How many mobile network providers do we need?

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Bruce Lyons, Professor of Economics

The recent 4G spectrum auction has resulted in four mobile network operators being able to compete with new high-speed services. Is this enough? Recent CCP research on the speed of uptake of mobile phones casts interesting light on the answer.

As a result of the recent 4G spectrum auction, we can expect four firms to be competing with new high-speed services, particularly for smartphones and tablets. There were seven bidders but two potential entrants dropped out near the end, leaving four familiar operators to pick up the main licences: Vodafone; EE (the joint venture of T-Mobile and Orange); Telefonica (O2); and Hutchison 3G (“3”). A fifth firm (BT subsidiary Niche Spectrum Ventures) also won part of the spectrum but will probably use this to facilitate broadband access in rural areas and wi-fi hotspots elsewhere. BT is not expected to re-join the mobile market it started with Cellnet in 1985 before selling out to Telefonica in 2005. So, it seems we will have four competing 4G operators plus one possible maverick lurking with capacity. Is this enough? Recent CCP research casts interesting light on this question.

Most of the press coverage has not been about the competitive consequences of having four operators. It has been about the auction revenue raised for the Treasury, which was £2.34bn. This was disappointing on two counts. First, it compares very modestly with the £22.5bn raised by the 3G spectrum auction in 2000, just at the time that the dotcom boom was turning to bust. No one expected this sort of revenue to be generated this time. Second, it is less than the £3.5bn budgeted in the Chancellor’s autumn statement, thus leaving a large dent in his attempts to stop the government deficit from rising.

Of course, disappointing auction revenue is important for taxpayers and users of government services that may be cut, but in the long run it is not what matters most. In fact, there is a trade-off between revenue for the Treasury (maximised by selling a lucrative monopoly) and creating a competitive industry that is great for consumers but which leaves firms without excessive anticipated profits with which to bid for licenses. Ofcom estimates some £20bn extra consumer surplus as a result of rolling out 4G. Politicians, perhaps inevitably, are more bullish, with Culture Secretary Maria Miller predicting a £50bn value to the UK economy. The exact figure is impossible to predict accurately, but the ballpark figures indicate what is at stake. It is crucial that the structure of the market is designed so as to bring out the maximum benefits as soon as possible.

This brings us back to the question posed at the end of the first paragraph, but we first need to ask: enough for what? We usually think first of the effects of competition on price, then go on to consider product range, quality and innovation. However, an alternative approach is possible for evaluating the appropriate market structure in the context of a new product introduction. In joint work with Yan Li at CCP, we argue that the speed of consumer uptake of a new service (product diffusion) provides an important summary measure of how well the market is performing for potential consumers. Like any other product, the demand for mobile phone services is influenced by a range of marketing and technical factors that constitute the overall product ‘offer’. This offer includes price level, price structure (e.g. cost of sending relative to receiving a call), reach (geographic coverage), services and reliability. Individual elements of the product offer are difficult to observe and measure on a consistent basis either internationally or over time, but consumers buy only if this complex offer is attractive to them, so consumer uptake is a relatively straightforward summary indicator of consumer benefit.

Our research aimed to identify those features of the market...
that maximize the rate of diffusion of mobile telephony through
the population. We focused on understanding the central period
of diffusion in all 29 OECD countries plus China. Over 16 years
from 1991, average market penetration across these countries
rose from less than 2% to nearly 97%. The figure illustrates this
growth of mobile network penetration with each dot
representing a different country and the curve showing the
average over time. Some countries had achieved in excess of
100% penetration by 2006, with many individuals having
multiple accounts (e.g. one for work and one personal). China,
Canada and Mexico were the lowest achievers. Note the
distinct S-shaped curve which is characteristic of the diffusion
process – early adoption is slow as there are relatively few
people to phone when they are away from a landline, but then
growth takes off rapidly before slowing again as maximum
penetration is approached. We take this into account in
specifying our empirical model.

Our main interest was in the slope of this diffusion curve for
each country and how it increased or decreased with changes

in, for example, market structure and technological
developments. When the market is regulated, as it must be
because of the scarcity of radio spectrum, it is particularly
important to understand how the various potential regulatory
levers (e.g. number of firms, public ownership, price controls)
affect the diffusion process. This period and set of countries

provides a fascinating range of market structures. In four
countries, including the UK, the mobile networks were always in
private hands and in three countries, including China, Mexico
and Turkey, they have always been nationalised. In the
remaining 23 countries, privatisations took place during the
period. There is a similar range of experiences with independent
regulation (e.g. Ofcom in the UK), which was not always
established at the time of privatisation.

It is the range of international experiences with different
numbers of mobile networks and their change over time that
helps us most with answering our question. In 1991, there were
just five countries with two operators (including the UK) and the
rest were monopolies. By 1999, every country had at least two
operators and the USA had the highest number with seven. In
2006, the average number of operators was 3.8, only three
duopolies were left, the UK had five operators and the USA and
Canada were the only countries with six. This provides a wide
range of observations and so allows our econometric study to
estimate the effect of all market structures from monopoly to
heptopoly (seven firms).

We found that consumer uptake
was more rapid when operators were
privatised. The presence of an
independent regulator also had a
modest positive effect. However, the
effect of increasing the number of
operators was much more important.
Monopoly results in the slowest uptake
but the uptake increases with every
additional firm. The presence of five
firms results in the most rapid consumer
uptake. While our results did not identify
four firms as a particularly attractive
market structure, the general finding
was that more firms resulted in speedier
diffusion. However, there was no
evidence of gain from having more
than five.

We were also able to probe a little
deeper to see if the competition arising
from more firms worked through price or
something else. In practice, it is difficult
to measure price for mobile calls
because of all the different pricing
options that are offered. Nevertheless,
taking a summary measure of the price of a 3-minute call, we
found that price accounted for up to half of the effect on more
rapid uptake. This left much of the effect of competition to work
through better services, marketing and other aspects of the
offer to potential customers. We found that privatisation was
particularly effective for these non-price effects and independent
regulators were good only for price control. Needless to say, it is not only market structure that matters. Mobile penetration was slower in more urban economies not least because of the lack of landlines as an alternative in rural areas. Initial take-up also depended positively on per capita GDP. Some national markets were late to start but then tended to grow faster, with our model predicting full catch-up by around 2014.

Finally, technological developments had a major impact. In particular, digital was introduced in the 1990s and brought new services (e.g. text messaging), greater reliability and more privacy. This was a substantial boost to mobile subscriptions. Another aspect of new technology is also of considerable interest. Some countries quickly standardised on a particular digital technology (e.g. GSM in Europe) while others allowed alternatives to develop simultaneously (e.g. Canada, New Zealand, USA). We found that multiple technologies resulted in slower take-up as consumers were either confused or held back to see which technology was going to be the most successful.

So, are four operators (plus BT lurking with spectrum in the background) enough to maximise the speed of 4G uptake? Our research was not directly set up to address this technology generation question because we looked at the take-up of mobile subscriptions of whatever generation. Nevertheless, our results do suggest four or five is about right and that future mergers should be looked at very carefully if they would result in fewer operators.

Announcing a forthcoming book by CCP researchers: Behavioural Economics in Competition Policy

Judith Mehta, Editor and CCP Research Coordinator

CCP researchers from economics, law, politics and business studies have come together to write a book on behavioural economics and how it can contribute to competition policy. Behavioural Economics in Competition Policy builds on the insights we have acquired into specific behavioural issues and how these may – or may not – be resolved by intervention. It reflects our interest and expertise in the area and our multidisciplinary approach to competition policy and regulation issues. The book is aimed at policymakers and practitioners who may be weighing up whether and how to take the evidence on consumers’ behavioural traits into account when considering intervention in markets. It will also be of interest to those who are new to the field of behavioural economics, whether in public, private or third sector organisations.

We review the interactions between firm and consumer behaviour when consumers are characterised by cognitive limitations and/or poorly-formed or inconsistent preferences.

Behavioural Economics in Competition Policy consists of a series of articles in the style of this Research Bulletin. After an Introduction to the terrain of behavioural economics and its implications for market competition, we review the interactions between firm and consumer behaviour when consumers are characterised by cognitive limitations and/or poorly-formed or inconsistent preferences. Just some of the questions addressed include the following: how do such consumers respond to complex transactions? to what extent is ‘choice overload’ a genuine phenomenon? what are the social influences on consumer behaviour? when do firms have an incentive to ‘correct’ consumer biases, and when do they have an incentive to exploit those biases? We also report on manifestations of behavioural traits in different markets, and we look at some of the difficulties associated with determining welfare both before and after an intervention.

We hope to have Behavioural Economics in Competition Policy in distribution by late spring/early summer 2013; we will announce the publication date on our website: www.competitionpolicy.ac.uk. An electronic version will also be made available. If you would like to ensure a hard copy of the Book is sent to you, please contact me at: J.Mehta@uea.ac.uk.
Innovative but influential:
The OFT’s economic research programme

Amelia Fletcher, Professor of Competition Policy and former Chief Economist at the OFT

Over last two decades, the UK’s Office of Fair Trading has steadily created a substantial body of economic research and evaluation papers. These have often been innovative, but yet influential on policy and cases. Many remain of ongoing interest today. But what is the role of a competition and consumer authority in delivering such a research programme, and what have been the main strands of work to date?

The OFT has consistently dedicated resource to economic research and evaluation. This could perhaps be seen as surprising. Historically, few other authorities have invested in this area to the same extent (although more are doing so over time).

However, the OFT has seen this programme as an important component in enabling it to make its interventions in markets as valuable as possible. It plays a role in helping the authority to identify and prioritise the right cases and studies to achieve maximum impact, as well as to deliver those cases and studies successfully. It has a role in ensuring that enforcement policy is in the right place to maximise benefits for consumers, by minimising the false positives and false negatives associated with intervention. It also has the more incidental benefit of contributing to the OFT’s international reputation for thought leadership, with the research often sparking policy debates which are hotly discussed in international fora.

One could though ask what role competition authorities have in this arena at all. Why not simply leave research up to the academics? It is indeed true that many of the OFT’s economic research papers draw heavily on existing academic literature. A key distinguishing factor is that there is a clear focus in the OFT’s research papers of drawing out key themes and implications for real-life policy issues and cases, as well as highlighting issues on which further academic work would be beneficial. There is also an emphasis on making them sufficiently non-technical to be easily accessible by authority economists and ideally non-economists too. As such, the papers provide an important link between academia and frontline practitioners, helping to ensure that academic work has real impact.

It is possible to identify four main strands within the OFT’s economic research and evaluation programme during this period.

Early years, the basic antitrust framework: Over the first decade or so of the OFT’s economic research programme, the focus was antitrust basics such as market definition (1992), barriers to entry and exit (1994) and vertical restraints (1996). These papers provided a valuable framework for analysis at an early stage in the OFT’s evolution as an antitrust enforcement body. Especially noteworthy was the paper by CRA on innovation and competition policy (2002) which anticipated many of the issues that would come to be important in this area of antitrust over the decade which followed.

Advanced work on antitrust themes: From around 2003, the OFT’s economic research programme developed a more advanced focus with the intention of taking economic thinking on antitrust issues to a more sophisticated level. Some of these papers were immediately influential, such as the paper by RBB on fidelity rebates (2005) which influenced the way in which loyalty rebates were treated in the European Commission’s Article 82 (now Article 102) prioritisation guidelines. The recent paper by Lear on price relationship agreements (2012) is another good example and has probably been the highest profile OFT economic research report in recent years, partly due to the significant number of cases ongoing in this novel area globally.

Other papers can be better seen as “slow burners”. The paper by Dotecon on minority interests in competitors (2010) did not relate to any specific ongoing case, but it provided a useful framework for considering the impact of minority stakes, as well as a rationale for why authorities should have the tools to intervene against them where appropriate. The paper by RBB on conjectural variations (2011) was also designed to be a “slow
burner’, with the primary aim of triggering new thinking in antitrust and initiating a wider debate, albeit it has already influenced the OFT’s thinking on coordinated effects in at least one merger case.

Whilst most of the OFT’s economic research reports focus on reviewing, and drawing conclusions from, an existing academic literature, the OFT has occasionally commissioned original research, as exemplified by the recent paper by Greg Shaffer on RPM in fragmented markets (2013). Prior to this, the best existing models of RPM involved concentrated duopoly markets, whereas many of the potential RPM cases coming to the OFT’s attention were in relatively fragmented markets. It was far from clear from the available literature whether RPM was likely to be genuinely harmful in these cases. This research was therefore commissioned to fill a very real gap, of significant practical importance. In fact, the paper broadly supported the case for intervention, concluding that RPM may well be anticompetitive in fragmented markets, and could even be more anticompetitive.

Behavioural economics: A key theme in OFT’s economic research over the last five years has been around behavioural economics and its implications for competition and consumer policy. Much of this work has related to remedy design, building on the recognition that simply giving consumers lots of information need not necessarily generate effective consumer decision-making. The paper by the ESRC Centre for Competition Policy on potential remedies in consumer markets (2008) considered the pros and cons of different types of consumer remedy, while the paper by London Economics on ‘road-testing’ consumer remedies (2009) provided a methodological framework for appraising the likely impact of such remedies. Both papers have clearly influenced authority thinking in this area.

As part of this strand of work, the OFT commissioned its first behavioural ‘experiment’. This lab-based experiment, carried out by Steffen Huck and London Economics, looked at the impact on consumer decision-making of the way in which prices were framed. It found that even smart UCL students, concentrating hard, made significant purchasing errors when prices were framed in particular ways, with the most serious detriment arising from a form of pricing known as ‘drip pricing’, whereby total prices are revealed only towards the end of the shopping process. The OFT has drawn on this study to support consumer enforcement work against serious instances of drip pricing.

The ‘slow burner’ in this particular strand of research, is the thought-provoking paper by Mark Armstrong and Steffen Huck on behavioural economics as applied to firms (2010).

Evaluation of impact: The OFT’s evaluation programme commenced in around 2004, drawing on some groundwork that had been done in a 2002 OFT economic research paper by Stephen Davies and Adrian Majumdar. The programme had, and has, two key aims. The internal aim is to develop a better understanding of the impact of the OFT’s work so that resources can be targeted more effectively. The external aim is to demonstrate the impact of the OFT’s work, as well as the benefits of competition and consumer policy more widely (the latter being especially important for the OFT’s advocacy role across government).

The OFT’s evaluation work effectively has three strands. First, the annual ‘Positive Impact’ reports estimate the consumer savings arising across all of the OFT’s work, employing a simplified but published methodology. Second, there is an ongoing programme of ex post evaluation which looks in more detail at specific interventions. These can provide useful feedback on which elements of the OFT’s intervention have been successful and which have not, and can also trigger further work. Third, there are occasional papers designed to examine wider impact, such as the report by London Economics on the compliance and deterrence impact of the OFT’s competition enforcement (2011).

So what does this all mean, looking forward? Alongside the OFT, the UK Competition Commission has also published important research and evaluation work, and indeed it co-commissioned some of the papers mentioned above. When the new UK Competition and Markets Authority comes fully into being in April 2014, it will be interesting to see to what extent it retains this focus on economic research and evaluation, and builds upon the legacy left by the OFT and Competition Commission in this important area.

The OFT’s economic research can be found at www.oft.gov.uk/OFTwork/research/economic-research/completed-research. Its evaluation work can be found at www.oft.gov.uk/OFTwork/research/evaluation/Evaluation-completed
The role of intent in the case-law on abuse of dominance

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The use of intent evidence to establish whether an undertaking has breached competition law by abusing its dominant position is controversial. Some argue that the intent of the dominant undertaking should play no role in this assessment since it may be impossible to distinguish the intention to restrict competition from the intention to compete vigorously. Some others argue that intent may be useful in this assessment as a proxy for effects or for the welfare consequences of a practice where these are ambiguous. This note briefly demonstrates how intent was used in the EU case-law under Article 102 and argues that such use of intent as part of the test for abuse should be abandoned.

It has been suggested that one must distinguish between ‘smoking gun’ type of subjective intent and objective intent where conduct only makes business sense as a way of eliminating competitors.
greater likelihood of finding abuse.\textsuperscript{10} Despite the fact that using a test of whether the practice can be explained rationally by any reason other than the harm inflicted on competitors might make the application of the notion of exclusionary intent objective rather than subjective,\textsuperscript{11} this in itself does not suffice to justify the use of intent. This approach still begs the question why the intent of the undertaking is relevant. In a case where it can be established that the practice has no other rational explanation than to exclude (and thus by definition has no redeeming features), the objective market facts should suffice for a finding of abuse. What the dominant undertaking ‘intended’ is irrelevant since what matters is – even if it did not intend to exclude competition – that its conduct can only be explained by its potential to exclude on the basis of market conditions, etc. Thus, intent evidence is superfluous in such a case. Consequently, the use of intent takes away from the legal certainty that is already lacking to a significant degree in the area of abuse of dominance by introducing a concept that is neither necessary nor apt for the analysis.

**Some case examples: one old, one new**

The first example is AKZO, in which the European Commission (EC) held that there can be an anticompetitive object in price cutting whether or not the aggressor sets its prices above or below costs.\textsuperscript{12} Where the exclusionary consequences of price cutting are self-evident, no evidence of intention to eliminate a competitor is necessary. Where low pricing is susceptible of several explanations, evidence of an intention to eliminate a competitor or restrict competition might be required to prove an infringement.\textsuperscript{13} Evidence may be internal documentation pointing to a scheme to damage competitors.\textsuperscript{14} In AKZO, the evidence was documentary evidence of a detailed plan to eliminate the competitor, plus other factors such as the selective nature of price cuts.\textsuperscript{15} According to the EC, maintenance of a system of effective competition requires that a small competitor be protected against behaviour by a dominant firm designed to exclude it from the market not by virtue of greater efficiency or superior performance but by an abuse of market power.\textsuperscript{16}

On appeal, the Court of Justice (CoJ) held that prices between Average Variable Cost (AVC) and Average Total Cost (ATC) must be regarded as abusive if they are determined as part of a plan for eliminating a competitor: they can drive from the market undertakings as efficient as the dominant firm but incapable of withstanding the competition waged against them due to their smaller financial resources.\textsuperscript{17} Evidence in this case consisted of minutes of meetings containing threats to lower the prices; memorandum by AKZO manager containing a detailed plan with measures if the competitor continued to expand in the plastics sector, etc. According to the CoJ prices to the competitor’s customers could only be explained by AKZO’s intention to damage the competitor and not by AKZO’s endeavour to restore its profit margins.\textsuperscript{18} The prices were unreasonably low with the aim of damaging the competitor’s viability.\textsuperscript{19}

In AstraZeneca, the second example, AstraZeneca’s practices were found to have delayed-blocked entry of generics (and in some cases impeded parallel imports) (i) by misleading representations to patent offices, and (ii) by deregistering the market authorisation for Losec capsules. According to the EC, conduct which may otherwise be permissible, even on the part of a dominant undertaking, may be rendered abusive if its purpose is anticompetitive, in particular if it is part of a plan to eliminate competition.\textsuperscript{20} It must be noted that this is a general statement of principle. According to the EC, the fact that AZ’s strategy did not succeed does not affect the qualification of the behaviour as an abuse, ‘considering that the conduct was implemented with the aim of keeping competitors off the market’.\textsuperscript{21} Evidence regarding the first abuse was the fact of AZ not revealing certain data on the application for patent extension which is more or the less the abusive conduct itself.\textsuperscript{22} Evidence regarding the second abuse was
(i) documentary evidence that the deregistration was to prevent/delay generic entry and impede parallel imports; and (ii) deregistration was selectively planned for those countries where there is good chance of achieving the exclusionary aim. On appeal, the General Court (GC) found that it was quite clear from the documents on which the EC relied that AstraZeneca intended by means of the deregistrations to obstruct the introduction of generic products and parallel imports. The fact that the dominant undertaking is under no obligation to protect the interests of competitors does not make practices implemented solely to exclude competitors compatible with Article 102.

The GC also held that the fact that abuse is an objective concept does not lead to the conclusion that the intention to resort to practices falling outside the scope of competition on the merits is in all events irrelevant, since that intention can still be taken into account to support the conclusion that the undertaking concerned abused a dominant position, even if that conclusion should primarily be based on an objective finding that the abusive conduct actually took place. This statement is, to say the least, circular: it suggests that the conclusion of abuse should be based on a finding of abuse where the real question is how to establish that the practice is abusive in the first place. The statement of the GC is disastrous for legal certainty.

Overall, it is unclear from the case law what intent means and what evidence is necessary and/or sufficient to prove it. Due to the limited amount of space, this article gives two examples from the case-law concerning the use of intent.

**What is wrong with ‘intent’?**

Using intent in building a story of abuse is problematic since the evidence used in the case-law appears to be mostly internal documents of the dominant undertaking. These reveal, at most, subjective intention. So long as there are no market effects to prove their existence or the market effects are ambiguous (ie they can be interpreted as competing vigorously as well as an abuse) subjective intention should be irrelevant. It should not matter what the dominant undertaking subjectively ‘intended’ to do; what should matter is what it actually did. Moreover, if internal documents are used to establish ‘intention’, these can always be fabricated/ avoided / discarded. If the test relies on intent, proof of abuse will literally be in the hands of the dominant undertaking. This would make it harder for a competition authority, ceteris paribus, to prove abuse in comparison to a test that does not require such intent to be proved.

The use of intent also begs the question of why intent matters if what we are concerned about is not the effects of conduct. If we are concerned about the effects, then why not look directly at effects? If the effect is anticompetitive but the intent was not, under the case-law, this does not matter.

Then the question is why it should matter when the effect is not anticompetitive but the intent was. Finally, with an approach based on the exclusion of as efficient competitors, a test based on intent does not necessarily distinguish between the exclusion of efficient or inefficient competitors since it is focused on the intent of the dominant undertaking and not the position of its competitors. Thus, it does not fit with the current trend in enforcement either. All in all, the intent of the dominant undertaking should not be part of the legal test for finding abuse.
In the last few years there have been numerous court cases involving major producers of smartphones and manufacturers of telecommunications hard and software, many are still ongoing. This short article reviews the cause of all this litigation: the emergence of patent thickets affecting mainly telecommunications and software industries. It provides a brief review of economic research on causes and effects of patent thickets and provides an illustration of their distribution across different industries.

What are patent thickets?

Patents are used by firms from a wide range of industries to protect technological innovations and in some jurisdictions (e.g., U.S.) also software and business methods. Economists regularly survey firms to learn how they rank patenting and other methods to appropriate rents from innovation. These surveys reveal that firms in the pharmaceutical and chemical industries rely heavily on patent protection. Firms in the semiconductor industry have relied much less on patent protection in the past. This has changed dramatically over the past two decades and firms selling Information and Communication Technology (ICT) products are now extremely patent active. The growth of patenting in ICT has created patent thickets, which may undermine the functioning of the patent system and may also have significant effects on competition. This article provides a brief review of the current debate on patent thickets.

Shapiro describes a patent thicket as a “dense web of overlapping intellectual property rights that a company must hack its way through in order to actually commercialize new technology.” This description captures a growing problem for firms producing ICT products: the technology they use is so complex that a commercial product (a router or a mobile phone) will touch on innovations protected by hundreds if not thousands of patents. These ICT patents are owned by different, often competing, companies. Disputes over alleged patent infringement often lead to litigation; recent examples include RIM v NTP or more recently Yahoo v Facebook or Apple v Samsung.

Patent thickets emerge if the ownership of patents connected to a technology is scattered and if patents are poorly delineated. Scattered ownership distinguishes patent thickets from patent fences, a term describing a patenting strategy often employed in the pharmaceutical industry. Pharmaceutical companies use patent fences in two ways: (1) to enhance patent protection by patenting substitute molecules that could enable rivals to enter a market or (2) to extend patent protection on an active ingredient beyond the original patent scope (statutory lifetime and/or breadth) by filing so-called secondary patents. Secondary patents protect related aspects, such as dosage forms, formulations, methods of use, or crystalline forms of the original compound.

In contrast to patent thickets, all patents in a patent fence usually belong to the same company. Patent thickets and patent fences create different problems for companies and policy makers.

Currently patent thickets arise predominantly in ICT industries. Companies respond by cross-licensing large bundles of patents. Companies that hold few patents are at a disadvantage in the negotiations over such licenses. In some cases this leads to acquisition of firms with strong patent portfolios for the sake of these, rather than because of any interest in their other assets (e.g., Google’s acquisition of Motorola Mobility). The complex patent landscape in ICT has also attracted intermediaries who buy and sell access to patents – such firms are sometimes referred to as trolls or more broadly as patent assertion entities (“PAEs”) or non-practicing entities (NPEs).

Economists and competition authorities in the United States suggest that patent thickets are a signal of inefficiencies in the patent system and that they have serious economic costs. As a result, numerous proposals for reform of the US patent system have been advanced in the last decade. In 2011 this culminated in the enactment of the America Invents Act. It is too early to tell how this act has redressed incentives for ICT patent applicants and
PAEs and what effects it may have on existing patent thickets in the US patent system.

The growth of patent thickets in the European patent system has been documented in a number of recent papers. In a report for the UK Intellectual Property Office it has been shown that patent thickets in Europe are also concentrated in ICT. The Figure right, taken from this report, demonstrates how strong this concentration is. Figure 1 reports a count of “Triples,” which are a proxy to measure thickets empirically. In this figure ICT is included within the electrical engineering category, whereas transport is part of mechanical engineering and pharmaceutical patents fall within the chemistry category.

Some observers – mostly in the legal profession - have suggested that patent thickets are a consequence of intense innovation within ICT technologies and part of the “general costs” of the patent system rather than a reflection of problems with regard to the functioning of the patent system for ICT technologies. Whether innovation in ICT is more intense than in other technologies that are patentable is surprisingly hard to measure. So far, there is no conclusive empirical evidence on this question. There is evidence, however, that technological complexity contributes to the formation of thickets. This can be illustrated by showing the extent to which firms in an industry own patents that are considered to block claims contained in patents by other firms. Figure 2 shows such blocking relationships between firms (“triples”) for companies in the transport and ICT industries.

Figure 1: Count of Triples by Main Area and Priority Year

Figure 2: Transport (left) and ICT (right)
The size of a circle indicates the number of blocking patents a firm holds and the arrows connecting two firms indicate a blocking relationship. Figure 2 shows that the density of blocking relationships in ICT (right) is much higher than in transport (left).

**Causes of thickets**

If the emergence of patent thickets cannot be attributed to a spurt in innovation or R&D investments, what is the cause for the shift to more patenting? The evidence points to the creation of a centralized court of appeal for patent related cases (CAFC) in 1982 and a concomitant strengthening of patent rights in the United States. At the same time Texas Instruments began asserting its patents aggressively, driven by a drying up of income from other sources. These actions and a related court case (Polaroid v Kodak) demonstrated the power of hold-up and led ICT firms to start patenting intensively to participate in the high stakes game of patent bargaining. Firms like Microsoft, Apple, Google, Facebook have followed suit and are just the most recent entrants into the patent wars.

Another factor contributing to the growth of patent thickets is a lack of resources at patent offices and misaligned incentives of examiners that increase the probability of the granting of weak patents. Also, the growth in the trade of high technology products and the resulting increase in patenting by foreign firms has led to the spreading of patenting practices originating in the United States and Japan to Europe and other jurisdictions such as China.

**Effects of thickets**

The most widely documented effect of thicket growth is the increase of incentives for more patenting: thickets self-perpetuate. Given that R&D investments have not kept up with patenting rates, most of the additional patents cover marginal innovations and often do not stand up to scrutiny by the courts. Compounding this patent opposition, which is a mechanism to weed out low quality patents before the grant, works poorly in technologies affected by thickets.

Nonetheless, firms have found ways to deal with patent thickets and the threat of hold-up associated with them. Grindley and Teece document licensing and cross-licensing as ways of resolving or avoiding patent disputes related to patent thickets. Shapiro also notes patent pools and standard setting processes as potential resolution mechanisms. Each of these mechanisms allows groups of firms to share the use of their patent portfolios thereby largely eliminating the threat of hold-up. But there is also evidence to suggest that patent pools can reduce the rate of innovation.

Recent work focuses on the effect that patent thickets have on entry into technologies and markets. Cockburn and MacGarvie find that product market entry in software falls in response to the growth of thickets. Hall et al. show that entry of UK firms into technologies affected by patent thickets falls significantly.

13. Ziedonis (n 4); Graevenitz (n 9).
15. Grindley and Teece (n 11).
16. Shapiro (n 5).
19. Hall et al. (n 8).
Network of industrial economists winter conference: Competition issues in the health and pharmaceutical sectors

Franco Mariuzzo, School of Economics and CCP

OCP organized the Network of Industrial Economists Winter Conference, which took place at the British Academy in London. The event focused on competition related issues in the health and pharmaceutical sector, on the morrow of the new Health and Social Care Act 2012, which set efficiency and quality as priorities in the provision of health care in the UK.

Aware of the well established research on competition in health and pharmaceuticals in the US and the lesser degree of such research in Europe, the conference aimed at disclosing current on-going international academic research on the topic, in hopes of inspiring future national research and providing information for policy makers in a period of great challenge.

The conference program scheduled three sessions: two for experienced researchers and one for new researchers. The papers presented were all empirical and balanced between structural and reduced form modelling.

The conference opened with a brief introduction by Morten Hvid (Director, CCP), who warmed up the audience on the relevance of the research that was to be unveiled. Hugh Gravelle (University of York, Centre for Health Economics) was the first invited speaker of the day. He presented his work “Competition, prices, and quality: Australian GPs”. He motivated his research by pointing out that first, the economic theory yields ambiguous predictions about the effect of increased competition on prices and quality, and furthermore that the empirical studies of competition in health care markets have focussed on hospitals, with little research in physician service markets. The presentation focussed on “Bulk billing”, a practice in Australia (also known as balance-billing in the U.S.) where the GPs can either accept the national tax financed Medicare payment as full payment from the patient or charge a higher price than the rebate and bill the difference to the patient. Using data at the GP-level with information on bulk-billing rate locations and various measures of quality, he showed convincing evidence that those GPs with more distant competitors charge higher quality-adjusted average prices, the primary reason for which is that GPs facing less competition bulk bill a smaller proportion of their patients. He also discussed some limited evidence of a negative relation between quality of services and GP competition. The second invited speaker of the morning was Gautam Gowrisankaran (University Arizona, Department Economics). He disclosed his research “Mergers when prices are negotiated: Evidence from the hospital industry”. His knowledge provided good insight on the bargaining mechanism between hospitals and managed care organizations in the US. The novelty of his research was a structural estimation with a bargaining model between hospitals and managed care organizations. We learnt that a proposed hospital acquisition that was challenged by the Federal Trade Commission would have significantly raised hospital prices, had the merger been allowed. The techniques employed in the paper have potential to be employed in any market where prices are negotiated by the relevant parties.

The first session in the afternoon shifted attention to the pharmaceutical sector. Pierre Dubois (Toulouse School of Economics & CEPR), presented his research “The effects of price regulation on pharmaceutical industry margins: A structural estimation for anti-ulcer drugs”. The main objective of the paper presented was to evaluate the effects of pharmaceutical price regulation on industry margins in France employing a structural econometrics methodology tailored to accommodate for the estimation of price-cost margins on a regulated market with unobserved price constraints. Demand estimations on French,
German and US markets were used to back out the price-cost margins in the French market, which with the introduction of the reference price in 2004, became more regulated. The main findings of his study suggest that margins have increased in France over time, but pharmaceutical companies have become more constrained (regulated) in their price setting after 2003. His welfare evaluation indicated that savings from the regulation were not as high as expected. Farasat Bokhari (University of East Anglia, School of Economics & Centre for Competition Policy), presented the second paper of the session, with the title “Specifications in demand systems for drugs: logits v. aids”. He showed results from hypothetical merger simulations based on demand system estimation of pharmaceutical products using the Almost Ideal Demand System (AIDS) model and discrete choice estimation methods such as the Random Coefficients logit. His results suggest that aids models seem to be preferable for the pharmaceutical sector. For many products they display a certain degree of complementarity, which cannot be accounted for in current discrete choice models, and which in turn leads to substantial effect in the evaluation of merger counterfactuals.

To round out the day, the second session of the afternoon was allocated to new researchers. Presentations were shorter, but no less remarkable. Charlotte Davies (University of East Anglia, Medical School) opened the session with a talk on “Market structure in medical devices: An example of the hip prostheses market”. Her research centred on the purchasing behaviour of the NHS in the medical devices industry (hip prostheses). We learnt that the high market concentration of the supplying industry, a common feature to exercise market power, is preserved also at the local (hospital) level. This opens up the question of whether individual hospitals should be exposed to seller power or whether the NHS buyer power should intermediate in the process. The second paper “Estimating switching costs for Medicare advantage plans” was given by Kathleen Nosal (University Mannheim, Department of Economics). The Medicare Advantage system was created in the U.S. as a result of the Balanced Budget Act of 1997 and the Medicare Modernization Act of 2003, to bring in private competition into the provision of Medicare coverage and offer more options to U.S. Medicare beneficiaries. With Medicare Advantage, the Medicare eligible have the option of choosing from a variety of privately administered managed care plans. Kathleen’s research centred on the switching costs for US consumers that switched Medicare Advantage plans. Two interesting findings were that switching costs reduced consumer welfare by around $1000 a year, and the median switching cost was estimated at about $4162 a year. Interestingly, switching costs helped Medicare Advantage to maintain high market share in years when the programme value was low. Sotiris Vandoros (London School of Economics Health) was the last speaker of the day with his work in progress on “Therapeutic substitution post patent expiry”. He employed data on six European countries during the time period 1991-2006, to give evidence of switches from molecules of off-patent drugs, towards other molecules of the same class which are still in-patent: a phenomenon that makes generic policies less effective.

Chris Pike from Monitor, the new sector regulator for health, was given the difficult task of bridging between the academic research and policy relevant questions. He began by noting that health care has little in common with regulated utilities with their network infrastructure. He suggested that instead it consists of spatially differentiated products that are typically provided by non-profit making organisations, with relatively low fixed costs (even in hospitals). He identified the need for further theoretical and empirical research on competition in the sector in order to help the regulator to make health care markets work better for patients and taxpayers. He drew attention to the need for this analysis to consider the role of the GP as the agent of the patient, and commissioners as purchasers on behalf of the patient. He thanked speakers for their contributions on a range of issues.

Monica Giulietti and Giuliana Battisti (both Warwick Business School) coordinators of the Network of Industrial Economists thanked CCP for putting together an extremely interesting programme, and CCP and KPMG for the financial contribution to the conference organization.

It was a high profile conference, with much insight on two key sectors. The weather was extremely rainy, providing the perfect backdrop (or excuse?) to exchange more research ideas in a local pub.
Our Ninth Annual Conference taking place this summer will focus on ‘Institutions and Competition Policy’ – we will be assessing the importance of institutional design, looking at the impact of institutions on competition policy enforcement and the processes of organisational and legal change. As in the past, we have a strong line-up of speakers and we are looking forward to two days of interesting talks and exciting debates. You will find more information in this Bulletin and on our website.

As always, there are changes to the team at CCP. I’m delighted that we have been joined by Amelia Fletcher, former Chief Economist at the Office of Fair Trading and now Professor of Competition Policy in Norwich Business School. We also welcome our new Centre Manager, Catherine McWalter, and a new research associate, Martin Graffenberger. We have said farewell to our previous Centre Manager, Suzy Adcock, who is now Departmental Administrator at the Department of Politics and International Studies, University of Cambridge, and to Dáithí Mac Síthigh who moved to a Lectureship in Law at the University of Edinburgh.

We organised the Network of Industrial Economics Winter Conference in London in December around the theme of ‘healthcare and competition’. This signals increased interest among CCP researchers in a topic which has become much more policy relevant with the passing of the Health and Social Care Act 2012, an Act which introduces more competition into healthcare in England and creates a new economic regulator, Monitor.

The increased policy-relevance of behavioural economics has prompted us to produce a booklet to be launched late spring or early summer. Several of our researchers have worked extensively in this field over many years, developing both the theory and the policy applications that flow from evidence on consumers’ behavioural traits. The booklet provides us with an opportunity to share the insights we have acquired in an accessible format and with a wide audience. More details about the booklet can be found in this Bulletin.