences. Various approaches have been taken to trying to identify both the potential negative impacts of anti-competitive behaviour on productivity, and the possible positive effects of competition enforcement actions, as set out below.

4.17 In the UK, the introduction of the 1956 Restrictive Practices Act provided a useful natural experiment to test the impact of cartel policy:

- Broadberry and Crafts (2000) find that price fixing agreements were widespread prior to the 1956 Restrictive Practices Act and seem to have had an adverse effect on costs and productivity.
- Symeonidis (2008) finds strong evidence of a negative effect of collusion on labour productivity growth. Cartels reduced labour productivity growth by up to 30 percentage points in a nine-year period. Before competition policy reforms, labour productivity declined by 2% a year in industries characterised by collusion but grew by 16% a year in industries characterised by competition. Once cartels became illegal, no significant differences between collusive and non-collusive industries existed in terms of rates of labour productivity growth.

- 4.18 More recently Petit, Kemp and Van Sinderen (2015) assess the impact of cartel formation on productivity in the Netherlands. They consider data on 27 industries of the Netherlands economy in the period 1982 to 1998, and test the impact of cartels included in the ‘cartel register’ on productivity.¹⁵ Their research suggests that cartel presence restricts productivity growth. As expected, cartel formation points to a lower TFP growth rate and cartel termination points to a higher TFP growth rate, although these latter findings are not statistically significant.
- 4.19 Alongside these studies suggesting that cartels can lead to lower productivity, there is also a developing literature looking specifically at the effectiveness of competition authorities’ interventions in preventing and deterring cartels. These studies typically do not look directly at productivity impacts. Instead they focus particularly on consumer impacts (for example, price reductions as a result of the ending of a cartel), and on deterrence effects of enforcement action.
- 4.20 In relation to consumer impacts of cartels, several studies attempt to estimate the average increase in prices (sometimes known as the ‘overcharge rate’) resulting from a cartel. Overall there appears to be robust evidence that cartels lead to higher prices for consumers, and thus that interventions by competition authorities can lead to lower prices. For example:
- Connor (2014) estimates a median overcharge rate of 23% based on data on more than 500 cartels.
 - Connor and Bolotova (2006) estimate a median overcharge of 19% and mean overcharge of 29% across 395 cartel episodes.
 - Levenstein and Suslow (2006) examine 35 international cartels that were prosecuted by the Department of Justice and the EU in the 1990s. They estimate a median overcharge of 25%, and individual overcharges ranging from 10% to 100%.
 - Bolotova (2009) estimates a median overcharge rate of 20% based on 406 cartels. Overcharges are found to be higher where the market share of the cartel participants is higher, and overcharges are lower where the cartel has more participants. International cartels are found to raise prices more than domestic ones.

¹⁵ Until 1998, cartels were permitted in the Netherlands, but had to be notified on a public register.

- Smuda (2014) uses data on 191 overcharge estimates in Europe and estimates a median overcharge of 18% and mean overcharge of 21%. On average, the price impacts of cartels are found to last for over 8 years. International cartels raised prices by more than domestic one, and bid-rigging cartels also raised prices by more than other cartels.
- 4.21 Arguably the potential deterrent effect of antitrust interventions is even more significant in terms of the overall impact on productivity. In 2011 the OFT commissioned research from London Economics to estimate the impact of enforcement on deterrence, based on surveys of businesses and advisors. The analysis suggested that for each cartel case investigated by the OFT, 28 others were deterred. While this is only one estimate, and different methodologies might give alternative figures, it appears clear that there is a significant deterrent effect.
- 4.22 For other types of antitrust intervention, including cases involving potential abuse of dominance, the impacts tend to be much more case-specific. For this reason there is relatively little literature on average productivity impacts. However, evaluations carried out previously by the OFT and others give some examples of the estimated impacts on consumer outcomes. For example:
- The NHS claimed damages of £90 million resulting from additional expenditure on Alginate and Antacid drugs caused by the delay of the assignment of a generic name for Gaviscon Liquid alongside the withdrawal of the supply of prescription packs of this product. The NHS claim was a direct result of the OFT finding of abuse of dominance against Reckitt Benckiser in 2001 in relation to the withdrawal of Gaviscon Liquid. The damages claim was settled for an undisclosed and confidential amount in February 2014.
 - The OFT estimated that its 2001 intervention against Napp pharmaceuticals for abuse of dominance in the market for sustained release morphine resulted in savings for the National Health Service in excess of £1.5 million per year.
- 4.23 As with cartel enforcement, the deterrent effect of wider competition interventions is also likely to be significant. The 2011 London Economics research estimated that investigations into abuse of dominance could be expected to deter 12 other instances of potential anti-competitive behaviour, while investigations into potentially anti-competitive commercial agreements could deter similar behaviour in another 40 cases. As with the estimates of cartel deterrence effects, different studies might give alternative numbers, but the research does suggest that deterrent effects of competition interventions can be significant.

Mergers

- 4.24 As with antitrust policy, there are similar challenges in assessing the impact on productivity both of mergers themselves, and of merger enforcement actions by competition authorities. Part of the difficulty is that mergers that are analysed empirically are necessarily those that have been approved by a merger regime, rather than being a sample of all possible mergers. In practice only a small proportion of mergers give rise to any competitive concern.
- 4.25 Theory would suggest that mergers can have productivity-enhancing effects. As shown in the previous section, improvements in management can be an important channel for driving greater productivity, and mergers can facilitate this. There may also be cost efficiencies resulting from a merger which directly increase productivity. On the other hand, mergers can reduce competition, and hence have a negative overall impact on productivity. The aim of merger control is to prohibit or remedy anti-competitive mergers, while allowing others to take place.
- 4.26 Overall the literature on the effects of completed mergers provides mixed evidence on whether mergers tend to have positive or negative effects on productivity in practice. There is some indication that the reported effects of mergers can vary according to different types of merger, and the different methodologies used to study them. For example:
- Event studies looking at the impact of mergers on shareholder value tend to find a short-term positive effect on share prices particularly for shareholders of the acquired company (eg Jensen and Ruback (1983)). However, these findings appear less clear over a longer period. Tichy (2001) considers merger studies that use extended observation windows and finds that the majority report negative abnormal returns to shareholders by 20 months after the merger.
 - According to Tichy (2001), outcome studies looking at the balance sheet position of merging companies before and after the merger tend to show a decline in sales and profits.
 - However, other studies suggest mergers can have a positive productivity effect. For example, Baldwin and Gu (2006) survey Canadian manufacturing between 1979 and 1999. They find that on average, merger entry and divestiture exit account for 21.7% of labour productivity growth over this period. Also Giandrea (2006) finds that mergers had a positive total impact on TFP, accounting for 0.36% of TFP growth between census years.

- 4.27 Given the link between competition and productivity outlined in the previous section, there are strong reasons to suppose that effective merger control that prevents anti-competitive mergers should have a positive effect on productivity. However, it is difficult to directly measure the impact of merger enforcement on productivity. Instead, as with cartel enforcement, most of the studies of merger interventions focus on the likely impact on consumer prices, and on the deterrence effect on other potential anti-competitive mergers.
- 4.28 For example, Ashenfelter and Hoskin (2010) provides one study of possible price effects of allowing anti-competitive mergers (as a way of estimating the possible benefit of merger intervention by a competition authority). They analyse five mergers in the USA between 1997 and 1999 where competition concerns were raised but which were ultimately allowed to go ahead by the competition authorities. In four of the five mergers investigated, prices increased by a small but significant amount, typically between 3% and 7%.
- 4.29 As with cartel enforcement, the more important impact of merger policy on productivity may be through wider deterrence of potentially anti-competitive mergers. Van der Noll et al (2011) find, based on survey evidence, that 5% of merger propositions in the Netherlands are modified before submission to the competition authority and just under 12% are abandoned altogether. Similarly, in the UK, London Economics (2011) reports that 18% of mergers were abandoned and 15% were modified before submission to the competition authority.

Market studies and market investigations

- 4.30 As well as regulating the conduct of firms, the CMA can undertake market studies that can make recommendations to change the way markets work. Previous studies by the OFT and Competition Commission (CC) in the UK frequently concerned entry barriers that are not erected by firms. For example:
- A market study by the OFT recommending the elimination of administrative restrictions on entry in the retail pharmacy sector resulted, even with only partial implementation, in shortened travel and waiting times, and improved access to lower-priced over-the-counter medicines, with overall quantified net benefits conservatively estimated at £12 million to £20 million per year. In addition, the market study also resulted in other (non-

quantified) benefits including extended opening hours, and greater choice for consumers.¹⁶

- A 2003 OFT market study into taxis that found that restrictions on the number of taxi licences in certain areas significantly lowered the quality of service to customers. An evaluation in 2007 found that around one third of all the Local Authorities which had quantity restrictions in 2003 had de-restricted since then. Most of the benefits to consumers of derestriction outlined in the 2003 study were realised in the newly derestricted areas, and the number of taxis in newly de-restricted areas grew by around 30% between 2003 and 2007.¹⁷
- The CC's investigation of the groceries market recommended changes to retail planning rules for supermarkets aimed at reducing entry barriers.¹⁸
- Similarly the CC's market investigation into rail rolling stock recommended changes to the government's approach to rail franchising to facilitate flexibility and choice.¹⁹

4.31 This is significant in light of the body of literature which demonstrates that entry barriers created by government – licencing, administrative costs of start-up and other regulation – have significant negative implications on productivity.

- Poschke (2006) employs a model of heterogeneous firms adopting technology on entry to explore differences in TFP between similar economies. He finds that small increases (for example, 1% of average firm output) in the administrative costs of entry, can explain 10 to 20% of the differences in TFP between Europe and the USA.
- Brandt (2004) investigates the correlation between indicators of the degree of regulation and firm entry. Her results suggest that overly complicated licence and permit systems discourage entry. Equally, excessively long periods in which creditors have a claim over bankrupts' assets can act as an exit barrier, which further dis-incentivises entry in the first place.

¹⁶ OFT (2010).

¹⁷ OFT (2007b).

¹⁸ CC (2008).

¹⁹ CC (2009).

- Scarpetta et al. (2002) arrive at similar conclusions on regulatory barriers to entry, noting that the negative effects of product market regulation particularly hamper market access by small and medium sized firms.²⁰
- Aghion et al (2009) suggest that reforms introduced by the UK government throughout the 1990s aimed at reducing entry barriers, such as market liberalisation and interventions by competition authorities, had a positive impact on innovation and productivity in the UK.

4.32 Where regulatory entry barriers do exist, they are often specific to markets. Market studies and market investigations are able to target such instances, and so provide an excellent tool for scrutinising their impact on consumers and competition.

Consumer policy and productivity

4.33 The link between consumer policy and productivity is less developed in the economic literature, particularly from a quantitative angle. However, there is a strong theoretical argument that consumer policy can help empowered consumers drive stronger competition, which in turn drives productivity.

4.34 Consumers drive competition by choosing to buy from the firm that offers the best combination of price, quality and product characteristics. Firms that offer the same goods at higher prices, or less innovative products, lose business and are forced to change or leave the market (driving the ‘market sorting’ effect described in Section 3). Empowered, active consumers are therefore central in creating the incentives to for firms to compete. Stronger competition should then encourage greater firm-level productivity.

4.35 There are a number of conditions that need to be met for this mechanism to work well:

- Consumers need to be able to enforce their contracts with producers, otherwise the confidence to make transactions will break down, leading to detriment for both parties. This is a key role for consumer law and wider contract law.
- Consumers need to have good information about the product that they are buying, and be able to use this information to compare between firms and products. For some products the effort required to gather information can be high and the benefit from better information uncertain so consumers do

²⁰ Indeed, they suggest that relatively lower levels of product market regulation may explain why firm entry in the USA involves much smaller firms than in Europe.

not consider it worthwhile to gather information. In other cases, information complexity can make it difficult for consumers to assess different offers, even where information is available.

- The costs of switching product must not be prohibitive as suppliers know that they can mark-up products significantly before it is worthwhile for consumers to switch. This dampens price competition in the market. It also becomes difficult for new firms to enter the market.

4.36 In addition to the CMA's role in enforcing consumer law, several market studies and market investigations carried out by the OFT, CC and CMA have focused on empowering consumers, particularly by ensuring that they have information to compare offers, and that costs of switching are not excessive. For example:

- The CC's investigation of home credit found that lack of information for consumers was one of the key factors leading to weak competition and higher prices. The CC's remedies included establishing a price comparison website to increase transparency and allow consumers to compare offers, and better provision of information on statements.²¹
- The OFT's 2005 market study into care homes identified lack of information as a key concern - consumers weren't able to make informed decisions on care homes based on price, quality and objective characteristics. An evaluation carried out in 2011 found that, as a result of OFT recommendations, price transparency had increased and other information (such as reports on inspections) was more readily available. It also found evidence of improvements in quality of outcomes for consumers.²²
- An ex post evaluation of the CC's investigation into extended warranties on domestic electrical goods found that the remedies had led to more and better information to consumers. For example, 15% of consumers compare the retailer's extended warranty offer with that of another supplier in 2008 compared with 4% in 2002.²³
- The CMA also introduced measures in the market for payday lending that improved consumers' access to information with the objective to stimulate competition. Specifically, the CMA prohibited lenders from providing payday loans unless details of their prices and products are published on

²¹ CC (2013).

²² OFT (2011a)

²³ OFT (2008)

at least one authorised payday loan price comparison website operated by an FCA-authorised person. The remedy is anticipated to remove barriers to entry and expansion previously erected on reputational grounds and a lack of consumer awareness about different suppliers' products.²⁴

4.37 The current CMA investigations of energy and banking also illustrate some of the interactions between consumer behaviour and effective competition. An important question being considered in both investigations is whether consumers are able to engage effectively in the market to encourage strong competition between firms. If firms are competing strongly, this should stimulate greater productivity. Initial CMA analysis suggested that between 2012 and 2014 over 95% of the dual fuel customers of the largest energy firms could have saved by switching tariff and/or supplier, and that the average saving available to these customers was between £158 and £234 a year.²⁵ It is not clear that these results are consistent with consumers engaging effectively in the market. In the banking inquiry, survey evidence suggests that 37% of personal current account customers have been with their main PCA provider for more than 20 years, and 73% of customers had not shopped around in the past three years.²⁶

²⁴ CMA (2015).

²⁵ CMA (2015), '[Energy market investigation: updated issues statement](#)'.

²⁶ CMA (2015), '[Retail banking market investigation: updated issues statement](#)'.

5. Some implications for the CMA

5.1 The previous sections have summarised evidence for the link between competition and productivity, and for the impact of competition policy on productivity. This section draws out some possible implications for the CMA, focusing on three issues:

- Targeting competition interventions – is there scope to target the CMA’s work in areas which might boost productivity?
- What is the relationship between CMA interventions and government involvement in markets which might affect productivity?
- Measurement of impact – how does productivity relate to the CMA’s target of generating benefits for consumers, and what might this mean for the evaluation and measurement of the impact of the CMA’s work?

Targeting CMA investigations

5.2 A first set of issues relates to how the CMA might choose its interventions, where it has discretion, in order to have the greatest impact on productivity.

5.3 Perhaps the key lesson from the recent literature discussed in Section 4 (eg Buccirossi et al 2013) is that competition policy enforcement can have a positive impact on productivity. Arguably the strongest conclusion for the CMA is that its role should be to carry out its core competition functions as effectively as possible, and that this in turn could be expected to have a positive impact on productivity.

5.4 However, this still leaves open the question of whether the CMA might be able to increase its impact on productivity by prioritising its resources on investigating markets where productivity appears to be low. The CMA’s Prioritisation Principles already reflect this ambition. For example, in considering the likely impact of any interventions, the CMA considers whether there is expected to be ‘additional economic impact on efficiency, productivity and the wider economy’.²⁷ The CMA’s Strategic Assessment in November 2014 also noted that ‘we are likely to consider sectors which are important to economic growth to be of strategic significance when applying our prioritisation principles’. In many cases the CMA will have limited discretion. For example, opening an enforcement case requires evidence of a potential infringement. However, the challenge is whether productivity measures could

²⁷ CMA (2014), ‘CMA Prioritisation Principles’, p.5.

be used as part of targeting some CMA interventions such as market studies on sectors where the potential for improving productivity through increasing competition is greatest.

5.5 The UK's relative productivity performance appears to vary significantly between sectors.²⁸ Therefore, one approach might be for the CMA to attempt to use cross-sectoral data to target interventions at sectors with low productivity. Since evidence suggests that competition is one of the key factors contributing to productivity, it follows that in some markets poor productivity might reflect a lack of competition. If the CMA were able to address these competition problems, the resulting increase in competition would be expected to stimulate higher levels of productivity.

5.6 Achieving this type of targeting in practice is very challenging. In particular, there are significant difficulties involved in:

- Measuring productivity at a sufficiently granular level to provide a useful guide to action. Most sector-level productivity indicators are measured at too aggregate a level to provide an adequate filtering mechanism for identifying competition problems. The effectiveness of competition can only be properly assessed at the level of an individual economic market.²⁹ This means that we would need to find productivity indicators which matched as closely as possible to the relevant markets over which we would want to assess competition.³⁰
- Drawing clear conclusions about the functioning of a market from a set of productivity indicators. The speed and nature of changes to productivity resulting from competition are neither consistent across markets nor predictable. For instance, an apparent dip in productivity might be caused by investment in new plant or machinery that takes time to become fully productive. Equally, the temporary coexistence of both traditional and innovative delivery models in a market in transition might be the precursor to a significant improvement in productivity in the medium term but might appear to reduce productivity in the short run. Intervention in these circumstances would not be justified and could be harmful.

²⁸ For example, see Figure 3, paragraph 2.7. Also see The Economist, 'The productivity puzzle, Under the bonnet' and IMF (2015).

²⁹ For example, there could be two markets in similar sectors with very different levels of competition, perhaps because of anti-competitive behaviour in one market and not the other, or because certain regulations or other barriers affect the two markets in different ways

³⁰ Markets, in the strict sense defined in competition economics, have both a product and a geographic dimension (and sometimes also a temporal dimension). In principle, highly disaggregated sectoral indicators might be a reasonable proxy for product markets, but this would still not address the geographic dimension – for example, whether the relevant market local, national or cross-national.

- Identifying markets where the productivity problem is driven by competition concerns rather than other factors. Clearly competition is not the only factor that might be driving poor productivity – for example, it could stem from a shortage of skills or a lack of investment. A more thorough market analysis would be necessary to identify whether competition in a market is not working as well as it could and the reasons why. Therefore, evidence of low productivity in itself would not be sufficient to suggest that the CMA should start a formal investigation. At a minimum, productivity indicators would need to be used alongside other more direct indicators of potential competition concerns in order to form a basis for CMA investigation and, if necessary, action.
- Identifying appropriate productivity comparisons. Although estimates of labour productivity are easier to calculate (and require less data) than estimates of TFP, comparisons of labour productivity between sectors are of limited value because many of the differences will be driven by variations in capital intensity. Therefore, we need to find other ways of trying to identify poor relative productivity performance – for example by using international comparisons, looking at changes in productivity over time, or attempting to estimate TFP directly.

5.7 The OFT in 2004 looked at the feasibility of using economic indicators to select markets which may be failing consumers for market investigations. It undertook research seeking to identify whether there were ways of using publicly available data to identify markets which might be expected to give rise to concern.³¹ Further work in 2007 developed thinking on the use of sector productivity indicators, to be used alongside other high-level indicators of competition such as data on market shares and levels of firm entry and exit.³² More recently, the Dutch competition authority (ACM) has used economic indicators to identify markets where anti-competitive behaviour may be more likely, and used this analysis as part of its case prioritisation.³³

5.8 These exercises have highlighted the conceptual and practical difficulties of basing prioritisation decisions solely on indicators of productivity. But they have also demonstrated the potential value of such indicators when used in combination with other economic indicators and different forms of intelligence, such as direct evidence of harm, consumer complaints or public concern.

5.9 In recent years, greater availability of firm-level micro-data in the UK has reduced some of the previous difficulties of obtaining sufficiently

³¹ OFT (2004), NERA *Empirical indicators for market investigations*, OFT749a.

³² OFT (2007a).

³³ See Petit (2012).

disaggregated productivity measures. As a result, the CMA has begun carrying out analysis on firm-level data to produce disaggregated sectoral indicators, where possible at a 5-digit Standard Industry Code (SIC) code level.³⁴ Initial potential indicators include:

- Competition indicators – including:
 - Measures of concentration – such as the market share of the three largest firms in the sector, and concentration indices such as the Herfindahl Index (HHI).³⁵ A more concentrated market might be expected to exhibit lower levels of competition.
 - Measures of the rate of firm entry and exit – low rates of entry and exit might indicate a relatively low degree of competition.
 - Simple measures of firm-level profitability. High profitability might be an indicator of a lack of competition.
- Productivity indicators – including:
 - Simple estimates of labour productivity (eg Gross Value Added per employee).
 - Estimates of change in labour productivity over the last four years – in particular to identify sectors where productivity has been declining.
 - Estimates of dispersal of labour productivity between firms in a market – where a high rate of dispersal might indicate a lack of competition (since relatively low productivity firms are able to stay in the market).

5.10 In addition, as part of the CMA's work on anticompetitive barriers to electronic commerce, we have examined data on the differences in the extent to which online commerce – potentially a significant driver of productivity improvement – has grown in various sectors. Combined with the other sources of data above, this too may provide pointers to markets where further research is justified to establish the reasons for the observed patterns in the data.

5.11 These strands of work are at an early stage, but indicate how the CMA may be able to use productivity indicators as part of its prioritisation decisions. No such indicator, nor combination of indicators, will provide a silver bullet for identifying markets meriting investigation, still less the presence of

³⁴ UK official firm-level statistics are typically organised on the basis of standard SIC codes. 5-digit SIC codes are the most disaggregated classification, identifying around 730 separate sub-sectors.

³⁵ The HHI is calculated as the sum of the squares of the market shares of each firm in a given market. A monopoly would have an HHI of 10,000. A perfectly competitive market would have an HHI close to zero.

anticompetitive conduct justifying enforcement action. But combined with evidence of potential competition concerns, they can help provide a basis for the CMA to prioritise.

Role of government and competition advocacy

5.12 A second implication of the evidence on productivity and competition relates to the role of government in influencing the nature and effectiveness of competition, and the level of productivity in markets. government may seek to enhance productivity in three main ways:

- First, it can set a macroeconomic framework designed to encourage investment and enterprise, and adopt supply side policies designed to support and encourage improvements in productivity through, for example, encouraging investment in infrastructure and human capital.
- Second, it can set the framework of competition law and policy through legislation, the design of regulatory and competition authorities and the duties, powers and steers it gives them.³⁶ Recent reforms in the UK through the Enterprise and Regulatory Reform Act 2013 were aimed at strengthening the competition law regime and building on best practice internationally. Having established that framework, there is international consensus that competition authorities should make their decisions on which cases to pursue and on the outcomes of those cases free of government or political interference.³⁷
- Third, it can itself influence markets in a variety of ways, as a cross-economy or market specific regulator, through its taxation and spending policies or as a participant (buying or selling goods or services)

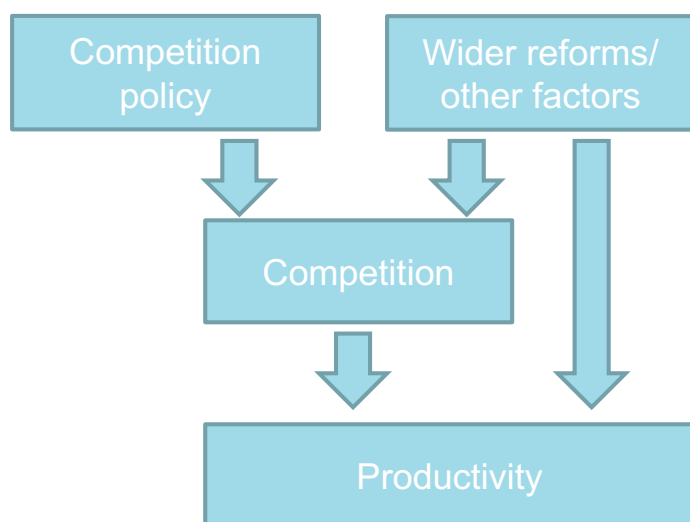
5.13 Figure 4 summarises these relationships. As shown in Section 3, there is strong evidence that competition can drive productivity growth. Similarly the evidence in Section 4 illustrates the positive impact of competition policy on competition, and hence on productivity. At the same time, there are clearly a much wider set of factors which also influence the strength of competition, many of which relate to wider government frameworks and interventions in markets. By providing a stable and consistent high-level framework for

³⁶ Department for Business Innovation and Skills (2013).

³⁷ One of the findings of the literature in section 4 is that strength of the institutions enforcing competition policy can have a significant impact on effectiveness, and ultimately on productivity. Eg Buccirossi et al (2013), Voigt (2009), Ma (2011).

markets to operate in, government can help encourage competition and hence productivity.

Figure 4: Relationship between competition policy and wider market conditions in driving competition and productivity



Source: CMA.

5.14 One of the most powerful ways in which government can influence competition is through its approach to regulation that bears on economic activity. The evidence on deregulation suggests that government can promote competition and productivity by removing regulations that hinder competition unless there is an outweighing public benefit. As noted in Section 3, there is a significant body of literature demonstrating the positive impact on productivity of removing government restrictions on markets (paragraphs 3.11 and 3.12). There is also strong evidence that low levels of product market regulation tend to be associated with greater productivity (paragraphs 3.7 to 3.9). This evidence is supported by more specific examples of impacts of deregulation. For example:³⁸

- The liberalisation of European air routes by the European Commission facilitated the entry of a number of new low cost carriers. These carriers introduced new business models, including new booking methods and extensive use of outsourcing. In addition to increased consumer choice, the price of an economy class ticket provided by traditional carriers on European routes fell by over 66% between 1992 and 2002.

³⁸ These examples are taken from Davies et al. (2004).

- The deregulation of international telephone calls has provided consumers with greater choice of providers and significant decreases in the price of UK international calls, down 90% over the decade to 2002.
- The 1997 prohibition in the UK of the Net Book Agreement, an agreement between publishers not to supply books to retailers that priced below the publisher's net price, led to a dramatic reduction in the price of popular paperback fiction, with discounts on bestsellers and 'multi-buy' offers such as two-for-one now regularly being seen. In addition, it has helped promote and grow new efficient distribution models such as sales via the internet.

5.15 This evidence suggests that government should think carefully about the effect existing regulations have on competition in markets: do the objectives of regulation justify any potential harm to competition and therefore to the prospects for productivity growth? It should also think about the competition implications of new regulations and how it can best achieve its objectives with the least distortion to competition. For example, a regulatory intervention designed to safeguard an element of quality some customers care about (for example, privacy for online shoppers) might prevent the emergence of a new product or business model, and it may be that the regulation can be designed in a different way to minimise any negative impacts on competition.

5.16 The CMA can play an important role as an independent authority, alongside government, through its competition advocacy activities. This role of advising and recommending on the impact of policy on competition and markets is set out in legislation.³⁹ As noted in Section 4, many of the previous market studies and investigations carried out by the OFT and CC addressed regulatory and other wider barriers to competition, and encouraged deregulation and reform in markets. Successive governments have responded in recent years to OFT, CC and CMA recommendations by taking steps to remove or alter regulation governing markets such as retail pharmacies, local bus services and residential property management. Most recently, that CMA has published advice to government on how to ensure that any redesign of the regulatory

³⁹ Section 7 of the Enterprise Act 2002 gave the OFT (now the CMA) the function of making proposals, or giving other information or advice on matters relating to any of its functions to any Minister of the Crown or other public authority (including proposals, information or advice as to any aspect of the law or a proposed change in the law). Section 37 of the Small Business Enterprise and Employment Act 2015 adds a power to make recommendations to ministers on the impact of proposals for legislation on competition within any UK market(s) for goods or services, and states that the CMA must publish any such recommendation. The Explanatory Notes state that the government has committed to accept the CMA's recommendations for improving competition, and 'there is a presumption that all will be accepted unless there are strong policy reasons not to do so'.

regime governing higher education in England can encourage fair competition in the interests of students.⁴⁰

- 5.17 The CMA can also advise on the potential impact of new legislation or regulation. It has advised twelve UK government departments and the devolved administrations in the last year on the potential impact of policy proposals on competition in markets. Its advice is founded in past work in relevant sectors and in its broader understanding of the workings of competition in different markets drawn from its enforcement, merger control, markets and regulatory work. It has recently published its intention to act as a constructive critic of government in the use of its new powers to make recommendations on the impact of proposals for legislation. This should help to ensure that the impact of policy on competition and markets is properly considered. We are refreshing guidance previously issued by the OFT that helps policymakers themselves to assess that impact, and stand ready to advise government departments on specific policy developments.⁴¹

Relationship between consumer welfare and productivity

- 5.18 A final set of issues arising from the evidence on productivity and competition relates to how the CMA measures and monitors its impact on markets and consumers.
- 5.19 The CMA's primary duty is to make markets work well in the interests of consumers. In monitoring its activities, the CMA estimates the direct consumer benefits resulting from its interventions, and has a target set by government of generating consumer benefits of at least ten times its costs. The CMA also looks at wider factors, including the indirect impact of its enforcement activities.⁴² Therefore, to the extent that a goal of competition policy is to encourage greater productivity and growth, it is important to understand the relationship between productivity and consumer outcomes.
- 5.20 Productivity improvements should always lead to gains to consumers, at least in the long run. Real productivity improvements are likely to stem from reductions in costs, improvements in quality, or innovations which create new products and processes, all of which benefit consumers.
- 5.21 The extent to which consumers gain directly from productivity improvements depends on how far, and how quickly, firms pass on these benefits rather than retaining them in the form of higher profits. It will also depend on the source of

⁴⁰ CMA (2015), '[An effective regulatory framework for higher education: A policy paper](#)', CMA42.

⁴¹ OFT (2007c).

⁴² BIS (2014).

the productivity improvement – for example, process innovations that reduce costs may take time to feed through into consumer benefits, whereas product innovations should lead to an immediate gain by giving consumers more choice or a higher quality product. In practice, we would expect the large majority of productivity gains to be passed on to consumers, particularly where these are driven by competition:

- Empirically, there is strong evidence that efficiency gains are typically passed through to consumers. For example, Nordhaus (2004) estimates that only 2% of the social value of innovation in the post-war US economy has accrued to producers with 98% going to the users of new technology.
- The extent of pass through will also depend on the extent of competition, since firms will be less able to appropriate the gains from increased productivity in the form of excess profits where competition is strong. Therefore, to the extent that productivity gains are driven by competition improvements (rather than other factors which may not affect product market competition), we would expect to see greater pass-through of benefits to consumers.

5.22 The discussion of productivity impacts of competition policy in Section 4 highlights the importance of looking at wider consumer impacts rather than just short-term direct effects of particular interventions. For example, in relation to cartel enforcement, while it is possible to estimate the direct impact on consumers of price reductions following the ending of a cartel, the bigger impact on consumers (and productivity) should come through the wider indirect deterrent effect, discouraging others from participating in cartels.

5.23 Similarly, much of the recent literature on the impact of competition on productivity summarised in Section 3 emphasises the importance of dynamic effects – entry and exit by firms, and innovation stimulated by competition. These dynamic effects would be expected to have positive impacts both on productivity and on consumer outcomes, but these may not emerge for some time after an initial competition intervention. While we can attempt to understand these effects better, measure them and attribute them appropriately to competition policy interventions, we should not underestimate the difficulty of doing so.

Annex A: Concepts and definitions

A.1 This section explains the main concepts and definitions used in the report.

What do we mean by 'competition'?

A.2 Competition can be defined as a process of rivalry between suppliers that takes place either **in the market** or **for the market**. Firms compete to attract customers by offering lower prices, higher quality of products or services, or innovative products and services. When competition is working effectively, the market will send clear messages to firms (for example, in the form of the prices they can charge and the profits they can earn) about which goods and services consumers want to buy. Efficient firms offering the products consumers want at low prices will prosper, and inefficient ones will not.⁴³

A.3 **Competition in the market** describes how firms already in a particular market compete on a day to day basis to gain market share. Examples are abundant including, for instance, most retail markets. For competition in the market to be effective, we would expect there to be a significant number of sellers, ease of entry and exit, and well informed, rational customers. For this reason, competition in the market is often measured by the number of firms in a market, the mobility of market shares, concentration ratios and mark-ups (rents) or by how readily consumers will substitute between products.

A.4 **Competition for the market** describes how firms initially compete to supply a market. An example of this would be competition for contracts to exclusively supply a market for a period of time. Highly innovative markets may also be characterised by competition for the market, as the firm with the most successful innovation gains a high market share for a period of time until a competitor develops a more desirable product. In this way, dynamic competition can exist even where there is little static competition. As a result, static measures of concentration or market share may not capture competition for the market, and more dynamic measures such as entry and exit rates, and market share volatility must be used instead. These considerations are particularly important to the debate on innovation.

⁴³ See Vickers (1995).

Definitions of Productivity

- A.5 Productivity measures output per unit of input. Since productivity increases can mean higher levels of output while input levels remain constant, it is the most direct route to inflation free economic growth, and higher standards of living.
- A.6 It is instructive to look at both the **levels** and the **growth rates** of productivity, particularly for cross country comparisons of efficiency and competitiveness. The two are likely to capture slightly different aspects of the effect of competition on efficiency. For instance, low absolute levels of productivity may indicate x-inefficiency, or slow diffusion of technology, while low levels of productivity growth might indicate industries that are not particularly innovative or that there is decline in the drivers of productivity. The interaction of levels and growth rates is also significant. Countries starting at lower levels may experience higher relative growth rates as they 'catch up' to productivity leaders.
- A.7 There are two main measures of productivity: labour productivity and total factor productivity. **Labour productivity** considers output per unit of labour input. These labour inputs can be constructed either as **output per worker**, or **output per hour worked**. High levels of labour productivity may reflect a high efficiency level and/or high capital per worker.
- A.8 **Total factor productivity (TFP)** is based on the output from all factors of production. TFP growth is measured by the difference between output growth and the growth of inputs (labour and capital). An increase in TFP implies more output can be produced for a given level of labour and capital inputs. TFP growth incorporates the effects of changes in the degree of factor utilisation, innovation and technological progress. Because the standard measure takes account of capital inputs, it identifies the role of technology, scale and organisation in contributing to labour productivity.
- A.9 Another way of understanding the relationship between labour productivity and TFP is to recognise that labour productivity can be decomposed into:
- The proportion explained by differences in relative physical capital intensity.
 - The proportion explained by differences in relative labour quality.
 - A residual TFP (total factor productivity) component which captures, among other things, cross-country differences in the efficiency with which existing production inputs are utilised.

A.10 The measurement of productivity presents a series of challenges. Many of the issues concern how to derive accurate and consistent data on inputs and outputs. For example, for measurement purposes the value of output rather than the volume is sometimes used. With this measure high levels of prices, for example due to market power, can erroneously give the impression of high productivity.

Efficiency and productivity

A.11 The terms 'productivity' and 'efficiency' are closely related. Productivity, often considered at an industry or national level, can be raised by increasing the efficiency of firms (and public bodies). Efficiency is more often the subject of economic analysis, and so for the purposes of this report we use the different types of efficiency to explain the mechanisms through which competition affects productivity.

A.12 **Static efficiency** relates to how much output can be produced from a given stock of resources at a certain point in time. There are two main types of static efficiency – allocative and productive.

- **Allocative efficiency** describes the situation in which a firm or an industry allocates its resources socially efficiently, which is achieved through the price of a product being related to its marginal cost of production.
- **Productive efficiency** describes the situation in which a firm or an industry is producing at its lowest possible average cost. When a firm or industry is productively efficient, it operates at its production possibility frontier (PPF), producing the maximum output from a given set of inputs.

A.13 **Dynamic efficiency** involves the development of new technologies or processes that can improve productivity. It is the rate at which firms reduce their real costs, or improve their product quality over time.

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