Ex-post economic evaluation of competition policy enforcement: A review of the literature
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DG Competition

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# Ex-post economic evaluation of competition policy enforcement: A review of the literature

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**Ex-post economic evaluation of competition policy enforcement: A review of the literature**

**Executive Summary**

1. Over the past decade competition authorities (CAs) and academic researchers have become increasingly interested in conducting ex-post economic evaluations of competition policy enforcement actions. The scepticism expressed at the end of 1990s by some academics about the benefits of competition policy was a catalyst for CAs to start evaluating their activities. Robust ex-post evaluations of competition policy decisions allow demonstrating more convincingly the benefits of competition policy in terms of better functioning markets and an increase in well-being of consumers. Moreover, they support enforcement practice by improving the quality of decisions taken.

2. Given this increased interest in the evaluation of competition policy, this paper reviews the academic literature on and the experience of CAs with ex-post economic evaluations of competition policy with a view to summarising what we have learnt so far and what are areas for further research. This executive summary includes four main parts. Part A covers the main lessons to be learnt for ex-post evaluation practice. Parts B and C summarise the main conclusions drawn from the empirical work on the micro- and macro-economic impact of competition policy, respectively. Finally, part D proposes areas for further research.

**A. Ex-post evaluation practice**

3. The main outputs of the CAs include, on the one hand, the decisions taken in the different areas of competition policy (mergers, cartels, abuse of dominance and State aid control) and on the other hand, the definition of the regulatory framework (legislation, guidelines, notices,…) in these areas. Other activities consist in market studies, sector inquiries, advocacy actions and international collaboration with other CAs. The potential matters to be evaluated can include any of these activities. Therefore, the scope of the ex-post economic evaluation activities is very broad, ranging from microeconomic evaluations of specific policy interventions (decisions or regulations) in a well-defined market to the macroeconomic assessment of the broader economic impact of competition policy enforcement.
However, in practice, most of the existing work has concentrated on the microeconomic (price) effects of individual merger and cartel decisions.

The main reason why CAs carry out ex-post evaluations is to improve the quality of their decision-making practice.

They also use these evaluations for competition and competition policy advocacy. A few of them perform evaluations to justify the use of public funds.

A good planning of evaluation projects is essential.

4. Most of the existing work by both CAs and academics is on the microeconomic (price) effects of individual merger and cartel decisions. At the macro-level, some efforts have been made to measure the wider benefits of competition policy for consumers. Less work has been done on the macroeconomic or sector impact of competition policy enforcement. The UK, and to a lesser extent, the Dutch CA, have been more active in this area. While some studies aim to assess the effectiveness of State aid support, there are very few evaluations of the impact of State aid control. Similarly, there is very little work aimed at evaluating efforts to control the abuse of dominance or other activities of CAs, such as sector inquiries, advocacy or international cooperation.

5. CAs may want to undertake ex-post evaluations for several reasons:
- The main reason why CAs carry out ex-post evaluations is to improve enforcement practice and the quality of specific decisions taken.
- Evaluations may enhance the effectiveness of competition laws through the examination of the effects of existing regulations before a policy reform.
- Evaluations are useful for internal and external prioritisation, allowing the CAs to better decide how to allocate resources between different competition policy instruments and enforcement activities. They may also be used to help decide on the budget to be devoted to competition policy and other policy areas. Some agencies, like the CMA, use ex-post evaluations to determine the benefit-cost ratio of public policy, setting a target of 10:1.
- Evaluations can also be used to support policy advocacy. Analyses assessing the impact of competition policy at the macroeconomic level are particularly useful in this respect.
- Evaluations improve the transparency of decisions by informing external observers about their rationale and their effects.
- Evaluations can support benchmarking and comparisons of CAs’ performances over time and between one another. However, such comparisons are fraught with difficulties, because it is not easy to devise good aggregate performance indicators. In addition, CAs may want to promote the use of indicators that portray them in a favourable light.

6. Evaluation takes time and resources. Therefore, a good planning of the evaluation project is essential. First, it allows gathering better data. For example, decisions or regulations can be identified as candidates for ex-post evaluations at the time when they are issued. The collection of data could then already start before the beginning of ex-post evaluation proper. Second, it allows getting the results of the evaluation exercise on time before the expiration date of the rule or regulation up for review. Finally, having a plan
of action, such as the multiannual evaluation programme of DG Competition, guarantees a certain degree of regularity in evaluations. Such regularity allows gradually increasing the number of ex-post evaluations which progressively can be used to derive more general conclusions. Conducting an ex-post assessment only in response to a serious failure would be a very incomplete and biased form of performance measurement.

**Preparation**

First, the preparation of the evaluation project should start by defining the main objective pursued and, on that basis, the subject of the evaluation and the methods to be used should be identified.

The use of multiple evaluation methods combining quantitative and qualitative methods increases the robustness of the evaluation.

7. The preparation of the evaluation starts by defining the main objective pursued and the evaluation questions to be studied. There is generally a trade-off between the degree of aggregation and the degree of accuracy of the evaluation. If the main objective of the CA is to improve its enforcement, it has to work at a low level of aggregation, mainly on individual decisions, and analyse reasons for success or failure. If the main motivation is to increase the effectiveness of competition law, it has to analyse whether the existing regulations achieve the desired outcome. Finally, assessments of the macroeconomic impact of competition policy enforcement and evaluations of its effect on the functioning of a sector are best used for advocacy purposes.

8. The preparation of the evaluation also requires a decision on the methodologies to be used. This allows reflection on data needs and verification of the feasibility of the project. Data are often very costly. Therefore, cost and data availability issues should be considered early on during the evaluation process. Various methods can be utilised to carry out ex-post evaluations, including qualitative and quantitative methods as well as mixed methods, such as case studies or market studies (see Table 1). At one extreme, relatively simple rules of thumb are used by CAs to calculate the customer savings resulting from the merger or cartel prohibition decisions. At the other extreme, sophisticated econometric methodologies are used to assess the effects of such decisions on variables like prices. Such methods are less often used by CAs because of their technical difficulties and greater data requirements. It is recommended to use a combination of different approaches in order to increase the robustness of the results obtained. Also, a combination of qualitative and quantitative methods allows looking at the question from different angles. However, in practice, evaluations that combine different methods are less frequently used because they are more costly. Finally, it is important to not forget that evaluations are used by policy-makers and that the methodology needs to be understandable to them.

9. Amongst the qualitative methods, one can distinguish on the one hand performance measurement via court judgements in response to appeals lodged by parties concerned by competition policy decisions and on the other hand surveys of stakeholders and peer reviews amongst competition authorities. The quantitative methods range from very simple methods aimed at the calculation of customer savings, to the more complex estimation
and simulation of structural models. Other quantitative methods – including in particular the Difference-In-Differences (DiD) approach – are not based on an underlying model of the market but on a comparison of actual developments following the competition policy intervention with what would have happened in the absence of such intervention ("i.e. the counterfactual"). Finally, event studies track the reaction of stock prices to a decision. In general, CAs prefer the use of a combination of qualitative and quantitative methods. For example, the UK CA regularly conducts retrospective merger reviews, which are based on a combination of questionnaires and interviews with the parties concerned, model simulations and DiD techniques. The US (Federal Trade Commission) and the Dutch CAs also apply a DiD approach to analyse the post-merger increase in prices and on that basis, determine whether their merger decisions were correct.

Table 1: Methodologies for the ex-post economic evaluation of competition policy

<table>
<thead>
<tr>
<th>Methods</th>
<th>Basis of analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microeconomic evaluations</strong></td>
<td></td>
</tr>
<tr>
<td>Qualitative methods</td>
<td></td>
</tr>
<tr>
<td>• Court judgements</td>
<td>Court judgements in response to appeals by parties concerned challenging the decisions made by competition authorities</td>
</tr>
<tr>
<td>• Surveys and peer reviews</td>
<td>Interviews with or questionnaires filled out by competitors, suppliers, customers, law firms and competition authorities</td>
</tr>
<tr>
<td>Quantitative methods</td>
<td></td>
</tr>
<tr>
<td>• Estimation and simulation of structural models</td>
<td>A fully specified demand side model</td>
</tr>
<tr>
<td>• Reduced form estimation</td>
<td>Single equation based on a clearly defined theoretical framework</td>
</tr>
<tr>
<td>• Calculation of customer savings</td>
<td>Assumptions concerning expected effects on prices, sales and productive efficiency, and the expected duration of such effects</td>
</tr>
<tr>
<td>• Quasi-experimental methods</td>
<td>Comparison of performance of treatment group of companies with a control group</td>
</tr>
<tr>
<td>• Event studies</td>
<td>Reactions of stock prices of competitors to a merger announcement/appeal, and of stock prices of parties concerned by the detection of a cartel or the launch/conclusion of an antitrust investigation</td>
</tr>
<tr>
<td><strong>Mixed methods</strong></td>
<td></td>
</tr>
<tr>
<td>• Case studies</td>
<td>Combination of the above elements of information concerning a specific case</td>
</tr>
<tr>
<td>• Market studies/sector inquiries</td>
<td>Developments in a specific market following a number of competition policy interventions affecting that market</td>
</tr>
<tr>
<td>• Meta-retrospectives</td>
<td>Academic papers and publications by competition authorities on selected issues (on antitrust or merger remedies, cartel detection and fines, e.g.)</td>
</tr>
<tr>
<td><strong>Macroeconomic evaluations</strong></td>
<td></td>
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<tr>
<td>Qualitative methods</td>
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<tr>
<td>• Surveys</td>
<td>Surveys to assess the effectiveness of competition policy</td>
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<td>• Calculation of aggregate customer savings</td>
<td>Assumptions concerning expected effects on prices, markets concerned and the expected duration of such effects</td>
</tr>
<tr>
<td>• Macro-econometric modelling</td>
<td>Reduced form estimations or simulations based on macroeconomic models</td>
</tr>
</tbody>
</table>

Main sources: Bergman (2008); Hüschelrath and Leheyda (2010) and own review
One has also to decide early on who will be conducting the evaluation: insiders, outside experts or both.

10. Another issue to be addressed early on is who will be doing the ex-post evaluation: insiders, expert outsiders or both. The Dutch, UK and US competition agencies, which are so far the most active in evaluation activities, use all a combination of in-house and outsourced studies. Agencies with the longer experience, like the UK CA, tend to do relatively more in-house work. There are pros and cons to the outsourcing of evaluations. On the one hand, external evaluators might have a higher expertise in the design and implementation of ‘state of the art’ methodologies than internal evaluators. They can also make the assessment more objective. However, the formal participation of the CA directly concerned has several advantages: the competition agency is likely to be the main repository of information about the decision to prosecute and about internal discussions concerning the management of individual cases. Possible ways to reduce the trade-off between independence and effectiveness in the evaluation exercise are: (i) combine internal and external expertise with a limited involvement of outsiders; (ii) ask outside experts to sign nondisclosure agreements; or (iii) perform internal evaluations as a collaborative effort between case handlers and horizontal units. Within the European Commission, the use of a steering group accompanying the evaluation process helps ensure the objectivity of the evaluation.

Execution

The sophistication of the tools used to carry out evaluations depends on the data available. This would argue in favour of spending more time and resources on the construction of good databases.

11. The execution of the ex-post evaluation project should start by collecting the data, which allows refining the methodology and defining the indicators to be used for the evaluation. A sound ex-post evaluation requires data of the parties collected during the enforcement process but also pre and post enforcement data from the parties and from other market participants (affected and non-affected by the enforcement). Good databases are essential for quantitative ex-post evaluations. In spite of this, most CAs do not maintain a comprehensive database on their enforcement activities and even if they do, they do not make such databases publicly available. Giving access to such databases (including only non-confidential information) to external researchers would help to develop further evaluation activities, without compromising the provision of the confidential data essential for the conduct of investigations. Another issue is that ex-post evaluations of individual decisions are carried out a few years after the interventions being examined have taken place. Consequently, the parties concerned may no longer keep the relevant data. However, a lot of quantitative data are collected at the time of investigation. Therefore, it would make sense to spend some time and resources to organise these data in such a way that it can be used later on for ex-post evaluations. Similarly, the monitoring of market developments after a case has been closed could help for future ex-post evaluations.
Exploitation

The exploitation of results requires taking a critical view on what has been done before drawing any conclusion.

12. Before deriving any conclusion from the evaluation exercise, it is essential to have a critical view of what has been done, in particular, regarding the key assumptions made and the methodological challenges. Evaluations are based on assumptions which are approximate and not always verifiable. Therefore, the sensitivity of the results to the assumptions made and their robustness need to be discussed. If the results are considered as sufficient solid, the next step is to draw conclusions from the evaluation. However, one has to be cautious with the use of ex-post evaluations. For example, the self-evaluation of CAs on the basis of the immediate consumer savings resulting from the detection of cartels and the prohibition of anticompetitive mergers involves a risk of over-enforcement because the authorities could have incentives to strive for obtaining large figures. Moreover, over-reliance on these estimates could also distort decisions on the allocation of resources within a CA. This may lead the CA to disregard legal violations in low-value markets where enforcement would be important because of deterrent effects. However, such effects are more difficult to measure.

13. Another important question is related to the degree of publicity given to the results of the evaluation. CAs face specific problems which could plead in favour of a non-disclosure of ex-post evaluations. For example, it might be difficult for a CA to publish the ex-post assessment of its past decisions. If a CA reports that it made a mistake in a particular case, the concerned firms may have an incentive to appeal the decision and request damages. One may also decide to issue public versions of the evaluations that delete references to sensitive information. Such a publication of the results of the evaluation would be beneficial for the agency in several respects: it allows an external quality control, can provide ideas for improvement by stimulating a useful public debate and it can improve the legitimacy of the institution.

14. The Dutch, UK and US agencies give a certain degree of publicity to their evaluation activities. However, the CMA is the only authority having a dedicated public website with its evaluation reports. The European Commission and the CMA seem to be the only ones having a multi-annual evaluation plan. The CMA has the obligation to carry out regular evaluations, at least two cases per year.
B. Microeconomic impact of competition policy

The empirical literature on the microeconomic evaluation of competition policy has concentrated on merger control and cartel policy enforcement.

15. Most of the existing work on the microeconomic impact of competition policy aims to evaluate the effects of merger control and cartel prohibitions. Product markets being subjected to ex-post evaluation vary greatly. They include goods and services markets as well as intermediate and final products. Product characteristics do not appear to act as a constraint on ex-post evaluations. The main challenge for researchers is to gather the data required for the analysis.

Mergers

Most but not all merger evaluations find that mergers lead to higher prices for customers. However, this does not necessarily imply that the decision taken by the competition authority was mistaken.

16. Meta-retrospective studies confirm that on average marginal merger decisions (i.e. decisions in which the CA has to make a difficult trade-off between the anti- and pro-competitive effects of the merger) contribute to higher prices for customers as on average the market power effects of mergers outweigh the efficiency effects. At first sight, this would seem to argue in favour of a stricter merger control. However, an increase in marginal costs associated with post-merger inefficiencies and collusive conduct amongst remaining market participants also contribute to explain a post-merger price increase. Moreover, this observation might simply be a reflection of the selection bias in choosing merger cases for ex-post evaluation: it is those ‘close’ decisions that are chosen for an ex-post evaluation because the CAs consider that they can learn more from them for future decisions. Finally, as the actual market outcome following a merger approval decision is a stochastic event, the price rise following the decision may be explained by other, unexpected factors.

In merger cases where there are efficiency gains, the extent of the pass-through of those gains to customers depends on the degree of concentration in the market.

17. Some studies do not observe a price increase following a merger. In the Italian and Spanish banking sector, for example, consolidation appears to have improved conditions for both lenders and borrowers. In this sector, the efficiency gains from mergers appear to be relatively important, particularly in the longer run. Even though the increased market concentration leads to higher prices initially, these changes are temporary and in the longer run, efficiency gains due to cost cutting appear to outweigh the negative effects of an increased market power of banks. The studies also show that the extent to which efficiency gains are passed on to customers depends on the degree of concentration in the market.

It is difficult to distinguish the effects of a merger from that of the associated remedies.

18. A subset of mergers and acquisitions are approved by competition authorities subject to remedies. Such remedies can be either behavioural or structural in nature. Structural remedies are aimed at preserving competition by requiring the merged firm to divest certain assets to a new or existing competitor. Behavioural remedies affect the future behaviour of the merged firm. In the case of structural remedies in particular, it is very difficult to
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However, structural remedies appear to be more effective than behavioural remedies.

19. While it would be more straightforward to make a joint assessment of the mergers and the associated remedies, some studies focus on the analysis of the effectiveness of merger remedies as such. These studies indicate that prohibitions are a more effective means of merger control than remedies, as remedies tend to only partially offset the anticompetitive price effects of mergers. Divestitures have been estimated to reduce the average price increase by roughly 50 percent, while behavioural remedies are less effective.

20. The inadequateness of behavioural remedies is confirmed by recent meta-retrospective studies done in the US, which show a significant average price increase following merger approvals with remedies (including behavioural remedies in particular) whereas prices increase only marginally following prohibition decisions. Moreover, some studies conclude that remedies are not as effective as prohibitions in deterring anti-competitive mergers.

21. Studies aimed at evaluating the impact of merger policies and regulations (as opposed to the impact of individual decisions) often use surveys and interviews, in particular to determine the deterrent effects of merger control. According to UK competition lawyers, four out of five harmful mergers in the UK are deterred as a result of competition policy enforcement. Also, a merger is more likely to be abandoned or modified if there has been a recent inquiry by the CA in the sector. However, it is difficult to obtain a more precise indication of the magnitude of such deterrent effects, as the estimates are largely based on the “gut-feeling” of the lawyers and companies being interviewed. Nevertheless, reviews of the literature on the deterrent effects of merger control agree that such effects largely outweigh the costs of maintaining an effective competition policy regime.

22. The outcomes of event studies, which are typically used to assess the correctness of decisions taken as well as the success of reforms of the merger control regime, show a greater convergence. Difficulties with the market definition or the length of the procedure appear to affect the frequency of Type I (prohibition of a pro-competitive merger) and Type II errors (acceptance of an anti-competitive merger). By contrast, the Commission’s decisions are not sensitive to firms’ interests and therefore, the claim that “the Commission listens too much to competitors, at the expense of consumer interests” is not supported by data. There also appears to be a consensus that the 2004 merger reform has reduced the probability of anti-competitive deals being cleared. Moreover, the ‘more economic approach’ of the 2004 Merger Regulation has resulted in an increased ex-ante predictability of decisions.

distinguish the effects of the merger from that of the associated remedies, especially if such remedies are implemented at the same time as the completion of the merger.
Abuses of dominance

Surveys tend to show that the deterrent effects of antitrust enforcement actions are strong and that these actions cause reputational damage for the companies concerned.

23. There is a lot of scepticism amongst academics regarding the evaluation of abuse of dominance cases because of the complexity of the analytical framework and the lack of data. Even though the number of studies on the effectiveness of antitrust policy enforcement under Articles 101 and 102 TFEU is very small, they all point to the conclusion that antitrust enforcement actions have real consequences for the firms involved (in terms of reputational damage e.g.), going well beyond the direct effects of fines and legal costs. Consequently, the deterrent effects of such enforcement actions appear to be substantial.

24. The benefits of an effective antitrust enforcement are likely to be well above government spending on such enforcement. A UK survey estimates that for each abuse of dominance case, 12 potential infringements are deterred; for each cartel case, 28 potential infringements are deterred and for each commercial agreements case, 40 potential infringements are deterred. Also, surprise inspections and infringement decisions by the European Commission appear to have a significant negative effect on share prices.

Cartels

Up to four out of five cartels may remain undetected. But this observation has to be viewed with caution as it is very difficult to estimate detection rates of cartels.

25. The probability of detection is very difficult to determine, because non-detected cartels are by definition unobservable. More recently though, researchers have developed methods aimed at overcoming this challenge. One method from ecology, for example, allows making inferences about changes in the ‘unobservable’ detection rate based on the observed changed in the number of detected cartels. Using this and other methods, researchers have come to the rough conclusion that up to four out of five cartels may remain undetected.

26. Meta-retrospectives of studies and other published documents reporting on overcharges (i.e. the difference between the collusive and competitive price) resulting from cartels are the most commonly used method for evaluating the impact of cartel policy enforcement, as cartel prohibitions are expected to eliminate such overcharges.

Overcharge rates are, on average, between 15% and 20% of the competitive price but they show a great variance.

27. On average, overcharge rates are between 15% and 20% of the benchmark price, with overcharges achieved by cartels in Europe and North America being lower than in the Rest of the World, where cartel policy enforcement may be less strict. Within Europe cartels in the western and northern part of the continent (excluding the UK) appear to be less effective in attaining high overcharges in comparison with cartels located elsewhere.

28. There is a considerable variation in the mean overcharge reported by the different meta-retrospectives, reflecting the extent to which outliers are taken into account. A study even finds that 7% of cartels in the EU do not lead to an overcharge. However, for other
cartels extremely high overcharge rates of more than 50% are reported, which appears unrealistic. Such high estimates tend to introduce a bias in the mean overcharge rates reported by meta-retrospectives. This is also the reason why meta-retrospectives often report median overcharge rates, which tend to be some percentage points below the mean rates.

29. The meta-retrospective studies appear to agree on the conclusion that the stronger enforcement and increased scope of cartel policies in the U.S. and the EU in particular has contributed to the observed decline in overcharges (with the notable exception of overcharges resulting from bid rigging cartels).

30. Cartel prohibitions act as a deterrent to companies contemplating their involvement in current and future cartels. A number of papers have attempted to address the question whether current fines are sufficient to deter companies from joining cartels. Most of these papers retrospectively calculate the net benefits of joining cartels that are known to have existed in the past. Such net benefits depend on a number of factors including the level of overcharges, the duration of the cartel, the size of the market, the probability that the cartel will be detected by competition authorities and the likely level of fines imposed in case of detection.

31. Measuring the net benefits of cartel participation is difficult as it implies an assessment of the probability of cartel detection. However, a number of papers have attempted to address this question and their calculations of the net benefits of cartel participation indicate that current fining levels are insufficient to deter companies from joining cartels. However, other authors conclude that fines set according to the EU Guidelines are not necessarily inadequate to achieve deterrence and suggest that other actions can be taken to decrease the inclination of companies to engage in collusive behaviour, including stronger private enforcement, the introduction of personal liability, increasing the resources for cartel detection, payments for whistle-blowers and fostering a competition culture.

32. If the decision were to be taken to increase fines, there would be an argument to limit such increase to more durable and international cartels, as: (1) average overcharges of cross-border cartels are 14 percentage points higher than those of domestic cartels; and (2) the average level of overcharges rises by 4 percentage points for each five additional years of cartel operation.
C. Macroeconomic impact of competition policy

There are two main approaches to assess the aggregate effects of competition policy enforcement. The first approach is a bottom-up approach measuring the direct benefits of competition policy for consumers (customer savings approach). The second approach relies on macroeconomic models to assess the effect of competition policy on competition and (directly and indirectly) on GDP growth. While the first approach has been mostly used by CAs, the second approach has been more popular amongst academics.

Customer savings approach

A relatively simple methodology is used by some CAs to estimate the customer savings resulting from competition policy interventions.

The estimates obtained with this method vary widely over time and between jurisdictions.

Table 2: Estimates of annual customer savings (% of GDP x 10-2)

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Commisson</td>
<td>8.7</td>
<td>7.6</td>
<td>8.9-13.1</td>
<td>4.4-6.4</td>
<td>2.6-5.7</td>
<td>3.8-4.7</td>
</tr>
<tr>
<td>US DOJ</td>
<td>0.4</td>
<td>1.3</td>
<td>0.2</td>
<td>1.1</td>
<td>5.8</td>
<td>0.7</td>
</tr>
<tr>
<td>US FTC</td>
<td>0.3</td>
<td>0.7</td>
<td>0.7</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>UK (CC+OFT)</td>
<td>2.6</td>
<td>2.7</td>
<td>1.3</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>NL CA</td>
<td>0.7</td>
<td>0.1</td>
<td>1.5</td>
<td>6.1</td>
<td>3.7</td>
<td>10.8*</td>
</tr>
</tbody>
</table>

Source: Own calculations based on national and EU sources
* Not comparable with the figures for 2008-2012 due to a change in methodology

The estimates of annual customer savings from competition policy interventions vary widely over time and between jurisdictions (see Table 2). Such variation can be attributed to several factors, such as the size of markets in which CAs intervene, the scope of the intervention and the number of cases investigated, as well as the assumptions and estimation methods used. Recently, the OECD has made some proposals aimed at an increased convergence of the assumptions and methods used by the different CAs.
The customer savings approach underestimates the total benefits of competition policy for consumers as it ignores deterrent and non-price effects.

36. An advantage of the customer savings approach is that the estimates are directly based on the relevant decisions taken by the CAs. Its main disadvantage is that customer savings are partial estimates which only measure the direct price effects of interventions for consumers. Therefore, these estimates are very small when expressed as a percentage of GDP. Some CAs appear to be concerned that these estimates give external stakeholders a partial or distorted view of the value and purpose of competition law enforcement. However, total benefits extend well beyond prices and include effects on quality, choice and innovation. The customer savings estimates also ignore the indirect consequences of the price reduction on the whole economy and the deterrent effects of competition policy. This would argue in favour of using macroeconomic modelling to get an estimate of the price reduction effects for the whole economy.

Macro-modelling approach

37. A comprehensive analysis of the impact of competition policy needs to consider not only the impact of competition on macroeconomic performance but also the impact of competition policy on competition and on macroeconomic performance (see Graph 1). However, most of the existing empirical work has concentrated on the macroeconomic impact of competition. Much less work has been done regarding the macroeconomic impact of competition policy as this type of work is very challenging for several reasons:

- First, it is not straightforward to find appropriate competition policy indicators. Similarly, as competition cannot be observed directly, indirect measures of competition have to be used, sometimes in combination.
- Second, it is difficult to empirically establish a causal relationship between competition policy and competition.
- Third, it is harder to track the chain of events which may follow a competition policy intervention in the medium to long term than to look at the immediate impact of a specific competition decision in a given market.
- Finally, disentangling the effect of competition policy from other factors affecting competition and growth (such as trade liberalisation and market integration) is very demanding.

38. The three transmission channels of an increase in competition are allocative, productive and dynamic efficiency. First, competition will lead to an improvement in the allocative efficiency of firms via the entry of new firms and the exit of the least efficient firms from the market (‘across firms’ effects). This will reduce the market power of incumbents and incite them to set prices closer to marginal costs. As a consequence, mark-ups tend to decline while the allocation of both inputs (labour and capital) and outputs becomes more efficient. More competition can also lead to increased allocative efficiency as less productive firms exit and
market share moves from less productive to more productive firms.

39. Second, competition will improve the productive efficiency of firms ('within firms' effects). Productive efficiency results from the introduction of better production methods within the firm, including organisational changes as managers and workers have greater incentives to reduce slack, trim fast and structure the workplace more efficiently. Incentives to improve productive efficiency result from the fact that the benefits of greater efficiency in terms of market share and profits is higher in competitive markets where the price elasticity of demand is high and that the probability of bankruptcy is higher in a more competitive environment.

40. Third, competition will increase the dynamic efficiency of firms by pushing them to innovate (dynamic effects). However, the link between competition and innovation is hotly debated. There is evidence of an inverted U-shaped relationship between competition and innovation, with too little or too much competition reducing innovation.

**Graph 1: The macroeconomic impact of competition policy**

41. Indicators used to assess the strength of competition policy can be divided into three main categories: input indicators, output indicators and composite indicators combining input and output variables. Input indicators include binary variables measuring whether an antitrust regime is in place or not, variables measuring the human and budgetary resources employed by CAs or variables related to the quality of competition laws and institutions (laws in the book or de jure, characteristics and laws as they are implemented in practice or de facto characteristics). Output indicators include survey results on the perceived effectiveness of competition policy and variables describing the interventions made by the CAs.
Further work is necessary to improve the quality of the indicators measuring the strength of competition policy.

There is little or no correlation between the input and output indicators of competition policy. This casts doubts on the quality of these indicators and shows how difficult it is to summarise the complex competition laws and practices in a simple indicator.

More sophisticated analyses tend to find that the introduction of competition laws and/or the quality of competition laws and institutions has a positive impact on the perceived effectiveness of competition policy.

Indicators of the strength of competition policy

42. There is a trade-off between the simplicity and objectivity of the indicators and the specificities of the various dimensions of competition policy which can be covered. On the one hand, indicators based on the staff and budget of CAs are relatively simple and objective. But they give a very partial view of the strength of a competition policy and assume that there is a positive relationship between the resources of a CA and the strength of its competition policy, which is not necessarily right. Similarly, the surveys based on the views of business leaders are over-simplistic, often based on a single question, and very subjective, representing views of local business people. On the other hand, composite indicators combining input, output and survey results raise a number of problems: aggregation, choice of the benchmark, difficulty of interpretation as they combine very different elements of competition regimes. They also do not show much variability across countries, which reduce their usefulness for empirical work. Despite these problems, composite indexes and survey-based indicators on the perceived effectiveness of competition policy are the most often used indicators.

43. There is little or no correlation between the input indicators on the quality of competition laws and institutions (de jure and de facto) and the output survey-based indicators on the effectiveness of competition policy. This can mean either that the ‘competition friendliness’ of a competition agency cannot be grasped by focusing on the quality of laws and institutions only or that subjective indicators based on the views of local business executives are biased. This might also be due to the fact that these indicators cover different features of competition policy. However, they pursue the same objective, which is to measure the quality of competition regimes across jurisdictions. The advantage of the fact that these different indicators are uncorrelated is that they can be used in combination in empirical work.

44. Most studies find a positive impact of the existence or strength of competition laws in the books on the perceived effectiveness of competition policy. Some of these studies go deeper into the institutional features of competition policy which determine its effectiveness. The conclusion is that the design of antitrust policy is important; in particular, countries with an economic approach to dominance investigation, an effective leniency policy and an independent CA are perceived as having a more effective antitrust policy.

45. However, it is not sufficient to have appropriate competition laws. Such laws need to be effectively enforced to have an impact. Unfortunately, there are no studies linking the actual effectiveness of competition policy and indicators combining de jure and de facto characteristics of competition laws. The effectiveness of competition policy is measured in this literature by a survey based indicator of effectiveness as perceived by business leaders.
Indicators of competition

Indicators of competition which are more often used include market openness, mark-ups, business dynamism and management quality and the perceived intensity of local competition.

46. Competition cannot be observed directly. Therefore, indirect measures of competition are commonly employed, often in combination. These indicators capture different dimensions of competition reflecting elements of market structure (measured by market concentration, market openness, entry barriers), market conduct (volatility in market shares, entry/exit, business dynamism, management quality) and market performance (mark-ups, profitability), as well as other dimensions (number of competition law infringements). Survey indicators describing the perceived intensity of competition by business leaders are considered as well.

Macroeconomic impact of competition policy

The strength of competition policy has a positive impact on competition but having wealthy, large and open markets is as important for competition as having good competition laws.

47. Empirical work analysing the impact of competition policy is less developed than the work analysing the impact of competition and conclusions are less clear-cut. A few studies come to the conclusion that the strength of competition policy (as perceived by business leaders or as measured by the quality of competition laws and institutions) has a positive impact on the perceived competition intensity. Other variables, such as the size of the economy, the population of the country, its degree of openness and GDP per capita have also a positive impact on competition, suggesting that having wealthy, large and open markets is as important for competition as good competition laws. However, these results are not always robust.

48. A number of relatively recent studies attempt to assess whether countries with competition laws or more effective competition laws achieve faster growth. The strength of competition policy seems to have a positive impact on growth, via its impact on the number of firms in the industry, mark-ups, productivity and domestic and foreign investment. For example, the introduction of competition laws has a high positive and long lasting effect on the number of firms in the industry: after 25 years, the number of firms increasing by 29% on average in a sample of 28 industries in 42 countries. Competition policy also seems to have a positive impact on productivity, improvement in competition policy being responsible for as much as one fifth of the increase in productivity in the UK at the beginning of 2000s. However, again, the conclusions are not clear-cut as other studies fail to find a significant impact of competition policy on productivity, mark-ups and foreign investments.
Macroeconomic impact of competition

49. Conclusions from the empirical work analysing the macroeconomic effects of competition via the three transmission channels are broadly convergent. The degree of competition (as measured by the mark-up) is still lower in Europe than in the United States, especially in the services where the mark-up is estimated to be 44% higher in the euro area than in the United States. The macroeconomic impact of a mark-up reduction is significant. For example, a study concludes that differences in competition between the euro area and the United States account for half their gap in GDP per capita. Another study finds that a reduction of mark-ups (by 30%), aligning the mark-up in services in the euro area to that in the United States, could increase real GDP in the long term (by 4.4%). Most of these empirical studies also conclude that the positive effects of a reduction in mark-ups on productivity are higher in low-competition sectors (such as services) and low-competition countries.

50. Business dynamism is also lower in Europe than in the US. For example, the share of static firms (the firms with an annual employment growth rate between -1% and +1%) is 30% lower in the US than in Europe and that the share of growing firms is 30% higher over the period 2002-2005. Reducing the share of firms with very modest or zero growth in the EU could reduce to a large extent the EU-US gap in TFP growth (up to 80%).

51. A more competitive environment (as measured by number of rivals, surveys, trade openness or average profits over sales ratio) is positively correlated with better management practices in manufacturing and in some services (hospitals, schools and public retails). But other factors than competition contribute to explain better management practices, such as flexible labour markets, availability of skilled people, private equity ownership and multinational character of the company. Moreover, better management practices are significantly associated with higher productivity: management practices account for up to a third of the differences in productivity between firms and countries.

52. The link between competition and innovation is more difficult to assess for several reasons. First, measuring innovation is at least as challenging as measuring competition. Various proxy variables are found in the empirical literature, such as indicators of R&D investments, R&D employment or R&D intensity, innovation counts, patents counts or total factor productivity. Another difficulty in measuring the link between competition and innovation is that competition is not exogenous relative to innovation. This endogeneity problem makes it difficult to isolate the causal link between competition and innovation without using specific econometric techniques.

53. Empirical work shows that the relation between competition and innovation is complex and that the effects of competition on innovation are not always statistically significant. However, the
Schumpeter view that market concentration or large firm size is associated with a higher level of innovation does not appear to be supported by empirical finding. By contrast, empirical work tends to corroborate the view that there is an inverted-U shape link between competition and innovation, with too little or too much competition reducing innovation.

54. The technological gap and the type of industry will influence the relation between competition and innovation. The positive impact of competition on innovation is greater in ‘neck to neck’ industries, i.e. industries with the same technological levels, and for firms and industries close to the technology frontier. In such sectors, product market competition reduces pre-innovation rent, thereby increasing the incremental profits from innovation. This is known as the ‘escape-competition effect’. But, for firms further behind the technology frontier in sectors with a high technology spread, competition reduces the post-innovation rents and thus their incentive to catch up with the current leader in the sector. In this framework, competition policy is particularly beneficial in industries with firms that are technologically advanced.

55. The impact of competitive pressure on innovation depends on the type of innovation considered (process or product) and on the cause of the increase in competition (increase in the number of competitors, greater product substitutability, increase in market size, reduction in entry barriers). For example, an increase in market size and in the substitutability of products will have a positive effect on process innovation because a unit reduction in cost will allow a higher output impact, while a decrease in entry barriers will have a negative effect because the unit cost reduction will benefit a diminished output.

56. Weak upstream competition can curb productivity growth in downstream markets as firms will have fewer incentives to innovate or adopt new technology for two reasons. First, because the rents the downstream firms expect from efficiency improvement are likely to be partially captured by the suppliers of the intermediate inputs upstream. Second, a lack of competition in upstream market can generate entry barriers limiting competition downstream if access to downstream markets requires using intermediate inputs produced upstream. These negative spill overs can be particularly important in case of services, less exposed to global competition. The results suggest that increasing competition in upstream sectors would increase multi-factor productivity growth by 1 to 1.5% per year in the observed OECD countries. This shows the positive gains to be obtained by ensuring good conditions of competition in sectors, such as transport, energy, telecommunications, which produce goods intensively used as intermediate inputs in other sectors of the economy.
D. Areas for further research

A lot of work can be done to better understand and evaluate the economic impact of competition policy. On the methodological front, important challenges remain in terms of definition of the counterfactual: identification of parties affected and non-affected by a decision or a policy and selection bias.

57. The definition of the counterfactual is a key issue for all types of impact evaluations. For example, when evaluating individual cases, the counterfactual describes what would have happened in the absence of the decision (or if a different decision had been taken) by the competition authority, while, at a more macro level, it concerns what would have happened in the absence of the policy being evaluated. The problem is that in reality we do not and cannot observe the counterfactual for parties affected by a decision or a policy. It is therefore essential to conduct sensitivity analyses on the estimate of the counterfactual.

58. The get around the fact that the counterfactual is unobservable, impact evaluations seek to compare the actual outcomes for parties affected by the competition policy enforcement decision (the ‘treatment’ group) with outcomes for non-affected parties which are as similar as possible to the affected parties (the ‘control’ group). The challenge for counterfactual impact evaluations is two-fold: first, to identify both the treatment group and the control group; and second, to obtain the relevant data, which is, in general more difficult for non-affected entities in the control group.

59. The parties in the treatment and control groups may have different characteristics leading to a selection bias, which may affect the outcome of the evaluation exercise. In order to limit such selection bias as much as possible, the evaluation literature suggests a number of statistical methods to select the parties in the treatment and control groups. However, even if carefully selected, the parties in the treatment and control groups are not necessarily representative of the total population of undertakings falling under competition rules. This is particularly a problem in the area of cartels because the samples used for the evaluation of anti-cartel enforcement policies are exclusively drawn from detected cases and exclude deterred and undetected cases.

60. An ex-post evaluation of an individual merger decision (or a single merger retrospective) does not allow making an assessment of the overall effectiveness and impact of merger policy. However, a review of a large number of merger decisions (for example by way of a meta-study) could offer some valuable insights in this area. This type of study has been carried out for the United States. It is regrettable that as of yet there is no similar meta-study in Europe, perhaps because the number of published ex post merger evaluations in Europe is smaller than in the United States.
61. Most of the existing empirical work on the microeconomic evaluation of competition policy has concentrated on the ex-post impact of merger and cartel decisions on prices. Nevertheless, the challenge remains to provide robust microeconomic evidence supporting the view that competition policy enforcement actions have a positive impact on business dynamism and innovation. Analysing the impact of competition policy enforcement on innovation is particularly relevant in this period of slow productivity growth in Europe, which makes so important the incentives for companies to engage in innovative activities. It is also necessary to be able to respond to the criticism that competition policy decisions do not sufficiently take into account their impact on the innovative performance of the parties or competitors concerned.

62. Innovation effects are currently incorporated into the legal framework for assessing mergers, both in terms of anticompetitive effects and possible efficiencies. In practice, there are a number of cases for which the innovation effects have been analysed. An ex-post analysis of the impact of these decisions on the innovative activity in the market concerned could be a first step to better understand the complex interaction between competition policy and innovation at a microeconomic level.

63. More work should also be devoted to sector analyses. This type of analysis could contribute to better understand the impact of competition policy on market functioning in key sectors. It can also help to identify the interrelations between competition policy instruments and between competition and regulation policy in key sectors, such as energy, transport and telecommunications. The pilot study on the ‘Economic impact of enforcement of competition policies on the functioning of the energy markets’ is a first attempt to better understand the impact of competition policy enforcement activities by the European Commission and national CAs on the functioning of the EU gas and electricity markets over the past decade.

64. A number of CAs use imperfect but accepted methodologies for calculating the direct impact of competition policy interventions on consumers. It would be highly relevant to look beyond these direct effects and develop better methodologies to assess the deterrent impact of the work of CAs.

65. Deterrence aims at discouraging future anti-competitive behaviour. The deterrent effects of a competition policy intervention are difficult to measure because they are not felt immediately and cannot be measured directly. Nevertheless, there appears to be a consensus in the literature that the deterrent effects of competition policy enforcement are considerable. Assessing deterrent effects could be informative for the prioritisation of resources across instruments and could contribute to improve the design of competition rules. For example, in the area of cartels, research has focused on how to determine the optimal level of fines imposed. In the area of mergers, it would be
interesting to better understand the extent to which merger control deters potentially anti-competitive mergers from being proposed or ensure that mergers are modified prior to being proposed to ensure compliance with the merger regime.

66. We would suggest considering an integrated framework combining the different analyses carried out to measure the aggregate impact of competition policy. Two options could be envisaged. The first option would consist in using the microeconomic calculations of the customer savings to obtain macroeconomic estimates. For example, the estimated price reductions resulting from competition policy interventions could be aggregated on the basis of the size of the markets affected and used as inputs in macroeconomic models. We have started to implement this approach.

67. The second option would be to better link the empirical analysis on the effects of competition policy and the one on the effects of competition. There are a few papers which attempt to carry-out a two-step analysis considering these two types of effects. Generally, the empirical papers either measure the impact of competition on growth drivers, such as decline in mark-ups, greater business dynamism and innovation or, more rarely, assess the impact of the competition policy on macroeconomic performance directly. This task would be very challenging, in particular, because it requires good indicators of the strength of competition policy, but it could also contribute significantly to our understanding of the channels through which competition policy affects macroeconomic performance.

68. When a lack of competition raises prices and reduces the quality of products, it causes damages to all consumers, including the poorest people. In this context, it could be interesting to analyse the distributional effects of market power. Existing evidence seems to suggest that an increase in competition is particularly beneficial for low-income people. However, the literature in this area remains in its infancy and there are a number of topics deserving further research. In particular, when analysing the macroeconomic impact of higher prices resulting from a lack of competition, one could attempt to go a step further and analyse these effects on inclusive growth.
Ex-post economic evaluation of competition policy enforcement: 
A review of the literature

Introduction

Improving the quality of regulation is at the core of the Smart Regulation agenda of the European Commission. Evaluation allows assessing whether policies have the desired effects, thereby facilitating the development of better regulations and policies. International organisations and national administrations also use policy evaluations to increase the added value of their policy interventions and achieve public policy objectives at minimum cost. The European Commission which has a long history of evaluating its spending programmes and is committed to evaluating its regulatory and policy actions has recently considered strengthening its retrospective or ex-post evaluation activities.

The last couple of years have also seen an increasing interest in the ex-post evaluation of competition policy, both by competition authorities (CAs) themselves and academic researchers. According to an OECD survey (2012b), 44 out of the 46 CAs surveyed are required by law or by statute to report on their enforcement and advocacy activities and some of them have performed ex-post assessments since 2000 and have attempted to quantify the benefits resulting from their enforcement activities.

Given this increasing interest in the evaluation of competition policy, this report looks at existing literature and experiences with ex-post economic evaluation of competition policy with a view to summarise what we have learnt so far and what areas for further research are. These are the main objectives of this paper which mainly compiles relatively recent work (from 2000) and provides detailed references of the literature used. A companion executive summary gives a helicopter view of this survey and attempts to draw the main policy conclusions from this survey.

The report covers the impact of competition policy in the area of antitrust and merger control and does not include a review of the impact of State aid control. The reason is that the effects of State aid control are different in nature than the effects of antitrust and merger control and belong to a very different area of the literature, which is still in its infancy.

This paper includes three main parts. The first part describes the existing ex-post evaluation practice, based on the experience of the CAs which are the most active in this area and on academic papers discussing the organisation and challenges associated with the ex-post evaluation of competition policy. It considers questions such as the objectives, scope and organisation of ex-post evaluation. The second and the third part have the same structure but Part II deals with the microeconomic evaluation of competition policy and Part III with macroeconomic evaluations. While the former aims to assess the impact of individual decisions or regulations on microeconomic variables, mainly on prices, the latter analyse the aggregate impact of competition policy on consumers or on the economy as a whole. Both parts start by discussing the methods currently used, then they present the main empirical results and they conclude by proposing areas for further research.
Part I: Evaluation: Definition, objectives and practice

1. Definition and scope

This first section describes the main concepts used in the rest of the paper. It starts by giving a definition of ex-post economic evaluation of competition policy. Thereafter, it presents the potential scope of ex-post evaluation activities in the area of competition policy.

1.1 Definition

The focus of this paper is on ex-post economic evaluation of competition policy. This requires (i) explaining the difference between ex-post and ex-ante evaluation; (ii) defining economic evaluation; and (iii) distinguishing the evaluation of the effects of competition policy from that of competition.

1.1.1 Difference between ex-ante and ex-post evaluation

Evaluation is the systematic identification of the effects of a specific intervention or policy. A first distinction can be made between ex-ante and ex-post evaluation (see Table I.1). According to Hüschelrath and Leheyda (2010), ex-post evaluations play a more prominent role in competition policy as they are mainly used for the assessment of the decisions taken by the competition authorities and they can therefore contribute to improve the quality of these decisions which is the main output of competition agencies.

In the Commission jargon, ex-ante evaluation is called “impact assessment” and it aims at using evidence to predict the impact of a specific EU action – legislative or non-legislative, spending programmes or other measures - and on that basis, assess whether it is justified and how it should work to achieve certain objectives. Retrospective or ex-post evaluation is defined as a critical, evidence-based judgement of whether an EU action has met the needs it aimed to satisfy and actually achieved its expected effects. It goes beyond an assessment of whether something happened or not, and looks at causality – whether the action taken by a given party altered behaviours and led to the expected changes and/or any other unintended or unexpected changes.

Table I.1 Main differences between ex-ante and ex-post evaluations

<table>
<thead>
<tr>
<th>Ex-ante evaluation or Impact Assessment</th>
<th>Ex-post evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prospective analysis</td>
<td>Retrospective analysis</td>
</tr>
<tr>
<td>Before the action is taken</td>
<td>After the action is taken</td>
</tr>
<tr>
<td>– Analyse expected effects under different scenarios</td>
<td>– Assess whether an intervention has achieved its expected effects</td>
</tr>
<tr>
<td>– Outline how to organise the monitoring of expected effects in preparation of retrospective evaluations</td>
<td>– Look at causality</td>
</tr>
<tr>
<td></td>
<td>– Analyse mechanisms explaining the effects and lessons learnt</td>
</tr>
</tbody>
</table>

The 2013 Communication of the Commission on Smart Regulation (see European Commission (2013a)) considers that there should be a continuous loop of evaluation and that impact assessments and evaluations should complement each other around the policy cycle (see Graph I.1): impact assessments rely on evaluations to identify why an intervention may not have worked as expected and whether and how it should be revised and ex-post evaluations rely on impact assessments to identify why and how an
intervention was expected to work. Therefore, the evaluation cycle starts with an ex-ante (impact) assessment of a new regulatory or policy proposal but if it is decided later to revise this policy or regulatory initiative, the proposal for revision should be backed up by a robust ex-post evaluation of the performance of the existing regulation or policy.

**Graph I.1 The policy evaluation cycle**


### 1.1.2 Direct and indirect economic effects of competition policy

This paper is about ex-post economic evaluation, i.e. it looks at the economic effects of competition policy enforcement in terms of prices, mark-ups and ultimately productivity and growth (see Graph I.2). The interventions made by the CAs are influenced by competition rules and institutions. Therefore, any analysis of the impact of competition policy enforcement should control for changes in the regulatory environment. A distinction can be made between the **direct and indirect economic effects** of competition policy actions. On the one hand, competition interventions (merger control and anti-trust decisions) have a direct impact on the conditions of competition, for example, by eliminating a cartel or by prohibiting a merger which would have reduced competition and led to an increase in prices for consumers. On the other hand, these interventions also have an indirect benefit via their **deterrent** effects. For example, imposing high fines in cartels is expected to deter other companies from entering into such illegal agreements. The deterrent effects are much more difficult to measure.

The direct and indirect economic effects of competition policy are mainly transmitted to the economy through changes in allocative, productive and dynamic efficiency\(^1\) which lead to changes in prices and costs or in the quality and variety of products offered to consumers. These changes affect the behaviour of firms, consumers, households and public authorities.

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1 Allocative efficiency occurs when the price is equal to the marginal cost of producing the product concerned. Productive efficiency occurs when a given set of products is manufactured at the lowest possible cost using existing technology. Dynamic efficiency refers to a situation where companies try to compete against each other by improving existing products and introducing new technologies. See part III, for more details.
EU competition policy also includes State aid control. The State Aid Modernisation initiative (see European Commission (2012)) aims at refocusing the Commission’s enforcement efforts on aid schemes having the biggest impact on the internal market. This initiative also encourages the Member States to conduct ex-post evaluation of their State aid schemes with a view to assess whether the original objectives of an aid measure have been fulfilled without creating significant competition and trade distortions. However, the effects of State aid control are different in nature than the effects of other instruments of competition policy and belong to a very distinctive strand of literature. Therefore, we have decided not to cover in this review paper the studies analysing the impact of State aid control.

1.1.3 Distinction between the effects of competition and those of competition policy

Finally, another relevant distinction to be made is between the evaluation of the effects of competition policy and the effects of competition. Competition policy refers here to competition legislation (in the areas of cartel and abuse of dominant positions prohibitions, and merger control) and its enforcement and it does not include other forms of competition-enhancing policies (such as reduction of “red tape” that favour the entry of new firms or ex-ante sectoral regulation). Measuring the impact of competition policy raises a number of difficulties, such as finding appropriate measures of the intensity of competition and of the strength of competition policy, establishing a causal link between competition policy and competition and disentangling the effect of competition policy interventions from other policies promoting competition, such as trade liberalisation and better regulation (see part III for a more in depth discussion of this work).

1.2 Scope

According to Kovacic (2006), competition agencies can measure the quality of their performance in two different ways. The first is to evaluate the effectiveness of the CA. This is the contribution of the agency’s outputs, such as the agency's decisions on cases or the advocacy interventions, to the attainment of the goals embodied in the jurisdiction’s competition law, such as for example, the improvement of consumer welfare in the EU competition law. A second approach to evaluation focuses on the efficiency of the operational process. In this case, the objective of the evaluation program is to assess the

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2 An efficient control of State aids should allow avoiding a waste of public resources and contribute to address market failures, such as access to finance for SMEs, financing of R&D, while minimising the distortions of competition and trade in the EU.
quality of the competition agency’s internal operations, i.e. the combination of managerial methods and organisational choices that affect the allocation of resources. This requires a cost/benefit analysis which allows comparing the benefits of the agency’s actions to its operational costs. This paper focuses on the first issue.

The main outputs of the CAs include, on the one hand, the decisions taken in the different areas of competition policy (mergers, cartels, abuse of dominance and state aid control) and on the other hand, the definition of the competition policy regulatory framework (legislation, guidelines, notice,...) in these areas. Other activities consist in market studies or sector inquiries, advocacy actions and international collaboration with other CAs. The potential matters to be evaluated can include any of these activities and the scope of the ex-post economic evaluation activities of the CA’s outputs can be very broad, ranging from microeconomic evaluation of specific policy interventions (decisions or regulations) on a well-defined market to macroeconomic assessment aimed at evaluating the broader economic impact of competition policy enforcement.

Overall, one can assess the impact of competition policy decisions and regulations at three levels (from the bottom to the top):

- **Market**: evaluation of the impact of a specific decision or competition policy rule on the functioning of a well-specified market
- **Sector**: evaluation of the impact of competition policy interventions on the performances of particular sectors.
- **Macroeconomic** impact: evaluation of the impact of competition policy interventions on welfare, growth or other macroeconomic variables.

The main differences between detailed or microeconomic ex-post evaluations of competition policy decisions at a market level and evaluations of the broader impact of competition policy at a macroeconomic level lies in two main factors (see also OECD, 2012b). First detailed ex-post evaluations always concern specific interventions or competition rules, whose effects are examined in detail, while evaluations of the broader impact concern a wide group of interventions (e.g., the customer’s benefits of all merger decisions). Second, ex-post evaluations of specific interventions or regulations assess their impact on the relevant markets in terms of microeconomic variables (such as the prices of the affected goods, mark-ups and market power of the affected companies, entries on the affected markets,...), while the evaluations of the broader impact translate the observed microeconomic effects in terms of economic performances at the level of the sector or the economy as a whole. The methodologies used, as discussed below, vary depending on the type of the evaluation exercise as some methods are better suited for some purposes than others.

Table I.2 proposes a classification of ex-post economic evaluations according to the activity of the CAs (mergers, cartels ...) and the degree of aggregation of the evaluation. It also attempts to give an overview of the extent of the evaluation activities carried out by academic researchers and CAs in the different areas. This assessment is based on our own survey of empirical work, as well as on Davies and Ormosi (2012a) which have made an analysis of the work done by CAs and academics and the 2012 OECD survey which has assessed the work done by 46 CAs (see Davies and Ormosi (2012a) and OECD (2012b)).
Table I.2  Typology of ex-post economic evaluations of competition policy

<table>
<thead>
<tr>
<th>Activities (Decisions/ regulations)</th>
<th>Impact on</th>
<th>Mergers</th>
<th>Cartels</th>
<th>Agreements and abuse of dominant positions (article 101 and 102)</th>
<th>State aids</th>
<th>Advocacy/ International cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Markets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macroeconomic impact</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= extensive evaluation activities  = some evaluation activities  = A few or none evaluation activities

The table shows that most of the existing work by both CAs and academics has concentrated on the microeconomic impact of mergers and cartels. This is consistent with the conclusions of Davies and Ormosi and the 2012 OECD survey. This survey shows that CAs tend to assess mostly merger decisions (43% of CAs surveyed) and cartel decisions (41%) and much less so abuses of dominance decisions (20%). The reasons given by many CA for not performing reviews of abuses of dominance are the methodological difficulties and the resulting lack of empirical academic work which makes it difficult to assess the assumptions regarding the price rise (see also Davies, (2012b)). But another reason is simply the scarcity of cases reaching a final prohibition decision and the difficulty to make a sound ex-post analysis of settlement decisions as the theory of harm is not clearly assessed in these decisions. Some evaluation has been done to measure the aggregate benefits of competition policy interventions (cartels and mergers) for consumers and on the effectiveness of state aids. But broadly speaking, less work or no work at all has been made in the area of state aid control, abuse of dominance, macroeconomic impact of competition policy as well as on the impact of other activities of CAs, such as sector inquiries, advocacy or international cooperation. This is also the case regarding the analysis of the impact of competition policy on the functioning of certain sectors.

2. Objectives

CAs started to be more seriously involved in ex-post economic evaluations only relatively recently. In fact, there are very few government assessments of the economic effects of their decisions and policies before 2000. As reported by Kovacic (2006), by the end of the nineties, some economists expressed a certain degree of scepticism regarding the benefits of competition policy and this could have been a catalyst for CAs to engage more in the ex-post economic evaluation of their activities. For example, Crandall and Winston (2003) argue that there is hardly any evidence that active competition enforcement provides appreciable consumer benefits, partly because the authorities are not good in identifying problems, partly because existing competition problems are difficult to remedy and partly because self-correcting market forces prevent the emergence of significant and lasting economic distortions anyway. Therefore, one reason why CAs carry out evaluation activities is to defend their legitimacy. However, the economic literature distinguishes other main reasons explaining why CAs undertake evaluations.
Box I.1: Reasons for performing ex-post evaluations by CAs since 2000: Results of the 2012 OECD survey

The 2012 OECD survey explored the reasons for performing ex-post evaluations, grouping them in three categories: evaluations for accountability which include annual reports required by law or by statute describing the enforcement and advocacy activities of the CAs (96% of the 46 CAs surveyed reported that they are doing this type of evaluations), evaluations of specific interventions and their impact on the affected markets (59%) and evaluation of the broader impact of competition policy (40%). When asked about the reasons for the obligation to prepare an annual report, a large number of the CAs just referred to the legal instrument imposing this obligation and a few consider that this reporting obligation ensures that the CAs are held accountable for their use of public funds and provides more transparency on this use of public fund. The majority of CAs undertakes ex-post evaluations of their specific decisions to review and improve their internal decisions making process. But they also use this type of evaluations to enhance their credibility and to set priorities. Finally, the evaluations of the broader impact of competition policy are used to understand more widely how effective the CAs' activities are and to increase awareness on the role of CAs in the economy.

Four main reasons are the most often quoted: (i) to improve competition policy decisions and enforcement practice; (ii) to improve the effectiveness of competition law; (iii) to set internal priorities; and (iv) to defend the legitimacy and improve the advocacy of competition policy enforcement with hard data. Other reasons invoked are to improve the transparency of policy decisions, to reduce the costs for business to deal with difficult procedures and to allow benchmarking performances with those of other competition agencies. These different reasons are described hereafter.

2.1 Improve the effectiveness of competition policy decisions and the enforcement practice of the CAs

Ex-post evaluations could contribute to improve the effectiveness enforcement practice and the quality of the decisions. Learning from past successes and detecting past errors lead to more effective enforcement. According to Kovacic (2006), enforcement decisions can be considered as experiments in which the public authorities test the efficacy of different hypotheses about business behaviour. This requires making difficult judgement amid uncertainty. Ex-post evaluations allow reducing uncertainty associated with future decisions.

These ex-post evaluations projects should thus cover specific decisions and their goal should be well defined with a specific improvement of enforcement practice in mind. For example, critical cases which have been heavily debated in-house or in the academic or consultant circles could be examined few years later to validate the options taken or the impact of a policy approach used in a number of decisions could be examined ex-post to see whether the approach needs to be revised. In this area, Court rulings also provide a type of ex-post evaluation for some decisions of the CA (see Section II.1.2.1).

2.2 Improve the quality of competition law

The quality of competition law refers to the overall design of the competition policy regime and evaluates the extent to which it contributes to the achievement of the goals embodied in the jurisdiction’s competition law. The application of competition rules is based on notices, guidelines and regulations that need to be revised periodically. Any policy reform should include an ex-post assessment of existing regulations before options for reform are considered.
The development of a more economic approach in the assessment of competition cases has contributed to the development of ex-post economic evaluations. In antitrust and merger practice, economic analysis plays a central role in resolving issues such as delineating the relevant market, assessing the efficiency consequences of various forms of business behaviour or defining appropriate remedies or settlements solving the competition concerns. Empirical economic research, including the analysis of past antitrust and merger cases, has contributed to changes in doctrine and enforcement policy. For example, the ‘merger remedies study’ by the European Commission (2005) assessed the impact on markets of 90 different merger remedies and on that basis, identified a number of risks and problems with the existing remedies policy at the time. This study provided a solid empirical ground for the revision of the mergers Remedies Notice, adopted in 2008.

2.3 Set internal priorities

An ex-post evaluation of the CAs interventions can also help to set priorities and identify activities on which to concentrate. The choice of priorities can be based on different criteria and the evaluation of past activities can help to identify the interventions that are most needed and/or are likely to have the highest impact. It can thus be used to improve the productivity of the CAs, for instance in terms of procedures and resource allocation. In this respect, it can also be used as a tool of internal quality control standard. However, Bergman (2008) and Neven and Zenger (2008) consider that ex-post evaluations of the CAs interventions are useful both for internal and external prioritisation. Regarding internal prioritisation, the ex-post evaluation can be used to shift resources between competition policy instruments (for example, from cartels to mergers). Regarding external prioritisation, the authority’s principal (which for a competition authority can be the government or, ultimately, the voters and for DG Competition, the college of Commissioners or the European parliament) could shift resources between competition policy and other policy areas.

2.4 Defend legitimacy and improve advocacy

It is important to be able to demonstrate the benefits of competition policy for a good functioning of the economy and for the welfare of citizens. This is more important in a period of economic crisis when competition policy is more heavily under pressure to demonstrate its benefits. According to Niels and Van Dijk (2008), this also becomes more crucial with the apparent increasingly proactive stance taken by CAs. These two authors also consider that further reflection is needed on the welfare standard to be used to measure the impact of the competition enforcement and that the consumer welfare argument used by CAs to justify their actions has some downsides. For example, competition policy is primarily about enhancing economic efficiency, which then usually increases consumer welfare. Therefore, it is also essential for the credibility and the legitimacy of the CA to go beyond the measurement of consumer benefits.

Typically, CAs allocate a significant proportion of their resources to advocacy activities. Such advocacy is more efficient when it is supported by sound ex-post analysis of the impact of past competition enforcement. In general, CAs estimate the customer’s benefits resulting from the detection of cartels and for the prohibition of mergers with anti-competitive effects. Empirical work has also been done on the positive effects of competition on growth and growth drivers, such as productivity and innovation. However, less analysis has been done on the impact of competition policy enforcement on macroeconomic variables, such as growth and employment, while this type of
macroeconomic analysis is done for other policies, such as internal market, labour market and innovation policies. This type of analysis would be particularly relevant for advocacy purpose.

2.5 Other reasons

Other reasons are sometimes given to justify ex-post evaluations. Kovacic (2006) considers that ex-post evaluations improve the transparency of policy decisions, which is essential to inform external observers about the content and rationale of specific decisions. In particular, the enforcement of competition laws relies significantly upon commitments. But it is difficult for those other than the parties to accurately assess the basis for or the significance of the commitment. A periodic ex-post exercise to evaluate the soundness of the decisions and to consider the effects of substantive interventions, such as commitments, would increase the transparency of policy decisions.

Another reason for conducting ex-post evaluations is that it can help to clarify the costs for agencies and for business to deal with complex competition procedures and/or to deal with parallel enforcement within (when competition authorities share competence with sectoral regulators) or across jurisdictions (when several national or regional competition bodies share competence on a specific case).

Finally, evaluation can be useful to support benchmarking and comparisons of the CA’s performances with these of other authorities. Bergman (2008) and Kovacic (2006) argue in favour of methods and reporting standards that would allow international comparison between CAs. The OECD (2013b) has recently attempted to do such a comparison using indicators of competition law and policy constructed to assess the strength and scope of competition regimes in 34 OECD and 15 non-OECD jurisdictions.

In this respect, Bergman suggests to report as much of the raw data as possible (such as the number of cases handled, the number of notified mergers, the number of phase 2 investigations or equivalently, the number of remedies imposed, the number of cartels detected and fined, the authority’s success rate in court). This type of information is currently provided in the website of DG Competition. Bergman also recommends using this type of data to make cross-country studies of efficiency, i.e. a comparison of the output produced by the CAs with their resources. However, he believes that a strong resistance vis-à-vis this type of analysis could be expected from the CAs and that different authorities may try to capture this process in order to promote definitions that would portray themselves in a favourable light.

Other economists and CAs, in general, are more reluctant vis-à-vis this type of comparison because of the difficulties to construct good aggregate indicators of the quality of competition regimes and institutions. For example, Baker (2003) consider that counting the numbers of cases handled is not satisfactory as the success of competition policy in fighting cartels and anti-competitive mergers can be seen as a failure of competition policy to deter anti-competitive actions (see also Section III.2.2 on the indicators of competition policy enforcement).
3. **Practice of ex-post evaluations**

Evaluation takes time and resources. Therefore, it is essential to organise the planning of evaluation activities.

First, it allows gathering better data. For example, decisions or regulations can be identified as candidates for ex-post evaluations at the time when they are issued. The collection of data could already start before the ex-post evaluation starts, as useful data already exist at the time an individual decision is taken or a regulation is implemented. Second, it allows getting the results of the exercise in time. For example, competition regulations have to be regularly reviewed by law. Finally, having a plan of action, such as the multiannual evaluation programme of DG Competition, allows guaranteeing a certain degree of regularly in evaluations. It is preferable to have regular evaluations well planned in advance than an isolated exercise responding to a situation of crisis, such as an accumulation of cases lost in court. Such regularity also allows increasing the available number of ex-post evaluations which can then progressively be used to derive more general conclusions. Therefore, conducting ex-post assessment only in response to a serious failure would be a very incomplete form of performance measurement. A better approach is to examine competition policy interventions on an ongoing basis and not simply in response to a failure (see Kovacic).

Three main steps can be distinguished in an ex-post evaluation project: preparation, execution and exploitation of the results (see Hüschelrath and Leheyda (2010)). At each of these steps, important questions have to be settled (see Table I.3).

<table>
<thead>
<tr>
<th>Table I.3</th>
<th>A short checklist of key issues to be tackled in an evaluation project:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Preparation</td>
</tr>
<tr>
<td>1.</td>
<td>Define the main objective of the evaluation</td>
</tr>
<tr>
<td>2.</td>
<td>Select the subject of the evaluation and define the main evaluation questions</td>
</tr>
<tr>
<td>3.</td>
<td>Select the methods to be used, consider data needs and check the project feasibility</td>
</tr>
<tr>
<td>4.</td>
<td>Choose the evaluation team</td>
</tr>
<tr>
<td>B.</td>
<td>Execution</td>
</tr>
<tr>
<td>5.</td>
<td>Collect the data</td>
</tr>
<tr>
<td>6.</td>
<td>Refine the methodology and identify the main indicators to be analysed</td>
</tr>
<tr>
<td>7.</td>
<td>Perform the analysis</td>
</tr>
<tr>
<td>C.</td>
<td>Exploitation</td>
</tr>
<tr>
<td>8.</td>
<td>Check the robustness of the methodologies and the results</td>
</tr>
<tr>
<td>9.</td>
<td>Draw synthetic conclusions useful for policy makers</td>
</tr>
<tr>
<td>10.</td>
<td>Consider disclosure and active dissemination of results</td>
</tr>
</tbody>
</table>

3.1 **Preparation of the ex-post evaluation project**

The preparation of the evaluation project should start by identifying the objective pursued and on that basis, the subject of the evaluation and the methods to be used (qualitative/quantitative) should be selected. At this stage, one has also to decide who will be doing the evaluations.
3.1.1 Define the main objective and the subject of the evaluation

The preparation of the evaluation starts by defining the main objective pursued and the evaluation to be studied. Table I.4 makes a link between the subject of evaluation activities and the objectives pursued by the CAs. While a given evaluation activity can contribute to several objectives, it is nevertheless possible to identify the objective to which it contributes the most. Moreover, according to Hüschelrath and Leheyda (2010), it is not advisable to try to achieve each possible objective in one evaluation project.

Given the trade-off between the degree of aggregation of the results and the degree of details and accuracy, the choice on the most suitable evaluation subject should be made after the decision about the main objective of the evaluation. If the main objective of the CA is to improve its enforcement, it has to work at a low level of aggregation and mainly on individual decisions and analyse reasons for success and failure. If the key motivation is to increase the effectiveness of competition law, it has to analyse whether the existing regulations achieve the desired outcome. Finally, the macroeconomic impact of the entire competition policy could contribute the best to advocacy.

Table I.4 Subject of evaluation according to the main objective pursued by the CAs

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Individual decisions</th>
<th>Regulations/policies</th>
<th>Sector functioning</th>
<th>Macroeconomic impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve enforcement</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve effectiveness of competition law</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting priorities</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legitimacy/advocacy</td>
<td></td>
<td></td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

Analysing the broad impact of competition policy or its contribution to the good functioning of a sector can also help to define priorities. However, several authors (such as Neven and Zenger (2008) and Bergman (2008)) emphasise the risks of choosing priorities only on the basis of the global effects of the interventions. For Neven and Zenger, the self-evaluation of CAs on the basis of the immediate consumer savings resulting from the detection of cartels and the prohibition of anticompetitive mergers involves a risk of over-enforcement because the authorities have incentives to strive for obtaining large figures. Bergman also considers that it can be counterproductive to fix priorities only on the basis of consumer benefits. For example, if the CA’s budget allocation is influenced by the consumer benefits, then the CA will have incentives to behave so that a large consumer benefit is measured. This may lead the CA to disregard legal violations in low-value markets where enforcement would be important because of the deterrent effects or to block too many mergers.

Table I.5 describes the ex-post evaluations currently on-going in DG Competition. While in the past, ex-post evaluations were mainly qualitative (Court judgements or public consultations), DG Competition has started to develop, mostly in cooperation with outside experts, quantitative evaluations. These quantitative evaluations concern individual decisions (ex-post evaluation of two merger decisions in telecommunications), regulations
(access to file), and policies (rescue and restructuring aids) as well as the impact of competition policy at the sector (energy study) and macroeconomic levels. The results of these quantitative evaluations will be available in 2015.

**Table I.5 Illustration: Recent and on-going ex-post evaluations in DG Competition**

<table>
<thead>
<tr>
<th>Subject of evaluations</th>
<th>Ex-post evaluations in DG Competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual decisions</td>
<td>• Ex-post evaluations by EU Courts&lt;br&gt;• Ex-post monitoring through Monitoring Trustee (for remedies)&lt;br&gt;• Targeted occasional evaluations of the effectiveness of enforcement (e.g., merger decisions in telecommunications)</td>
</tr>
<tr>
<td>Regulations/policies</td>
<td>• Mid-term reviews of existing regulations mainly done via public consultation/questionnaires sent to stakeholders&lt;br&gt;• Evaluation of Regulation 1/2003&lt;br&gt;• Evaluation of the effects of temporary State aid rules adopted in the context of the financial and economic crisis&lt;br&gt;• Evaluation of access to file rules and practices in antitrust cases&lt;br&gt;• Evaluation of the impact of R&amp;R decisions on the viability of aided undertakings&lt;br&gt;• A retrospective study on EU mergers and merger control</td>
</tr>
<tr>
<td>Sector and macroeconomic impact</td>
<td>• Yearly customer savings resulting from important cartel and merger decisions&lt;br&gt;• Study on the &quot;Economic Impact of enforcement of competition policy on the functioning of the energy sector&quot;&lt;br&gt;• Study on &quot;Simulating the effects of competition policy interventions in the EU using a macro-econometric model&quot;</td>
</tr>
</tbody>
</table>

**3.1.2 Select the methods to be used**

The preparation of the evaluation also requires the choice of the methodologies to be used to address the evaluation questions. This would allow reflecting on the data needs and checking the feasibility of the project. Data are often very costly. Therefore, a careful consideration of the cost and availability of data should be made very early in the process. The variety of methods which can be used to carry out ex-post evaluations is relatively large, including qualitative and quantitative methods as well as case studies using a combination of both. Some methods are more suited for some cases than others, depending *inter alia* on data availability and the questions investigated. It is recommended to use a combination of different approaches because it allows comparing the results obtained from different tools and this increases their robustness. Ideally, a combination of qualitative and quantitative methods would allow addressing a problem from a different angle.

Following Buccirossi et al. (2008) and Bergman (2008), who describe the various empirical methods that might be used in an ex-post evaluation of merger control decisions, and the survey made in this paper, Table I.6 lists the various methods that have been used for the ex-post evaluation of competition policy.
### Table I.6 Methodologies for the ex-post economic evaluation of competition policy

<table>
<thead>
<tr>
<th>Methods</th>
<th>Basis of analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Microeconomic evaluations</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Qualitative methods</strong></td>
<td></td>
</tr>
<tr>
<td>• Court judgements</td>
<td>Court judgements in response to appeals by parties concerned challenging the decisions made by competition authorities</td>
</tr>
<tr>
<td>• Surveys and peer reviews</td>
<td>Interviews with or questionnaires filled out by competitors, suppliers, customers, law firms and competition authorities</td>
</tr>
<tr>
<td><strong>Quantitative methods</strong></td>
<td></td>
</tr>
<tr>
<td>• Estimation and simulation of structural models</td>
<td>A fully specified demand side model</td>
</tr>
<tr>
<td>• Reduced form estimation</td>
<td>Single equation based on a clearly defined theoretical framework</td>
</tr>
<tr>
<td>• Quasi-experimental methods</td>
<td>Comparison of performance of treatment group of companies with a control group</td>
</tr>
<tr>
<td>• Event studies</td>
<td>Reactions of stock prices of competitors to a merger announcement/appeal, and of stock prices of parties concerned by the detection of a cartel or the launch/conclusion of an antitrust investigation</td>
</tr>
<tr>
<td><strong>Mixed methods</strong></td>
<td></td>
</tr>
<tr>
<td>• Case studies</td>
<td>Combination of the above elements of information concerning a specific case</td>
</tr>
<tr>
<td>• Market studies</td>
<td>Developments in a specific market following a number of competition policy interventions affecting that market</td>
</tr>
<tr>
<td>• Meta-retrospectives</td>
<td>Academic papers and publications by competition authorities on selected issues (on antitrust or merger remedies, cartel detection and fines, e.g.)</td>
</tr>
<tr>
<td><strong>Macroeconomic evaluation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Qualitative methods</strong></td>
<td>Surveys to assess the effectiveness of competition policy</td>
</tr>
<tr>
<td><strong>Quantitative methods</strong></td>
<td>Assumptions concerning expected effects on prices, markets concerned and the expected duration of such effects</td>
</tr>
<tr>
<td>• Calculation of customer savings</td>
<td>Reduced form estimations or simulations based on macro-econometric models</td>
</tr>
</tbody>
</table>

Main sources: Bergman (2008); Hüschelrath and Leheyda (2010) and own review

The different methods can be distinguished from one another by considering the basic source of information used for the analysis. Amongst the qualitative methods used for microeconomic evaluations, one can distinguish between performance measurement via court judgements in response to appeals lodged by parties concerned by competition policy decisions, on the one hand, and surveys of stakeholders and peer reviews amongst
competition authorities, on the other hand. The quantitative methods include econometric and statistical modelling techniques of various degrees of sophistication as well as event studies which track the reaction of stock prices to a decision. Other quantitative methods – including in particular the Difference-In-Differences (DiD) approach – are not based on an underlying model of the market but on a comparison of actual developments following the competition policy intervention with what would have happened in the absence of such intervention ("i.e. the counterfactual"). For macroeconomic evaluations, the methods used are mostly quantitative, including simple estimations of customer savings associated with competition policy interventions and econometric modelling techniques. However, surveys are used as well to assess the effectiveness of competition policy (see Section III.2.2.1).

3.1.3 Choose the evaluation team: using insiders, outsiders or both?

Question has been raised as to who should be doing the ex-post evaluation of competition policy (see, for example, Kovacic (2006), Niels and Van Dijk (2008), and Hüschelrath and Leheyda (2010)). In the Commission, the vast majority of evaluations are out-sourced. This aims at ensuring the independence of the evaluator. However, this independence is not necessarily given as some external evaluators might have a tendency to avoid providing bad evaluation results in order to not jeopardise future relationships as external consultants.

In the area of competition policy, the pros and cons of out-sourcing have to assessed carefully. On the one hand, external evaluators might have a higher expertise in the design and implementation of ‘state of the art’ methodologies than internal evaluators. They can also provide an expert perspective that the agency does not possess and can make the assessment more objective. On the other hand, external evaluators might have a restricted access to important data sources and be less familiar with the evaluation subject. Therefore, the formal participation of the CA directly concerned has several advantages: the competition agency is likely to be the main repository of information about the decision to prosecute and about internal discussions concerning the management of individual cases. The CAs also may have a unique capability to collect information related to the effects of enforcement programs.

The more disaggregated is the subject of the evaluation, the more difficult it is to out-source the evaluation. For example, while it would be possible to involve external evaluators into macroeconomic or sector evaluations, it would be more difficult to out-source a case-specific evaluation aiming at discussing the robustness of a decision because of the confidentiality issues. On the other hand, the case-handlers are not the best placed to have an objective opinion on the decisions they have drafted. Possible ways to reduce the trade-off between independence and effectiveness in the evaluation exercise are (i) to combine internal and external expertise and limit the level of participation by outsiders or ask them to sign nondisclosure agreements or (ii) to perform internal evaluations as a collaborative effort between case handlers and horizontal units. The steering group accompanying the evaluation process in the Commission also contribute to the objectivity of the evaluation.

\[\text{However, Kovacic (2006) considers that this difficulty issue is not insurmountable provided that external researchers sign nondisclosure agreements forbidding the publication of non-public information. This is the solution chosen in the FTC vertical restraints and abuse of dominance impact evaluations as the agency decided to seek outside researchers to perform this evaluation in order to get credibility and reliability of the results.}\]
3.2 Execution of the ex-post evaluation project

The execution of the evaluation project should start by the collection of data, which allows to refine the methodology and to define the indicators used for the evaluation. Good databases are essential for quantitative evaluations. At this stage, it is also necessary to refine the methodology, in particular by defining the indicators used for the evaluation.

3.2.1 Collect the data

Good databases are essential for the tracking and analysis of an agency’s activities over time (see, for example, Kovacic (2006)) and the availability of data is the most often quoted problem which restricts the quantitative ex-post evaluations. A sound ex-post evaluation requires data of the parties collected during the enforcement process but also pre and post enforcement data from the parties and from other market participants (affected and non-affected by the enforcement). Despite their importance, the maintenance and public disclosure of comprehensive databases on enforcement are generally not undertaken by CAs.

In this respect, it is very useful to develop databases that not only report each case initiated and the procedural and decisional history of the case but also (i) summarise the main (non-confidential) characteristics of the case in a way which would allow developing quantitative analyses and (ii) aggregate yearly statistics by type of case. For example, DG Competition has publicly available databases in relation to its decisions. However, the processing and aggregation of the information included in its published decisions remain a burdensome task for academics willing to make empirical quantitative analysis. Having more comprehensive databases would largely contribute to the development of evaluation activities inside the agencies. Giving access to such databases (including only non-confidential information) to external researchers would help to develop further evaluation activities, without compromising the provision of the confidential data essential for the conduct of investigations.

Another issue is that ex-post evaluations of individual decisions are carried out a few years after the interventions under exam have taken place and firms may no longer keep the relevant data (see OECD (2012b)). However, a lot of quantitative data are collected at the time of investigation. Therefore, it would make sense to spend some time and resources to organise these data in such a way that it can be used later for ex-post evaluations. Similarly, the monitoring of market developments after a case has been closed could benefit future ex-post evaluations.

3.2.2 Refine the methodologies and use methodologies understandable by policymakers

Different methodologies can be used and the sophistication of the tools used to carry out evaluations can vary considerably. At one extreme, simple rules of thumb are sometimes used to calculate the customer savings resulting from the detection of cartels and the prohibition of anti-competitive mergers. An effort has been recently made by the OECD (2014a) to define a set of general principles to be followed in calculating these savings (see Section III.1.1). At the other extreme, very sophisticated econometric methodologies are often used by academics, less so by the CA because of their technical difficulties and data requirements. CAs need to continuously update their knowledge to be able to use more robust techniques. However, there is a trade-off between the accuracy and robustness of the methodology and its complexity. In this respect, it is important to not
forget that evaluations are used by policy-makers and that the methodology used needs to be understandable.

The most problematic methodological issue related to the formulation of an appropriate counterfactual, i.e. the situation that would have occurred without the intervention. This issue and other methodological considerations are further developed in Parts II and III.

3.3 Exploitation of the results of the ex-post evaluation projects

The exploitation of results requires having a critical view on what has been done before drawing any conclusion. If the results are considered as sufficiently robust and not too much sensitive, their publication could be considered.

3.3.1 Check the robustness of the methodologies and the results

Evaluations are based on assumptions which are approximate and not always verifiable. Before deriving any conclusion from the evaluation exercise, it is essential to have a critical view of what has been done, in particular, regarding the key assumptions made and the methodological challenges. The sensitivity of the results to the assumptions made and their robustness need to be discussed. In particular, it is worthwhile to discuss the estimate of the counterfactual and to test the robustness of the results by considering different counterfactuals.

3.3.2 Draw policy conclusions

If the results are considered as sufficiently robust, the next step is to use the evaluation results to draw conclusions useful for policy-makers and improve the competition policy making. Several authors, including Buccirossi (2008a), Bergman (2008), Kovacic (2006) and Hüschelrath and Leheyda (2010), consider that it does not make much sense to carry out evaluations if these results are not used to improve the quality of the decision processes within the competition authority. However, other authors, including Bergman (2008), Davies (2012b) and Neven and Zenger (2008), have drawn attention to the possible misuse of evaluations. Evaluations should be used to guide and inform the agency rather than to dictate. For example, the self-evaluation of CAs on the basis of the immediate consumer savings resulting from the detection of cartels and the prohibition of anticompetitive mergers is not recommended because it gives a partial and very simplified assessment of the work of the CAs (see also Section III.1.2).

3.3.3 Consider disclosure of the results

Another important question is related to the degree of publicity given to the results of the evaluation. If the main objective is to defend the legitimacy of the CA, the results have to be widely publicised. This is not necessarily the case if the objective is to improve the quality of individual decisions.

The Commission guidelines recommend publishing the final evaluation report. However, CAs face specific problems which could plead in favour of a non-disclosure of its ex-post evaluations. For example, it might be difficult for a CA to publish the ex-post assessment of its past decisions. If a CA reports that it made a mistake in a particular case, the concerned firms may have an incentive to appeal the decision and request damages. If an appeal process is still ongoing, the CA may lose the case if it admits having made an error. However, the non-disclosure of results should not be used as an argument for not undertaking evaluations. Even if an agency is unwilling to reveal evaluation results to
outsiders, it would benefit from such evaluations by engaging an internal debate on its decisions and regulations.

One may also decide to issue public versions of the evaluations that delete references to sensitive information. Such a publication of the results of the evaluation would be beneficial for the agency in several respects: it allows an external quality control, can provide ideas for improvement by stimulating a useful public debate and it can improve the legitimacy of the institution.

4. Experience of other Competition Authorities

This section briefly compares the choice made by DG Competition for its evaluation activities with those of other CAs particularly active in this area on the basis of the framework described above. Four other CAs are considered here: the US Department of Justice (US DoJ) and the Federal Trade Commission (FTC), the UK CA (Office of Fair Trading (OFT) and Competition Commission (CC), now merged as the Competition and Market Authority (CMA), the Dutch Authority for Consumers and Markets (ACM) (see Table I.7).

Regarding the **objectives** of ex-post evaluations, the US, UK and Dutch agencies use ex-post evaluations as an internal management tool. The claimed objectives of the FTC are to inform policy and to evaluate the agency’s performance, those of the CMA are to evaluate whether it delivers its objectives and does so cost-effectively to the tax payer and the Parliament (there is a so called 10:1 target: direct benefits to consumers should at least represent ten times its costs to the taxpayer) and those of the ACM are to improve the management and legitimise the spending of the tax payers. All agencies put a lot of emphasis on the role played by ex-post evaluations to defend the legitimacy of their work and consider that the ex-post evaluations of individual decisions mainly aim at improving the internal decision making process.

The **scope** of the activities is very wide in the four agencies, ranging from the ex-post evaluations of individual decisions (mainly mergers and only a few cases of abuse of dominance in the CMA) to more macroeconomic estimates of consumer benefits. All agencies prepare a yearly detailed account of their activities, which includes both a qualitative description of their main investigations and decisions and a set of quantitative indicators that measure their level of activity. While all agencies estimate the yearly consumer benefits resulting from their merger and cartel decisions, only the CMA and the ACM have put more emphasis on the broader impact of their interventions. These two agencies do this type of analysis mainly to help increase the awareness on the role of the CAs in the economy. The former OFT and the CC regularly conducted ex-post evaluations of the impact of its market studies⁴, which are studies analysing the possible causes of malfunctioning in a given market or sector and whether the malfunctioning can be remedied.

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⁴ For example, in 2012, the OFT evaluated the impact of the 2004 PFT study into doorstep selling and in 2011, it evaluated the impact of the 2005 OFT study into care homes for older people.
Table I.7  Comparison of the ex-post evaluation activities in different CAs

<table>
<thead>
<tr>
<th>Competition Authorities</th>
<th>EU (DG Competition)</th>
<th>US (DoJ + FTC)</th>
<th>UK (FTC and CC/CMA)</th>
<th>NL (ACM)</th>
</tr>
</thead>
</table>
| **Objectives**          | 1. Improve enforcement  
                           2. Improve effectiveness of competition law  
                           3. Legitimacy and advocacy | 1. Inform policy  
                           2. Evaluate the agency’s performance (efficiency and legitimacy)  
                           3. Improve internal decision making process | 1. Internal management (to set priorities)  
                           2. Evaluate the agency’s performances (efficiency and legitimacy)  
                           3. Improve internal decision making process | 1. Internal management  
                           2. Legitimacy  
                           3. Improve internal decision making process |
| **Scope**               | 1. Annual report on enforcement and advocacy activities  
                           2. Individual merger decisions  
                           3. Mid-reviews of existing regulations | 1. Annual report on enforcement and advocacy activities  
                           2. Individual merger decisions | 1. Annual report on enforcement and advocacy activities  
                           2. Individual competition policy interventions (mainly mergers, but also a few abuse of dominance decisions…)  
                           3. Ex-post evaluation of the impact of the market studies  
                           4. Yearly estimates of consumer benefits resulting from cartel and merger decisions (OFT= required, CC= voluntarily)  
                           5. Impact of their activities on quality and product innovations  
                           7. Impact of advocacy activities | 1. Annual report on enforcement and advocacy activities  
                           2. Individual merger decisions | 1. Annual report on enforcement and advocacy activities  
                           2. Individual merger decisions |
| **Methods**             | Qualitative methods (public consultation, surveys of competitors and customers) court appeals)  
                           Quantitative methods (simulations, event studies, customer savings) | Mainly quantitative methods (merger simulations, reduced form estimation, DID, customer savings) | Qualitative methods (survey of competitors, interviews)  
                           Quantitative methods merger simulations, reduced form estimations, DID, customer savings, case studies) | Mainly quantitative methods (micro simulations, customer savings, macro simulations) |
| **Organisation: In-house/ Outsourced** | In-house (-) and outsourced (+) | In-house (+) and outsourced (-) | In-house (=) and outsourced (=) (OFT)  
                           Outsourced (CC) | In-house (=) and outsourced (=) |
| **Disclosure of results** | Decided on a case-by case basis | Widely disclosed | Widely disclosed | Widely disclosed |
| **Dedicated website**   | In preparation | No | Yes | No |
The OFT (2011) has also attempted to measure the impact of competition interventions on various factors contributing to economic growth, such as natural resources, capital, innovation and management and the ACM has used model simulations to measure the macro-economy impact of competition policy on growth and employment (see van Sinderen and Kemp (2008)). The OFT and the ACM have also tried to measure the size of the deterrent multiplier of their competition enforcement activities on the basis of surveys (see OFT (2007) and Baarsma et al. (2012)). However, they have not used the figures obtained in the global assessment of their interventions. Finally, the new UK competition authority, the Competition and Markets Authority (CMA), has decided to pursue the evaluation activities of the OFT and the CC and in its 2014/15 Annual Plan, it defines its approach to evaluation as consisting in the three following strands: (i) estimating the impact of each project as it completes, (ii) evaluating projects to identify the costs and benefits, and lessons learned; and (iii) exploring further how best to assess the CMA’s wider impact on economic growth including through deterrence or improving the prospects for exit, entry and innovation in markets (see CMA (2014)).

Various methods are used by competition agencies for the evaluation of competition law enforcement. In general, CAs combine qualitative and quantitative methods. The OECD (2012a) considers that, amongst the quantitative methods used to analyse the ex-post impact of specific interventions and regulations, simulations and simple DiD are frequently used by CAs. The UK competition agencies regularly conduct retrospective merger reviews and use to that end a combination of questionnaires and interviews with the interested parties and related firms and simulations and DiD techniques. The FTC and the ACM also apply a DiD approach to analyse the post-merger increase in prices and on that basis, determine whether they were right to clear the mergers. The FTC has used this DiD approach to analyse the impact of mergers in the oil refinery and hospital sectors and the ACM in the hospital sector. Until now, DG Competition has not carried out many ex-post evaluations of individual decisions and has rather outsourced them. The only ex-post evaluation study of DG Competition which is reported in the 2012 OECD survey is about the outsourced ex-post review of merger decisions carried out in 2006 (see Buccirossi et al. (2006)). This study combines various quantitative techniques (simulations, DiD, event studies) with a survey amongst main competitors and customers. However, DG Competition has also launched public consultations with a strong ex-post perspective (mainly to evaluate regulations and guidelines in the context of the State Aid Modernisation exercise) and has recently done in-house ex-post evaluations (for example, on regulation 1/2003 and on the effects of temporary State aids rules adopted in the context of the financial and economic crisis). Recently, DG Competition started to develop the use of quantitative methods for ex-post evaluations, with the assistance of its Chief Economist Team and external experts (see Table I.5).

Regarding the organisation of the evaluation activities, there are many common features of the various agencies. All use a combination of in-house and outsourced studies but the agencies with the longer experience do relatively more in-house work. For example, DG Competition has until now outsourced its ex-post evaluation studies but the new evaluation projects recently launched include more work done in-house. By contrast, the OFT has a long experience of in-house evaluation studies but the quality of this work is checked by an

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5 DG Competition is starting to evaluate the impact of two merger decisions in the telecommunication markets.
academic. All agencies give a certain degree of publicity to their evaluation activities; However, the OFT is the only authority having so far a dedicated website devoted to the evaluation reports. In the other institutions, the evaluation reports are grouped with other studies and economic analyses carried out by the agencies. Amongst the four CAs, the European Commission and the CMA seem to be the only ones having a multi-annual evaluation plan. The CMA has the obligation to carry out the evaluation of two cases per year and the other institutions also have the obligation to perform regular evaluations.
Part II: Microeconomic impact of competition policy

This part describes the empirical work investigating the microeconomic impact of competition policy, including ex-post economic evaluations of individual competition policy enforcement decisions as well as the regulatory framework in the areas of merger control and antitrust policy (including cartels). Section II.1 describes the methodologies most commonly used to conduct such evaluations while Section II.2 describes the results and conclusions of the empirical work undertaken on the basis of these various methodologies.

1. Methodologies

This section describes the different methodologies that have been most commonly used to conduct ex-post economic microeconomic evaluations of competition policy enforcement activities. Sub-section II.1.1 gives a short overview of the different methods used, making a distinction between qualitative and quantitative methods. Sub-section II.1.2 focuses on the main qualitative methods, including court judgements, surveys and peer reviews, while Sub-section II.1.3 describes the main quantitative methods, including event studies, structural estimation, reduced form estimation, simple model simulations, and quasi-experimental methods. Sub-section II.1.4 considers how the different methods may be combined to arrive at a more balanced assessment of competition policy interventions. Sub-section II.1.5 summarises the pros and cons of the different evaluation methods, while the concluding Sub-section II.1.6 reviews some of the challenges facing the evaluator – no matter what evaluation method is used – including how to define the counterfactual, how to deal with selection bias and how to assess the deterrent effects of competition policy interventions.

1.1 Overview of qualitative and quantitative methods

Most ex-post microeconomic evaluation methods are based on a comparison of actual developments following the competition policy intervention with what would have happened in the absence of such intervention ("i.e. the counterfactual"). Such comparison allows assessing the progress made towards the relevant competition policy objective as a result of the policy intervention. The broad objective of EU merger control and antitrust enforcement is to improve consumer welfare.

Both qualitative and quantitative methods may be used for the ex-post microeconomic evaluation of competition policy, often in combination. The use of multiple evaluation methods to assess a given policy (so-called ‘triangulation’) increases the robustness of the evaluation. Following Bergman (2008), quantitative methods are defined as methods that result in a numerical estimate of progress made towards the relevant competition policy objective. Qualitative methods, on the contrary, do not result in a numerical estimate. In practice though, case studies and meta-retrospective studies often use a combination of qualitative and quantitative methods to arrive at a more comprehensive and robust assessment of the policy intervention being evaluated.

Amongst the qualitative methods, one can distinguish court judgements in response to appeals lodged by parties concerned by competition policy decisions, surveys of stakeholders and peer reviews amongst competition authorities. Evaluations using such qualitative methods are often focused on determining whether the expectations at the time of the competition policy intervention have proven to be true, while evaluations using
quantitative methods tend to aim higher and establish a causal relationship between the policy intervention and the progress made towards the relevant competition policy objective.

The quantitative methods discussed below include event studies, model estimations and simulations and quasi-experimental methods. Model estimations range from the estimation of a fully specified ‘structural’ oligopoly model to the estimation of simple simulation model. Other quantitative methods – including in particular the quasi-experimental methods which compare the performance of companies subject to a competition policy decision (the ‘treatment’ group) to similar companies that were not subjected to such a decision (the ‘control’ group) – are not based on an underlying model of the market.

1.2 Qualitative methods

1.2.1 Court judgements

Amongst the various evaluation methods, court judgements are most engrained in the system. In most countries competition policy decisions can and often are appealed in court by the parties concerned. While court judgements in response to such appeals mostly address legal issues, increasingly courts view it as their obligation to evaluate the economic arguments underlying the decisions of the competition authorities as well. Whether or not a decision is upheld in court may therefore be considered as a first indication of the quality of the decision taken. Similarly, if the court upholds a high percentage of decisions taken by competition authorities in certain domains, the conclusion may be drawn that the underlying policy guidelines and regulations are functioning.

1.2.2 Surveys and peer reviews

For the ex-ante assessment of a merger proposal or alleged anticompetitive behaviour, competition authorities often rely on interviews with or questionnaires filled out by competitors, suppliers and customers. An ex-post evaluation whether the merger or antitrust decision taken was the appropriate one, could equally rely on such information. More generally, competition guidelines and regulations are often evaluated by surveying parties having to abide by such rules and regulations. The range of respondents to surveys aimed at assessing the quality of competition policy enforcement may be widened beyond the parties directly concerned by case decisions or competition rules. Lawyers and consultants advising the parties directly concerned or other competition authorities (by way of a peer review) may be better able to pass judgement on the enforcement measures taken.

By their nature, surveys and peer reviews are subjective measures of the effects of competition policy enforcement activities and they may be manipulated by respondents for strategic purposes. Survey respondents may have strategic considerations when answering the questions addressed to them. This is the reason why ideally surveys and peer reviews should be complemented by quantitative assessment measures or the judgement of independent experts (as is done by the Global Competition Review, e.g., see part III.2.2).

1.3 Quantitative methods

While the information gathered using qualitative methods can indeed be very useful, ideally it should be supplemented by quantitative evidence, for example on the price effects of merger decisions (see Ashenfelter et al. (2009)). The theoretical basis underlying quantitative assessments of competition policy interventions varies from fully specified
oligopoly models to simpler reduced-form estimation. This sub-section shortly considers the pros and cons of estimating these various types of quantitative methods.

1.3.1 Event studies

Event studies (and other financial-analysis based methods) may be considered a somewhat more objective tool to evaluate the effects of a merger, cartel or antitrust decision. Event studies track the reactions of stock prices of competitors to the parties directly affected by the decision. If a decision is procompetitive and results in a price reduction, one may expect that the future returns of competitors will be negatively affected by the decision. On the other hand, if the decision is anticompetitive, future profits may rise. Stock prices of competitors may therefore be used to assess the competitive effects of decisions taken (and may in some sense be a superior measure of competition than market prices themselves).

As the required financial market data from competitors are not always available (for example, if such competitors are not quoted on the stock market), the stock prices of the parties directly concerned by the decision may be used as an alternative source of information. However, in this case it is even more difficult to distinguish the competition effects from the other effects of the decision, such as its negative effect on the image of the companies involved.

The main advantage of event studies is that they deliver an almost immediate, theory-based assessment of the competitive effects of the decision taken. Moreover, a positive (if weak) correlation between ex ante stock market returns and ex post measures of profitability has been found empirically\(^6\), which, to some extent, supports the use of stock prices as a measure of competitive strength.

In spite of such benefits, the event study approach offers only a very imprecise means of evaluating the correctness of any given decision. At most, it can provide an indication of the correctness of the decision. As the event study approach does not lead to a numerical estimate of the decision’s effect, it should be considered as a qualitative method for the evaluation of competition policy enforcement decisions.

1.3.2 Estimation and simulation of structural models including a fully specified demand side

Structural models used for ex-post economic evaluation of competition policy interventions often assume that firms compete in price with differentiated products (Bertrand competition). Such models invariably include a fully specified demand side. However, the more sophisticated models contain a supply side model derived from oligopoly theory as well. This has the advantage that the changes in mark-ups may be calculated in addition to price changes. However, the estimation of the relevant parameters for such models is more demanding in terms of data and computationally heavier (CET (2010)).

Econometric estimations of the demand side can be grouped into two broad categories\(^7\): discrete choice (logit) models and Almost Ideal Demand Systems (AIDS, introduced by

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\(^6\) Duso et al. (2010) use a sample of large horizontal concentrations during the period 1990-2002 involving 459 firms either as merging firms or competitors, and contrast a measure of the mergers’ profitability based on event studies with one based on balance sheet profit data.

\(^7\) Epstein and Rubinfeld (2001) offer a relatively nontechnical description of the principles of merger simulation using structural models.
Discrete choice models assume that the consumer’s choice depends on price and product characteristics. The nested logit structure allows taking account of the fact that some products are more similar than others, and hence are more likely to be substitutes than others. In AIDS models, the demand function is derived from the expenditure minimisation problem of the consumer in which consumers purchase quantities of products so as to minimise the total cost of achieving a given level of utility. Contrary to discrete choice models, no structure is imposed on the specification of the demand function. Consequently, AIDS models are more flexible but also more demanding in terms of the number of parameters to be estimated.

Simplified versions of both types of models have been developed for practical use, principally when data availability is insufficient for the estimation of a fully specified demand side. The Antitrust Logit Model (ALM, proposed by Werden and Froeb, 1994) and the Proportionally Calibrated AIDS model (PCAIDS, developed by Epstein and Rubinfeld, 2001) are simple representations of competitive interaction of firms, allowing a systematic prediction of the price effects of even a large set of mergers. By assuming that the competitive interaction works through prices only and by imposing a particular structure on product substitution following a price increase, these models are able to simulate the effects of competition policy interventions with minimal data requirements. However, in innovative and advertising-intensive industries these assumptions are unlikely to be valid, which may result in biased estimates if ignored (Tenn et al. (2010)).

The principal advantage of structural estimation methods is the theory-based definition of the counterfactual. Once the parameters of the structural model have been estimated, simulations can be used to determine what the market outcome would have looked like if the competition authority had not intervened. However, the simulations tend to be quite sensitive to the modelling assumptions (with respect to the functional form of the demand curve, e.g.), which implies that they can only be applied in relatively straightforward cases. Moreover, data requirements are relatively heavy. Even a simplified structural estimation method such as PCAIDS requires data on market shares and price elasticities.

Structural estimation and simulation methods are most commonly applied to assess the effects on price levels of individual mergers or cartel cases where price data is readily available. The OFT has used the ALM in all but one of its simulations, the exception being a homogeneous goods market where a Cournot model was used (see Davies (2010)). DG Competition has applied a simple version of PCAIDS in its ex-ante merger evaluations.

While estimation and simulation of structural models may indeed offer theoretically attractive results when assessing individual cases – provided the necessary data are available – it is not suited for a systematic assessment of merger or cartel decisions.

1.3.3 Reduced form estimation (including cross-sectional and panel data analyses)

If insufficient data are available to conduct structural model estimations, the estimation of the reduced form offers an alternative tool to assess the impact of competition policy interventions. However, the need to have multiple observations implies that reduced form estimations are most often used to assess the effects of competition policy interventions at the macroeconomic or sector level (see Part III). Buccirossi et al. (2013), for example, investigates the causal link between competition policy, competition and productive efficiency, as competition is the channel through which policy affects efficiency and growth.
1.3.4 Quasi-experimental methods (including Difference-in-Differences)

Quasi-experimental methods are based on the comparison of developments in markets that have or have not been affected by one or more competition policy interventions. The approach has been inspired by methods commonly used in the pharmaceutical sector, which compare the health of patients in the treatment group with a control group of patients. In the area of competition policy, an evaluation of the impact of a merger decision, for example, would be based on the comparison of price developments in markets affected and non-affected by the decision. As affected and non-affected markets would need to have statistically similar characteristics, the focus of analysis often is on borderline cases (i.e. mergers that were almost blocked by the competition authorities), which are more likely to deliver meaningful results (see also Ashenfelter and Hosken (2010)). Alternatively, Gugler and Szücs (2013) use propensity-score matching techniques to construct control groups for the ex-post assessment of the impact of mergers.

Amongst the different quasi-experimental methods, the Difference-in-Differences (DiD) method is most commonly used for measuring the impact on the price level, e.g., of a competition policy enforcement decision. DiD is based on a comparison of developments over time between the treatment group and the control group. The improvement in performance of the control group (A-D) is subtracted from the improvement in performance of the treatment group (B-C) to arrive at the estimated impact of the competition policy enforcement measure ((B-C) - (A-D)).

Graph II.1 Difference-in-Differences method

Alternatively, the DiD approach may be based on a comparison of developments before and after a change in competition policy rules. Davies and Ormosi (2014a), for example, compare harm during periods when cartels were legal with harm during periods when cartels were illegal. Using this alternative approach implicitly assumes that the counterfactual is equivalent to the status quo, an assumption that needs to be verified using other methods, if possible.

The main advantage of quasi-experimental methods over the other quantitative methods is that the counterfactual does not depend on possibly restrictive and difficult to test assumptions underlying theoretical model. The value of an assessment of competition policy interventions using quasi-experimental methods stands or falls with the degree of comparability of market developments in the treatment case with the control case (i.e. its counterfactual). The choice of the counterfactual is of the essence (see Section II.1.6.1 below).
1.4. Mixed methods

1.4.1 Case studies

As the different methods described above all have their advantages and disadvantages, a comprehensive assessment of a competition policy enforcement decisions using more than one method may be attractive. Budzinski (2011) comes to the same conclusion based on a comparative analysis of methods for the empirical ex-post evaluation of merger control decisions. Even though the exercise may become more costly, the results will be more robust. Deloitte (2007), for example, reviewed a number of merger decisions by the UK competition authorities based on the one hand on a survey of market participants and on the other hand on a simple model simulation. Aguzzoni et al. (2011) also apply mixed ex-post economic evaluation techniques, including simulations, event studies and surveys, to evaluated specific merger decisions.

1.4.2 Market studies

Most market studies (including the sector inquiries carried out by DG COMP) are ex ante in nature and aim to identify weaknesses in terms of market functioning and spot infringements against competition policy rules. Alternatively, market studies may be used to track developments in a specific market following a number of competition policy interventions in that market. However, this market-based approach to ex post evaluation has only been rarely used until recently.

1.4.3 Meta-retrospectives

A meta-analysis of retrospective studies investigating a particular question may offer additional insights that individual studies are unable to offer. By contrasting and combining results from different studies, meta-retrospectives allow distinguishing issues on which there is a broad consensus in the literature from areas where there remain discrepancies between the results obtained. Kwoka (2013), for example, synthesizes all available literature on the effects of individual mergers investigated by the US Federal Trade Commission and Department of Justice.

1.5 A summary of the pros and cons of the different methods

The various ex-post economic evaluation methods described above each have their strengths and weaknesses (see Table II.1). Broadly speaking, qualitative methods can deliver relatively rapidly, but are more subjective and imprecise. Quantitative methods require greater data availability and are more dependent on the assumptions underlying the model used. Case studies, market studies and meta-retrospective studies, which use a combination of various qualitative and quantitative methods, build on the relative strengths of these individual methods to arrive at more robust comprehensive conclusions.

A look at the strengths and weaknesses of each individual method reveals that dependent on the evaluator's requirements different evaluation methods may be selected. Court judgements offer an initial indication of the 'correctness' of the decision taken. Surveys and peer reviews teach about the 'perception' amongst the parties most concerned whether the decision taken was the appropriate one. Event studies can provide an almost immediate indication whether the decision taken has procompetitive effects in the eyes of financial market players. In each case, the qualitative method applied reflects the views of an important set of actors.
Table II.1  Pros and cons of different methods for ex-post economic evaluation

<table>
<thead>
<tr>
<th>Methods</th>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>Qualitative methods</td>
<td></td>
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<tr>
<td>• Court judgements</td>
<td>• Offer initial indication of quality of decisions taken</td>
<td>• Address mostly legal issues</td>
</tr>
<tr>
<td>• Surveys and peer reviews</td>
<td>• Valuable if complemented by more objective assessment</td>
<td>• Subjective measure</td>
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<tr>
<td>Quantitative methods</td>
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<tr>
<td>• Event studies</td>
<td>• Offers almost immediate, but imprecise assessment</td>
<td>• Required financial market data may not be available</td>
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<tr>
<td></td>
<td></td>
<td>• Difficult to distinguish competition effects of decision from other effects</td>
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<tr>
<td>• Estimation and simulation of structural models</td>
<td>• Theory-based assessment</td>
<td>• Requires detailed price data</td>
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<td></td>
<td></td>
<td>• Sensitive to modelling assumptions</td>
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<tr>
<td>• Reduced form estimation</td>
<td>• Allows assessment at the macroeconomic or sector level</td>
<td>• Isolating effects of competition policy interventions may be difficult</td>
</tr>
<tr>
<td>• Quasi-experimental methods</td>
<td>• Less sensitive to theoretical modelling assumptions</td>
<td>• Highly dependent on choice of counterfactual</td>
</tr>
<tr>
<td>Mixed methods</td>
<td>• Triangulation increases robustness of evaluation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provides more comprehensive assessment</td>
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</tbody>
</table>

The outcome of evaluations using different quantitative methods does not reflect the views of different actors, but rather the different assumptions used to construct the model to be estimated. The different models described vary according to the extent that they are based on market theory. Structural models are very much theory based but as a result are very sensitive to the assumptions underlying the theoretical model. Reduced form estimations are often only loosely based on theory, allowing greater flexibility in terms of estimation but making it more difficult to establish the causal link between policy intervention and outcome. Without an underlying theory a statistically significant correlation between the policy and outcome variables may reflect that these variables have a common cause without there being a causal relationship between them. Alternatively, the correlation might be purely coincidental. Quasi-experimental methods, including in particular the DiD method often used in competition policy evaluations, do not reflect economic theory but are purely data-driven. Nevertheless, making the right choice of the counterfactual requires expert knowledge about the market being investigated.
1.6. Key methodological issues

1.6.1 Counterfactual

The definition of the counterfactual is a key issue for all types of evaluations. For example, when evaluating individual cases, the counterfactual describes what would have happened in the absence of the decision (or if a different decision had been taken) by the competition authority, while, at a more macro level, it concerns what would have happened in the absence of the policy being evaluated.

At first sight, the definition of the counterfactual in merger case evaluations appears relatively straightforward, at least in comparison with antitrust interventions where multiple alternative options exist. Nevertheless, Neven and Zenger (2008) consider that the formulation of an appropriate counterfactual is one of the most problematic methodological issues in the ex-post evaluation of mergers. The problem is that in reality we do not and cannot observe the counterfactual for parties affected by the merger decision (including parties directly involved, their competitors and their customers). It is therefore essential to conduct sensitivity analyses on the choice of the counterfactual when evaluating merger and antitrust decision.

The get around the fact that the counterfactual is unobservable, impact evaluations seek to compare the actual outcomes for parties affected by the competition policy enforcement decision (the ‘treatment’ group) with outcomes for non-affected parties which are as similar as possible to the affected parties (the ‘control’ group). The challenge for counterfactual impact evaluations is two-fold: first, to identify suitable parties in both the treatment group and the control group; and second, to obtain the relevant data. While data on the affected parties may already have been gathered during the case investigation, data gathering for non-affected parties, which may have no interest whatsoever in the evaluation exercise, likely to be much more difficult.

The methods commonly used to define the counterfactual vary according to the level of aggregation: fully specified oligopoly models and DiD studies are more suitable for the evaluation of individual cases, while reduced form estimations and event studies are particularly suited for analyses of the impact of a change in policy regulations and guidelines.

1.6.2 Selection bias

The parties in the treatment and control groups may have different characteristics leading to a selection bias, which may affect the outcome of the evaluation exercise. Such selection bias occurs because the performance of the control group is used to determine the counterfactual performance of the treatment group. In order to limit such selection bias as much as possible, the evaluation literature suggests a number of statistical methods to select the parties in the treatment and control groups (see Box II.1).
**Box II.1: Counterfactual impact evaluation methods**

Within the counterfactual impact evaluation literature a basic distinction is made between experimental and quasi-experimental evaluation designs (European Commission, DG EMPL (2013d)).

Under the experimental approach parties would be randomly assigned to either the treatment or the control group, in order to ensure that the groups are statistically equivalent (except for the fact that one is affected by the competition policy enforcement decision while the other is not). However, it would appear to be politically unacceptable to randomly select the parties being subjected to a competition policy enforcement decision. Consequently, the experimental approach would seem to be of little use in practice.

As an alternative, a number of quasi-experimental methods have been developed which seek to mimic randomisation:

a) propensity score matching, which matches parties affected by the enforcement decisions with non-affected parties sharing similar observable characteristics;
b) the DiD approach, which is based on the assumption that changes in performance of affected and non-affected parties would the same in the absence of the policy intervention;
c) the regression discontinuity approach, which focuses on the difference in performance between affected and non-affected parties close to the borderline;
d) instrumental variable techniques, which require the identification of an instrument that influences parties’ performance only through its relation with the enforcement decision.

Amongst these methods, the DiD approach has been most often used for the evaluation of competition policy enforcement decisions. The other methods have been used only rarely, with the exception of instrumental variable techniques used to correct endogeneity problem in the empirical work on the macroeconomic impact of competition policy...

Even if carefully selected, the parties in the treatment and control groups are not necessarily representative of the total population of undertakings falling under competition rules. The sector distribution of parties affected by competition policy decisions is likely to be different from sector weights defined on the basis of economic variables such as gross value added or employment.

In the area of cartels, there is the additional complication that the samples used for the evaluation of anti-cartel enforcement policies are exclusively drawn from detected cases (i.e. the treatment group) because no information is available about deterred or undetected cases. The problem is that the detected cases are unlikely to be representative of the total population of cases (including detected, undetected and deterred cases). Consequently, often used indicators of the effectiveness of anti-cartel policy enforcement, such as the number of detected cartel cases, are very difficult to interpret. A small number can suggest a successful deterrent policy or alternatively a poor cartel enforcement policy (see discussion on deterrent effects below).

The unavoidable exclusion of deterred and undetected cartel cases from the data sample can lead to an incorrect assessment of cartel enforcement policies. Ormosi (2014) proposes a method to estimate the total anticompetitive harm in cartels in a way that accounts for such selection bias. The method treats observed cartel cases as draws of ‘population harm’ and provides a parametric form for estimating total harm.
1.6.3 Deterrent effects

The goals of competition policy enforcement are to protect (consumer) welfare by punishing past infringements of competition rules ("desistence") and to discourage future anticompetitive behaviour ("deterrence"), thereby maintaining a level playing field in product markets to the benefit of the end consumer. This duality between desistence and deterrence becomes clear for example when a competition authority imposes a punishment for a cartel infringement. The deterrent effect of such action depends on the impact of such action on the perceived likelihood to get caught and on the expected fines. For a punishment to be effective in deterring anticompetitive behaviour it needs to be transparent (about fine-setting rules, e.g.) and be imposed on the undertakings that committed the infringements.

The deterrent effects of a competition policy intervention are difficult to measure because they are not felt immediately and cannot be measured directly. Bergman (2008) considers that even high-quality well-resourced ex-post evaluations have been unable to measure deterrence accurately (Bergman 2008). Audretsch (1983) estimates that an average merger case brought by US competition authorities deters between 11 and 16 other mergers. Somewhat smaller figures related to different competition policy instruments were reported by Deloitte (2007). Nevertheless, there appears to be a consensus in the literature that the deterrent effects of competition policy enforcement are considerable.

In the area of cartels, the detection and punishment of cartels is expected to deter new cartel formation as well as to reduce the overcharge and stability of undetected cartels. The deterrent effect is defined as the sum of the harm avoided by deterring cartel formation and the reduction of harm in the form of lower overcharges and shorter duration for undetected cartels. Methods used to measure the deterrent effects include surveys, calculation of overcharges and effects of enforcement on the observable population of cartels to make inference on how this might affect the whole population of cartels (including the number of undetected cartels). The validity of this approach depends on the robustness of the established link between the number of detected cartels and the whole population of cartels. For example, Ormosi (2014) uses methods similar to those applied to make inferences about wildlife population characteristics in ecology to determine whether an observed change in the number of detected cartels is caused by a change in the detection rate or by a change in the rate of deterrence. On fines, most researchers consider that EU antitrust fines are insufficient for cartel deterrence. By contrast, the conclusions of the literature on the introduction of a leniency programme are not convergent (see next section).

The literature on the deterrent effects of mergers is much more limited than that of cartels. In the area of mergers, the deterrent effect is defined as the extent to which companies modify or abandon their merger plans in order to take out anticompetitive elements. However, this is very difficult to measure as this implies observing the number of mergers deterred by the merger control regime and assessing whether the deterred mergers would have had anticompetitive effects. On the one hand, a strict application of merger control rules – which in isolation might seem detrimental to welfare because it may prevent fully taking into account the procompetitive effects of mergers under investigation – may in fact be welfare enhancing because it deters future anticompetitive mergers (see Nocke and Whinston 2011 and Sørgard 2009 and 2014)). On the other hand, one needs to consider the costs associated with deterrence. For example, companies may decide not to
go ahead with a procompetitive merger if merger control rules are applied too strictly. In the end, an appropriate balance needs to be found. Therefore, an assumption made in the literature is that the notified mergers are anti-competitive and a reduction in the number of notified merger is an indication of a positive deterrent effect of the merger control, which a strong assumption. There is also less consensus on results regarding the type of actions (phase I remedies or phase II remedies) having the greatest deterrent effects.

2. **Microeconomic impact of competition policy**

2.1 **Merger control**

2.1.1 **Microeconomic analysis of merger decisions**

Most of the existing work on the microeconomic evaluation of competition policy enforcement has concentrated on merger control. Various quantitative and mixed methods have been used to analyse the impact of merger decisions. This section illustrates the use of the different methods described in Part II as a merger control evaluation tool. It also highlights some of the main conclusions drawn from such analyses as well as some of the methodological drawbacks that appear when applying the various methods in practice.

A subset of mergers and acquisitions are approved by competition authorities subject to remedies. Such remedies can be either behavioural or structural in nature. Structural remedies are aimed at preserving competition by requiring the merged firm to divest certain assets to a new or existing competitor. Behavioural remedies affect the future behaviour of the merged firm. In the case of structural remedies in particular, it is very difficult to distinguish the effects of the merger from that of the associated remedies, especially if such remedies are implemented at the same time as the completion of the merger. While it would be more straightforward to make a joint assessment of the mergers of the associated remedies, some studies focus on the analysis of the effectiveness of merger remedies as such.

Within the literature offering ex-post evaluations of merger decisions a large share of published papers concerns decisions by the U.S. FTC and DoJ. In the current overview, however, we have decided to focus our attention on the more recent evaluations of decisions by European Competition Authorities, while also making reference to important papers referring to US decisions.

(i) **Surveys and peer reviews**

The European Commission (2005) *Merger Remedies* Study used structured interviews of relevant individuals in the companies concerned to identify: (1) serious issues arising in the design and implementation of remedies; (2) the effectiveness of the Commission’s merger remedies policy; and (3) areas for further improvement of the Commission’s merger remedies policy and practice. The survey covered 40 decisions including 96 different remedies. Whilst the focus of the Study was primarily the detailed examination of the design and implementation of merger remedies, it also provided a first indication of the effectiveness of different remedies in preserving effective competition. It appears that 94% of the divested businesses were still alive three to five years after divestiture and therefore

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8 See Duso (2012) for a discussion of recent developments in the literature on ex-post evaluations of merger decisions.

9 See e.g. European Commission (2005) and Tenn and Yun (2011).
exercising some degree of competitive constraint on the merged entity. However, the effectiveness of remedies giving access to infrastructure or technology was relatively weak.

**Lear** – Laboratorio di economia, antitrust, regolamentazione (2006) carried out an evaluation for the European Commission of the Pirelli/BICC merger decision, which concerned Pirelli’s acquisition in the year 2000 of six manufacturing plants in the power cable industry. Lear uses a survey of market players to confirm that the merger had no negative effects either in terms of higher **prices** or in terms of a worsening of other **purchasing conditions**. In spite of the support of the European Commission, Lear was unable to achieve a satisfactory response rate in its survey. Therefore it decided to use the event study methodology as an alternative tool for the assessment of the merger decision (see below). More generally, the use of multiple methods to assess a single merger decisions is to be commended as it allows triangulating the result of the different assessments, thereby leading to a sounder conclusion.

**Event studies**

From a competition policy perspective the initial focus of analysis is on the impact of a merger on **prices and customer welfare** more generally. However, a number of studies, including the above mentioned Lear-study, have also investigated the impact of a merger on the **profitability of the main rivals** of the merging entity. Standard oligopoly models\(^{10}\) suggest that for the merged entity it is optimal – absent substantial efficiency gains – to reduce production levels. Consequently, in the new equilibrium rival producers should be able to sell a larger quantity of their products at a higher price, thereby increasing their profitability.

In spite of this theoretical argument, stock prices of rival producers of power cables did not go up on average following the Pirelli/BICC merger decision, whereas stock prices of customers did, which may seem counterintuitive as from a theoretical perspective an increased concentration of supply should lead to higher prices and a reduction of customer surplus. One explanation may be that only half of the firms possibly affected by the merger were listed on the stock exchange, raising questions about a possible selection bias. In any event, it is difficult to draw more general conclusions from the investigation of a single decision.

**Clougherty and Duso** (2009) use a dataset that includes 165 large, horizontal mergers having been investigated by the European Commission over the period 1990-2002. Contrary to Lear, Clougherty and Duso find that on average rival producers tend to experience an abnormal increase in stock prices at the merger announcement date, which would seem to imply that a majority of mergers have anticompetitive effects. The authors also find that the stock reaction of rival producers is not sensitive to the merger notification’s position (i.e. during the pre-crest or post crest period) on the merger wave. Merger waves are identified by subtracting the time trend from the total number of mergers notified at any point in time. The observed increase in the stock price of rival producers therefore reflects the impact of the merger and not the greater likelihood that they themselves will become takeover targets.

\(^{10}\) See e.g. Farrell and Shapiro (1990).
Estimation and simulation of structural models

Werden and Froeb (1994) were amongst the first to use a structural model to predict the price and the welfare effects of mergers in industries with differentiated products (so-called ‘Bertrand mergers’). These effects are explored both analytically and through simulations of hypothetical mergers of U.S. long distance phone carriers. According to the different merger simulations carried out, only mergers involving AT&T – the dominant long distance phone carrier at the time – lead to a significant reduction in welfare.

Since then, a variety of different structural models have been used as the basis for simulation analysis. On the demand side, a distinction can be made between discrete choice (logit) models and Almost Ideal Demand Systems (AIDS), which make different assumptions about the decision-making behaviour of consumers. Whereas discrete choice models explicitly specify the underlying consumer utility function from which the demand relationship is derived, in AIDS models the relationship between quantities and prices is represented by a parametric functional form (see Section II.1.3.2 for a more detailed discussion of these various models). The demand model parameters can either be calibrated to fit real life observations (as done by in the above mentioned paper by Werden and Froeb or the paper by Epstein and Rubinfeld below) or be estimated econometrically if data permit (as done in the more recent papers below).

Data limitations used to make the estimation of a fully specified demand model unfeasible. Consequently, calibration models making additional assumptions about the nature of demand and requiring less data were often used. Epstein and Rubinfeld (2001), for example, present a simplified AIDS model that may be calibrated using information on aggregate market shares, the industry price elasticity and the own-price elasticity for a single brand in the relevant market only. This model is based on the assumption that the market share lost as a result of a price increase is allocated to competitors in the relevant market in proportion to their respective shares. Using this assumption the authors are able to show that market shares can be used to assess the level of competition in a given market. They illustrate their point by examining the 1995 acquisition of the toilet paper producer Scott by Kimberly-Clark as well as the proposed acquisition by Heinz of Beech-Nut's baby food assets which was terminated in 2001. The studies illustrated that price increases are higher if the products of the merging firms are closer substitutes.

More recently, data availability has improved thereby permitting the estimation of cross-elasticities. Ivaldi and Verboven (2005), for example, assess the Volvo/Scania merger using a nested logit model to estimate the relationship between the list prices of a base model and total sales for the model range of heavy trucks. The consequences of the merger are simulated using an oligopoly model with differentiated products. The model is solved analytically not only under the merger and the non-merger scenario, but also under an alternative-merger scenario. The authors emphasise that the relevant point of comparison when assessing a merger is not the status quo, but rather an alternative merger scenario that would have been most likely in the event that the merger was rejected.

As often done in the literature, Ivaldi and Verboven initially assume that the merger does not entail any efficiencies, which necessarily implies an increase in prices and reductions of customer surplus. However, in an extension of their analysis, they consider the possibility that the merger entails a reduction in marginal costs. Such cost savings may (partially) be passed on to customers. Considering a hypothetical marginal cost saving of 5% (which
corresponds to the maximum efficiency claim that the European Commission considered to be plausible), point estimates show increases in customer surplus in four European countries and declines in customer surplus in twelve European countries. Only in a minority of countries the efficiency gains associated with the proposed merger offset the negative demand-side effects. However, in none of these four countries did the merger lead to market dominance according to the European Commission’s decision.

In his research on US airline industry, Peters (2006) uses demand model simulations to forecast post-merger price developments following five airline mergers in the 1980s and compares these price forecasts with observed post-merger prices. He finds that the post-merger price change depends not only on the change in market structure resulting from the merger, but also on changes in marginal costs and firm conduct, which are harder to capture using demand side models. While standard merger simulation methods predict a large share of the post-merger price change, they should not be expected to account for all of it. By incorporating post-merger information into the model, he is able to measure the relative importance of supply-side factors that may have contributed to the observed price changes during this period of US airline industry consolidation. The paper concludes that supply-side effects, including in particular increases in marginal costs associated with post-merger inefficiencies and collusive conduct amongst remaining market participants, were a non-negligible factor explaining the observed post-merger price increases.

Similar to Peters, Björnerstedt and Verboven (2013) compare the predictions from a merger simulation study with the actual effects of a merger. The paper looks at the effect of the merger between AstraZenecaTica (AZT) and GlaxoSmithKline (GSK) on the Swedish market for painkillers. Both the merger simulation study, which was initiated during the case investigation, and the actual price developments showed a sharp increase in prices charged by the merged entity. However, the simulation underestimated the price increases by rival producers, and therefore overestimated the decline in market share by the merged entity.

Romahn and Friberg (2014) focus their analysis on the divestitures required by the Swedish competition authorities in the 2001 takeover of the Swedish Pripps brewery by the Danish brewer Calsberg. To understand the role of divestitures they compare the merger as cleared with several counterfactual simulations in which the identity of the firm controlling the divestitures following the merger changes. Under the scenario in which the merger is cleared without divestitures prices rise substantially. However, the divestitures imposed reduce the average price increase by roughly 50 percent.

(iv) Reduced form estimation

Ashenfelter et al. (2013) estimates the price effects of the acquisition of Maytag by Whirlpool, which are appliance producers active on the US market. The paper finds that the merger led to a 7% price increase for Whirlpool dryers relative to other manufacturers’ dryers. However, Whirlpool’s clothes washer prices appear to have decreased relative to prices of rival clothes washers. The authors attribute these different results to the change in technology in the US washer market. Consumers are switching from traditional top-loading washing machines, where Maytag and Whirlpool were most successful, to more expensive but more efficient front-loading machines. In spite of this change in technology, the variety of washing machines sold by the merged entity dropped. Also, the need for the merging parties to catch up with the competition prevented them from raising the prices of their clothes washers. Nevertheless, the market share of the merged entity fell significantly
for both washers and dryers following the merger as foreign competitors such as Samsung and LG entered the market.

**Ashenfelter and Hosken** (2008) make an ex-post assessment of the price effects of five consumer product merger decisions\(^\text{11}\) considered to be amongst the most problematic in the US between 1997 and 1999 because the mergers concerned posed a significant risk of anticompetitive harm without there being sufficient cause for the competition authorities to block or substantially modify the transaction. In doing so, the authors aim to provide an upper bound on the size of the type II errors associated with merger clearance decisions. In four of the five mergers investigated, prices increased by a small but significant amount, typically between 3% and 7%, while the fifth merger (between Aurora Foods and Kraft) had little effect on prices for maple flavoured breakfast syrup.

Rather than focusing on the effects of a single merger, some of the academic literature has cast a wider net and looked into the impact of waves of mergers within a given industry. This offers the added advantage that broader conclusions can be drawn. **Focarelli and Panetta** (2003), for example, examines the pricing effects of the wave of consolidation in the Italian banking sector during the 1990s, highlighting the interplay between market power effects and efficiency gains at various time horizons. Using a database that includes detailed information on the deposit rates of individual banks in local markets for different categories of depositors, the paper looks into the long-run price effects of mergers. Even though the increased market concentration leads to higher prices, these changes are temporary and in the longer run, efficiency gains due to cost cutting appear to outweigh the negative effects of an increased market power of banks.

**Montoriol-Garriga** (2008) examines the effects of bank mergers on the average loan interest rates charged to small and medium-sized companies by Spanish banks. She finds that mergers are harmful to small businesses because of a possible disruption of lending relationships. On the positive side, banks reduce loan interest rates for borrowers that continue the lending relationship with the consolidated bank, particularly if there is a market overlap between the acquirer and the target. However, the decline in interest rates is much smaller if there is a significant increase in local banking concentration, which appears to reduce the extent to which efficiency gains are passed on to borrowers.

**Tenn and Yun** (2011) study Johnson & Johnson’s 2006 acquisition of Pfizer’s consumer health division, which was approved by the US Federal Trade Commission subject to the condition that six brands were divested. The paper assesses the impact of these divestitures on sales and prices using both a reduced form estimation and a Difference-in-Differences (DiD) estimator that measures the post-divestiture change relative to a control group of other brands in the same product category. The results show price declines for every divested brand post-divestiture. However, the post-divestiture performance in terms of sales is not statistically different from the pre-divestiture performance for three brands, while changes in sales of the remaining brands do not appear to be divestiture related. This suggests that the competitive pressure exerted by the divested brands was

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\(^{11}\) Procter and Gamble’s purchase of Tambrands (feminine hygiene products), Aurora Foods (Mrs. Butterworth) purchase of Kraft’s Log Cabin breakfast syrup business, Pennzoil’s purchase of Quaker State motor oil, General Mill’s purchase of the branded cereal business of Ralcorp, and the merger of the distilled spirits businesses of Guinness and Grand Metropolitan.
broadly maintained following their divestitures. However, as there is substantial heterogeneity across the control groups, the statistical power of the DiD test is rather low.

(v) Quasi-experimental methods

Two papers by Aguzzoni et al. (2013a and 2013b) perform a Difference-in-Differences (DiD) analysis in order to assess price developments post-merger in the UK retail markets for video games and books, respectively.

In the video games retail market, there was a reduction in prices following the approval of the merger by the UK Competition Commission in 2008. The price reduction was stronger for the merging parties, which is indicative of the existence of efficiency gains associated with the merger. There is anecdotal evidence that these gains can be associated with the merging parties’ ability to obtain better terms and conditions from suppliers of video games.

In the retail market for books, the merger between Waterstone’s and Ottakar’s, which was cleared by the Competition Commission in 2006, did not result in an increase in average prices either at the national or at the local level. This is somewhat surprising at the local level where one would expect fewer retailers to be active and competitive pressures to be less severe. However, the authors observed that Ottakar’s – the perceived premium chain – significantly decreased prices and Waterstone’s significantly increased prices in localities where they were both present.

Allain et al. (2013) use the DiD method to assess the impact of the merger between two French grocery stores at the local level. They find that prices went up in local markets where the merger did modify the ownership structure relative to local markets where the markets did not affect the ownership structure. Moreover, the merger had a significant positive impact on prices charged by rival producers. They find no evidence of efficiency gains.

Gugler and Szücs (2013) provide a quantitative assessment of the impact of a merger on rival producers in an oligopolistic market. Using a combination of matching and DiD methods, they are able to distinguish: (i) the positive externality due to the reduction in the number of competitors, which benefits rival producers (the market power effect); and (ii) the negative externality due to the optimal reallocation of the merging entity’s productive assets which increases the competitive pressure on rival producers (the efficiency effect). The authors use a dataset of 241 mergers having been investigated by the European Commission over the period 1990-2007. Due to data requirements, the sample is narrowed down to 130 acquirers and their rivals. Gugler and Szücs find that on average, the market power effects outweigh the efficiency effects. This result is consistent with the standard oligopoly outcome, under which rivals expand their output and increase their profits. Sales and profits of the merging parties, on the other hand, do not increase during the period immediately following the merger.

(vi) Overview

Table II.2 provides an overview of the methods used, markets covered and conclusions drawn from the microeconomic analysis of individual merger decisions. While qualitative studies (including surveys, interviews and event studies) appear on this list, it appears that a large majority of recent studies use quantitative methods (including in particular merger simulations, reduced form estimations and the DiD method). Product markets being subjected to ex-post merger reviews vary greatly. They include goods and services markets
as well as intermediate and final products. Product characteristics do not appear to act as a constraint of ex-post merger evaluations. The main challenge for researchers is to assemble the data required for the quantitative analysis.

In terms of results, there is no consensus that mergers are harmful to customers. While a large majority of studies conclude that mergers contribute to higher prices, some studies find no such effect. In the Italian and Spanish banking sector, for example, consolidation appears to have improved conditions for both lenders and borrowers. While in this sector, the efficiency gains from mergers appear to be relatively important, the extent to which such gains are passed on to customers depends on the degree of concentration in the market.

Table II.2  Evaluation of merger decisions by competition authorities

<table>
<thead>
<tr>
<th>Study</th>
<th>Method(s) used</th>
<th>Merger decision / Principal Market</th>
<th>Competition Authority / Date</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lear (2006)</td>
<td>Survey / Event study</td>
<td>Pirelli – BICC / Power cables</td>
<td>EC / 2000</td>
<td>No negative effects in terms of prices or purchasing conditions; stock prices of rival producers did not go up</td>
</tr>
<tr>
<td>European Commission (2005)</td>
<td>Interviews</td>
<td>40 mergers &amp; 96 remedies</td>
<td>EC / 1996-2000</td>
<td>In a large majority of cases divested businesses exercise some degree of competitive constraint on the merged entity. However, remedies giving competitors access to infrastructure or technology are relatively weak.</td>
</tr>
<tr>
<td>Clougherty and Duso (2009)</td>
<td>Event study</td>
<td>165 larger horizontal mergers</td>
<td>EC / 1990-2002</td>
<td>On average, stock prices of rival producers increase when the mergers are announced, implying that they have anticompetitive effects</td>
</tr>
<tr>
<td>Ivaldi and Verboven (2005)</td>
<td>Merger simulation</td>
<td>Volvo – Scania / trucks</td>
<td>EC / 2000</td>
<td>Only in a minority of countries the efficiency gains associated with the proposed merger offset the negative demand-side effects</td>
</tr>
<tr>
<td>Peters (2006)</td>
<td>Merger simulation</td>
<td>Five airline mergers</td>
<td>U.S. DoJ / 1980s</td>
<td>Increases in marginal costs associated with post-merger inefficiencies and firm collusive conduct help explain the observed post-merger price increases</td>
</tr>
<tr>
<td>Björnerstedt and Verboven (2013)</td>
<td>Merger simulation</td>
<td>AZT – GSK / painkillers</td>
<td>NCA Sweden / 2009</td>
<td>Merger simulation foresaw increase in prices by merging parties but underestimated the price increases by rival producers</td>
</tr>
<tr>
<td>Romahn and Friberg (2014)</td>
<td>Merger simulation &amp; DiD</td>
<td>Carlsberg – Pripps / beer</td>
<td>NCA Sweden / 2001</td>
<td>Divestitures play an important role in dampening price increases following the merger</td>
</tr>
<tr>
<td>Study</td>
<td>Method</td>
<td>Industry/Region</td>
<td>Merging Entities</td>
<td>Year(s)</td>
</tr>
<tr>
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<tr>
<td>Ashenfelter et al. (2013)</td>
<td>Reduced form estimation</td>
<td>Whirlpool – Maytag / household appliances</td>
<td>U.S. DoJ / 2006</td>
<td>Product variety and market share of the merged entity fell significantly following the merger</td>
</tr>
<tr>
<td>Ashenfelter and Hosken (2008)</td>
<td>Reduced form estimation</td>
<td>Five mergers / consumer products</td>
<td>U.S. FTC and DoJ / 1997-1999</td>
<td>Price increases associated with anticompetitive but nevertheless cleared mergers (type II error) may reach 7%</td>
</tr>
<tr>
<td>Focarelli and Panetta (2003)</td>
<td>Reduced form estimation</td>
<td>Consolidation Italian banking sector / bank deposits</td>
<td>1990s</td>
<td>In the longer run, efficiency gains associated with market consolidation outweigh the negative effects of increased market power</td>
</tr>
<tr>
<td>Montoriol-Garriga (2008)</td>
<td>Reduced form estimation</td>
<td>Consolidation Spanish banking sector / bank lending</td>
<td>1996-2005</td>
<td>Degree of local banking concentration negatively affects the extent to which efficiency gains are passed on to borrowers</td>
</tr>
<tr>
<td>Tenn and Yun (2011)</td>
<td>Reduced form estimation &amp; DiD</td>
<td>J&amp;J – Pfizer’s consumer health division / divestiture of 6 brands</td>
<td>U.S. FTC / 2006</td>
<td>Divested brands broadly maintained their pre-transaction level of performance</td>
</tr>
<tr>
<td>Aguzzoni et al. (2013a)</td>
<td>DiD</td>
<td>Game – Gamestation / videogame retailing</td>
<td>U.K. CC / 2008</td>
<td>Price reduction of merged entity may be associated with increased bargaining power upstream</td>
</tr>
<tr>
<td>Aguzzoni et al. (2013b)</td>
<td>DiD</td>
<td>Waterstone’s – Ottakar’s / book retailing</td>
<td>U.K. CC / 2006</td>
<td>Merger had little effect on average price levels, but authors observed price convergence within the merged entity</td>
</tr>
<tr>
<td>Allain et al. (2013)</td>
<td>DiD</td>
<td>Food retailing</td>
<td>NCA France and EC / 2000</td>
<td>Assessment of the impact of a merger at the local level</td>
</tr>
<tr>
<td>Gugler and Szücs (2013)</td>
<td>Matching &amp; DiD</td>
<td>241 mergers</td>
<td>EC / 1990-2007</td>
<td>Mergers allow rival producers to expand their output and increase their profits</td>
</tr>
</tbody>
</table>

2.1.2 Evaluation of the impact of merger regulations and policies

(i) Surveys and peer reviews

Inspired by Audretsch (1983), surveys of competition lawyers have been used in a number of studies commissioned by competition authorities to evaluate the deterrent effect of their merger decisions. However, only rough estimates can be made as the results are largely based on the “gut-feeling” of the lawyers and companies being interviewed. The Twynstra Gudde (2005) study asked competition lawyers in the Netherlands about their follow-up of 475 merger proposals in the period 2000–2003. Around 6% of such proposals were abandoned due to concerns about possible infringements of competition rules, while another 12% were modified. A more recent study carried out for the Dutch CA by SEO (2011) reports that 5% of notified mergers are modified prior to notification and that 13% are deterred in anticipation of a possible intervention by the Dutch CA. Similarly, a survey conducted by London Economics (2011) estimates that 18% of mergers over which the UK competition authority could take jurisdiction are abandoned and 15% are modified.
According to UK competition lawyers four out five harmful mergers in the UK are deterred as a result of competition policy enforcement (see Deloitte (2007) and Gordon and Squires (2008)). Many 2-to-1 market consolidations are never even considered, because the authorities would certainly be opposed. Moreover, a survey of companies also conducted by Deloitte suggests that a merger is more likely to be abandoned or modified if there has been a recent inquiry by the U.K. Competition Commission in the sector.

On this basis, Davies and Ormosi (2012a) come to the conclusion “that the beneficial deterrent effects of competition enforcement are likely to be considerable, probably far outweighing the measurable benefits of the actual caseloads of CAs” (p. 795).

(ii) Event studies

Duso, Neven and Röller (2007) assess the correctness of Commission decisions based on a sample of 167 mergers reviewed by the European Commission between 1990 and 2002. The authors distinguish between procompetitive and anticompetitive mergers on the basis of the reaction of stock market prices of competitors to the merging firms. From this, they identify four instances in which the Commission prohibited mergers that the stock market regarded as procompetitive (strong type I errors), as well as a larger number of instances in which the EU failed to prevent mergers that were regarded as anticompetitive (type II errors). Based on an investigation of the determinants of such errors, they conclude that the Commission’s decisions are not sensitive to firms’ interest, i.e. the claim that ‘the Commission listens too much to competitors, at the expense of consumer interests’ is not supported by the data. Instead, Commission decisions appear to be affected by factors such as market definition or the length of the investigation. For example, the probability of approval of an anticompetitive merger in Phase I is some 75% higher than in Phase II.

Serdarević and Teplý (2009) update the Duso et al. (2007) study to the 1990-2008 period. Their results largely confirm the results of the earlier study. In addition, they come to the conclusion that the 2004 reform of the merger control regime has significantly reduced the probability of type II errors (i.e. anti-competitive deals being cleared).

Duso, Gugler and Szücs (2013) also attempt to evaluate the impact of the change in European merger legislation in 2004. They conclude that the ‘more economic approach’ of the 2004 Merger Regulation resulted in an increased ex-ante predictability of decisions and a reduction of the frequency of weak type I errors (i.e. imposition of remedies on pro-competitive deals). Yet, they consider that the policy shift towards the increased use of remedies does not seem to be well-grounded, as remedies are not as effective as prohibitions in deterring anti-competitive mergers.

Carletti et al. (2012) analyse the effects of legislative changes affecting the institutional design of merger policy in the EU and 18 individual countries (including 4 non-EU countries) during the pre-reform period 1987-2004. The results show that strengthening merger control leads to a decrease of the stock prices of non-financial firms and an increase of stock prices of banks. The former result is in line with the hypothesis that merger control should challenge anticompetitive mergers and thus limit future monopolistic profits, while the latter outcome suggests that merger control reinforces “checks and balances” in the banking sector.

Duso, Gugler and Yurtoglu (2011) focus on the effectiveness of European merger control during the period 1990-2002. They consider merger prohibitions and remedies to be
effective if 'abnormal' increases in stock prices observed around the merger announcement date are reversed by the merger decision. Their results show that (1) merger prohibitions negate the increases in stock prices of both the merging parties and their rivals, which were generated when the merger was initially announced; (2) the imposition of remedies achieves only a partial reversion of stock prices; and (3) a merger clearance decision raises stock prices of competitors (in line with microeconomic theory) but not of the merging parties themselves. The authors conclude from this that: (1) prohibitions are an effective means of merger control; (2) remedies are only partially effective; (3) some mergers with anticompetitive effects are cleared outright.

Diepold et al. (2008) analyse around 50 mergers and acquisitions involving Australian companies from 1996-2003. Their findings show a significant impact of the announcement of these mergers on the stock prices of the targeted firms. Subsequent challenges of the mergers by the Australian competition authority had a more limited impact, which the authors attribute to the "younger enforcement environment" during the 1996-2003 sample period. However, an investigation of abnormal returns of rival firms shows the Australian competition authority to be effective in controlling domestic mergers, but to have little impact on cross-border mergers.

(iii) Meta-retrospectives

An ex-post evaluation of an individual merger decision (or a single merger retrospective if one wants to use the U.S. terminology) does not allow making an assessment of the overall effectiveness and impact of merger policy. However, a review of a large number of merger retrospectives may nevertheless some valuable insights. A meta-study is a statistical analysis in which results from different studies are combined in order to identify sources of convergence or divergence among the results of such studies. Aggregated together in a meta-study, individual merger retrospectives offer an alternative way to assess the effectiveness and impact of a merger control regime.

The large number of existing retrospectives of US mergers has allowed researchers to conduct such meta-studies. Kwoka (2013) summarises the outcomes of ex-post assessment of 46 US mergers, around one half of which involved remedies. His findings show:

- An average price change of positive 7.3 percent. 38 out of the 46 mergers investigated result in a price increase;
- Studied mergers in the airline and hospital industries overwhelmingly result in price increases, while petroleum industry mergers less often result in price changes;
- The 23 mergers with recorded outcomes included 8 clearance decisions, 10 remedy impositions and 5 prohibitions;
- Clearance decisions resulted in an average price increase of 7.4 percent; behavioural remedies in a price increase of 16.0; divestitures in a price increase of 7.7% and prohibitions in a price increase of 1.9%.

Kwoka concludes from this that a very large fraction of mergers approved by the US competition authorities led to price increases, even when remedies were imposed. Nevertheless, on average, the US competition authorities 'make the correct decisions as to whether to act against mergers, clearing those without anticompetitive effect significantly more often than those resulting in price increases. The remedies imposed by US
competition authorities are not an adequate tool for preserving competition. This is true in particular for behavioural remedies. More complex interventions appear to be ineffective as well because of the difficulty to check their implementation.

Ashenfelter et al. (2014) focuses on the price effects of horizontal mergers as well. Their meta-study covers 49 merger retrospectives in 21 industries published over the last 30 years. The airline, banking, hospital and petroleum industries are most frequently covered by these retrospectives. A large majority of the retrospectives analyse U.S. mergers but the meta-study also includes other merger retrospectives worldwide. Most retrospectives use a case-study approach and aim to identify the price effects of a borderline merger case relative to some control product. A smaller number of retrospectives attempt to measure the average price effect of many mergers using a common methodology. The authors stress that the mergers studied do not constitute a representative sample of all potentially anticompetitive mergers (which by the way is true for all meta-retrospective studies). Of the 49 retrospectives surveyed, 36 find evidence of merger induced price increases. The paper notes that due to data limitations the literature focuses almost exclusively on measuring the short-run effect of mergers on prices.

The meta-study by Coate (2014) looks at a 19 merger retrospectives of decisions taken by the U.S. FTC. His main concern is the selection bias of meta-retrospectives, which might explain the relatively high average post-merger price increases observed. As merger retrospectives tend to focus on borderline merger decisions, some of these mergers are likely to be anticompetitive given the uncertainty of the merger review process. In his analysis, Coate therefore tries to control for the likelihood that the merger was anticompetitive by using the probability of a merger challenge as an instrument. He argues that when adjusting for sample selection bias current FTC policy is efficient, as there is a broad compatibility between challenge probabilities and retrospective results. However, more work appears to be necessary to address the issues raised in this paper.

(iv) Overview

Table II.3 provides an overview of the methods used, coverage and main findings from studies aimed at evaluating the impact of merger regulations and policies. Three types of study methods can be distinguished: (i) interviews and surveys; (ii) event studies; and (iii) meta-retrospectives.

The studies using interviews and surveys are focussed on the deterrent effects of merger control. However, it appears to be difficult to obtain a precise indication of the order of magnitude of such deterrent effects.

The outcomes of the event studies show a greater convergence. The European Commission is not easily swayed by arguments of rival firms that it should intervene, unless the interests of consumers are at stake. Also, there appears to be a consensus that the 2004 merger reform has reduced the probability of anti-competitive deals being cleared. However, the increased use of remedies at the expense of merger prohibitions threatens to reduce the deterrent effects of EU merger control. The inadequateness of especially behavioural remedies is confirmed by recent meta-retrospective studies done in the US.

The meta-retrospective studies also confirm that on average marginal merger decisions result in an increase in prices. At first sight, this would seem to argue for a stricter enforcement by competition authorities. However, as pointed out by Coate (2014) this
might simply be a reflection of the selection bias in choosing merger cases for ex-post evaluation.

Table II.3  Evaluation of the impact of merger policies and regulations

<table>
<thead>
<tr>
<th>Study</th>
<th>Method(s) used</th>
<th>Coverage / date</th>
<th>Merger regulation or policy</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twynstra Gudde (2005)</td>
<td>Interviews</td>
<td>475 merger proposals / 2000 - 2003</td>
<td>Dutch merger control</td>
<td>Dutch merger control leads to 6% of merger proposals being abandoned and 12% being modified.</td>
</tr>
<tr>
<td>Duso et al. (2007)</td>
<td>Event study</td>
<td>167 mergers/ 1990 - 2002</td>
<td>EU merger control</td>
<td>European Commission decisions are not sensitive to firms’ interests at the expense of consumers.</td>
</tr>
<tr>
<td>Duso et al. (2013)</td>
<td>Event study</td>
<td>368 mergers/ 1990 - 2007</td>
<td>EU merger control</td>
<td>The increased focus on remedies following the 2004 reform cannot replace straight prohibitions.</td>
</tr>
<tr>
<td>Carletti et al. (2013)</td>
<td>Event study</td>
<td>133 banks &amp; 1700+ firms /1987 - 2004</td>
<td>Merger control in the EU and 18 countries</td>
<td>Strengthening merger control leads to a reduction of stock prices of non-financial firms but an increase in bank stock prices.</td>
</tr>
<tr>
<td>Duso et al. (2011)</td>
<td>Event study</td>
<td>151 mergers/ 1990 -2000</td>
<td>EU merger control</td>
<td>Prohibitions are an effective means of merger control while remedies are only partially effective.</td>
</tr>
<tr>
<td>Diepold et al. (2008)</td>
<td>Event study</td>
<td>50 mergers / 1996 - 2003</td>
<td>Australian merger control</td>
<td>The Australian competition authority appears to be effective in controlling domestic mergers, but its impact on cross-border merger is limited.</td>
</tr>
<tr>
<td>Coate (2014)</td>
<td>Meta-retrospective</td>
<td>19 studies / 1984 - 2013</td>
<td>U.S. merger control (FTC)</td>
<td>Merger retrospectives tend to focus on marginal merger decisions, which leads to a selection bias.</td>
</tr>
</tbody>
</table>
2.2. Cartel and antitrust policy

In antitrust, academic research has focused on the evaluation of the effects of cartel prohibitions (under Article 101 TFEU) and the levels of fines imposed. Work on the effectiveness of other antitrust policy enforcement measures (under Articles 101 and 102 TFEU) has been much more limited. This section first reviews the literature on antitrust enforcement before moving on to describe the state of play regarding the evaluation of cartel policy enforcement more specifically.

Impact evaluations tend to focus on only the observed part of the total effect of cartel and antitrust policy enforcement, because undetected infringements of antitrust rules (including cartels) and the deterrent effects of enforcement are difficult to measure. Nevertheless, the academic literature has made an effort to come up with estimates of (changes in) the rate of detection and the size of deterrent effects.

2.2.1 Evaluation of the effectiveness of antitrust policy enforcement

There is a lot of scepticism amongst academics regarding the evaluation of commercial agreements cases (under Article 101 TFEU) – with the exception of cartel cases – and abuse of dominance decisions (under Article 102 TFEU) because of the complexity of the analytical framework and the lack of data. The number of studies aimed at evaluating the effectiveness of antitrust policy enforcement regimes is therefore very limited.

(i) Descriptive analysis

One way to overcome these analytical challenges is to exploit the fact that U.S. firms were able to operate largely without fear of antitrust laws before the enactment of the Sherman Act in 1890 and in the 1930s when the Act was suspended. Baker (2003) exploits this ‘natural’ experiment by describing the behaviour of U.S. firms during these periods and by reviewing the economic literature on the subject. He concludes that the benefits of an effective antitrust enforcement are likely to be well above government spending on such enforcement.

(ii) Event studies

Gunster and van Dijk (2011) aim to assess the effects of EU antitrust investigations (including but not limited to cartel cases) on a company’s reputation. They find that a dawn raid results in a negative stock price shock of almost five percent, a final decision in a two percent reduction in the stock price and a successful appeal in a positive response of up to four percent. The three quarters of the total reduction in the companies’ market value, which cannot be accounted for by fines and legal costs, is attributed by the authors to reputational damage resulting from the enforcement action.

Aguzzoni et al. (2013c) also use event study techniques to estimate the impact of procedural steps in the pursuit of antitrust policy infringements on companies’ share prices. While surprise inspections and infringement decisions by the European Commission decisions appear to have a significant negative effect on share prices, the effects of judgements by the EU Courts are non-significant. Fines account for less than ten percent of the loss in companies’ market value, from which the authors infer that most of the losses are due to the cessation of illegal activities.

(iii) Surveys and peer reviews

London Economics (2011) uses a more direct method to assess the effectiveness of antitrust enforcement actions. Based on a survey of more than 800 companies as well as a
small number of law firms, it reports that for each abuse of dominance case, 12 potential infringements are deterred; for each cartel case, 28 potential infringements are deterred and for each commercial agreements case, 40 potential infringements are deterred. The study finds businesses comply with competition rules for fear of reputational damage and criminal sanctions associated with non-compliance, followed closely by the possible financial penalties. However, businesses also argue that the lack of knowledge of competition law is a key driver of non-compliance. A study conducted by SEO (2011) for the Dutch CA finds that for every cartel detected, 5 undetected cases of collusive behaviour are modified or deterred.

(iv) Overview

Even though the number of studies surveyed is very small, they all point to the conclusion that antitrust enforcement actions have real consequences for the firms involved, going well beyond the direct effects of fines and legal costs (see Table II.4). As a result, the deterrent effects of such actions appear to be substantial.

Table II.4 Evaluation of the impact of antitrust policies and regulations

<table>
<thead>
<tr>
<th>Study</th>
<th>Method(s) used</th>
<th>Coverage / date</th>
<th>Antitrust policy</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker (2003)</td>
<td>Descriptive analysis</td>
<td>Enactment of Sherman Act / 1890</td>
<td>U.S. antitrust policy</td>
<td>The benefits of an effective antitrust enforcement are substantial</td>
</tr>
<tr>
<td>Gunster and van Dijk (2011)</td>
<td>Event study</td>
<td>118 antitrust cases / 1974 - 2004</td>
<td>EU antitrust policy</td>
<td>Three quarters of the total reduction in the companies’ market value following a dawn raid or antitrust decision cannot be accounted for by fines and legal costs</td>
</tr>
<tr>
<td>Aguzzoni et al. (2013c)</td>
<td>Event study</td>
<td>91 antitrust cases / 1979 - 2009</td>
<td>EU antitrust policy</td>
<td>Surprise inspections and infringement decisions have a significant negative effect on share prices</td>
</tr>
<tr>
<td>London Economics (2011)</td>
<td>Interviews &amp; surveys</td>
<td>3304 merger proposals / 2003 - 2011</td>
<td>U.K. antitrust policy (OFT)</td>
<td>For each abuse of dominance case, 12 potential infringements are deterred and for each commercial agreements case, 40 potential infringements are deterred.</td>
</tr>
</tbody>
</table>

2.2.2 Evaluation of the effectiveness of cartel policy enforcement

Most quantitative assessments of impact of cartel enforcement decisions start out with an estimation\(^{12}\) of the magnitude of the overcharges (i.e. the difference between the collusive price and its competitive counterfactual) resulting from the cartel. Cartel prohibitions are expected to eliminate such overcharges. In addition, they act as a deterrent to companies contemplating their involvement in current and future cartels.

Deterrent effects are often captured by a multiplicative factor applied to the total amount of overcharges by prohibited cartels (i.e. the product of the magnitude of the cartel overcharge, the duration of the cartel prevention and the size of the market). However, the profit maximising theory of the firm would seem to indicate that deterrence depends on the

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\(^{12}\) The European Commission (2013b) offers a practical guide on how to estimate overcharges.
rate of cartel detection and the level of fines imposed on the detected cartels. Also, in deciding whether to join a cartel a firm may also consider the indirect consequences of being caught, on its public image, e.g. (see Gunster and van Dijk (2011)). In this respect it may well be, that the deterrent effect of fines will be more limited if competitors participating in the cartel are fined as well.

(i) Meta-retrospectives

Much of the empirical work on impact of cartel policy enforcement is based on the work by Connor (2014), who over the years has constructed a database of over 2000 overcharge estimates covering more than 500 cartels active at some point during the past three centuries. Within the database, the median overcharge equals 23% and the mean overcharge is almost 50% of the benchmark price, which is the price that would have been observed in the market in the absence of overt collusion. Connor finds that overcharges have trended downwards since the end of the Second World War as antitrust enforcement regimes have become more severe. However, for two types of cartels (i.e. bid rigging and ‘legal’ cartels) there has not been a significant decline in average overcharges (see Connor and Lande (2008)). Connor also makes the observation that overcharges by convicted, illegal cartels are on average 19% higher than those of unpunished, legal cartels.

Using a similar but smaller data base, Connor and Bolotova (2006) find that overcharges tend to significantly higher for durable international cartels. On average overcharges of cross-border cartels are 14 percentage points higher than those of domestic cartels, while the overcharge level rises by 4 percentage points for each five additional years of cartel operation. Connor and Bolotova also find that the overcharges achieved by cartels in the EU and North America are lower than in the rest of the world, where cartel policy enforcement may be less strict.

Boyer and Kotchoni (2011) observe that the data used in these studies are estimates rather than true observations, since the true illegal profits of cartels are rarely observable. They argue that a more econometrically sound treatment of model error, estimation error and publication bias would reduce the estimate of the median overcharge to 14% and the mean overcharge to 17½% of the benchmark price. The sharp reduction in the mean overcharge in comparison with Connor (2014) can be explained in part by the elimination of unreliable outliers in the sample.

In a study for the European Commission, Komninos et al. (2009) examine the empirical evidence on the effects of cartels on overcharges. Contrary to Connor, this study only considers cartels that started after 1960. It focuses on estimates of overcharges reported in peer-reviewed academic articles and chapters in published books. Based on a limited sample of 114 cartels, Komninos et al. find that (a) 93% of cartels do in fact lead to an overcharge, and (b) there is considerable variance in the overcharges caused by cartels.

Smuda (2014) explains the magnitude of overcharges in a sample of 191 overcharge estimates from the Connor database by cartel characteristics and the market environment. His focus on European markets allows him to capture regional variations within Europe. He concurs with Connor and Bolotova (2006) that international cartels achieve significantly higher overcharges than domestic cartels. Moreover, cartels in western and northern Europe (with the exception of the UK) appear to be less effective in attaining high overcharges than cartels based elsewhere on the continent. However, Smuda finds no significant
difference between the overcharges of legal cartels and that of illegal, detected cartels, which is contrary to the finding by Connor (2014).

(ii) Deterrent effects of cartel policy enforcement

Smuda (2014) then goes on to investigate the question of optimal deterrence. In line with the current literature on deterrence he adopts the principle that firms will engage in collusive behaviour if the gains from price fixing (as measured by the overcharges times the amount of goods sold over the duration of the cartel) exceed the expected punishment, which depends on the probability of detection and the level of fines imposed in case of detection. According to the EU Guidelines on the method of setting fines, fine levels depend on a number of factors including value of the sales connected with the infringement and the duration of the cartel. Assuming a generous detection rate of 33% and average cartel duration of 5.7 years, Smuda infers that in 63% of the EU cartel cases, the gains from price fixing exceed the expected punishment. EU antitrust fines are therefore insufficient for cartel deterrence. The paper concludes with a number of suggestions to change this trade-off, including stronger private enforcement, the introduction of personal liability of those implicated in the cartel and payments for whistle-blowers.

Smuda is not the only author that comes to the conclusion that effective deterrence requires stronger enforcement. Based on a back-of-the-envelope calculation of the expected net benefits of a representative modern international cartel, Schinkel (2007) concludes that the European Commission’s commitment to punish cartels will likely be insufficient to deter collusion, unless a more active enforcement of competition rules increases the probability of discovery. Based on a sample of 64 cartels prosecuted by the EU, Combe and Monnier (2009) find that EU fines are below the amount that had been illicitly gained from cartel membership, which bodes badly for their deterrent effects. Mariniello (2013) confirms that on average fines are well below the damage caused by discovered cartels. Most of the literature therefore appears to support a stricter enforcement of cartel rules or higher fines. Motta (2008), however, considers that fines set according to the relevant EU Guidelines are not necessarily inadequate to achieve deterrence. There are other ways to increase deterrence that should be further explored. A system of private rights of action, for example, possibly combined with greater attention to fostering a culture of competition would be more suited to increase cartel deterrence.

In contrast to the rather broad consensus in the literature on the appropriate level of fines, conclusions on the impact of leniency programmes on cartel detection are not convergent. Harrington and Chang (2005), for example, stress that the introduction of a leniency programme may increase the rate of detection of less stable cartels but have few effects on the most damaging, stable cartels. Miller (2009), on the other hand, maintains that the introduction of leniency programmes has resulted in a 40% reduction in the number of detected cartels.

The estimation of the probability of cartel detection is notoriously difficult, let alone measuring the impact of a greater enforcement effort on cartel detection. Connor and Lande (2012) cite a number of studies reporting detection probabilities between 10% and 33%. Combe et al. (2008) estimate the probability of an EU cartel being discovered within

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a given year at around 13%. A recent paper by Ormosi (2014) using an altogether different methodology confirms that less than a fifth of EU cartels between 1985 and 2005 were detected.

Looking at developments over time, Hyytinen et al. (2010) find that at the end of a period during which cartels in Finland were legal (1951-1990) almost all manufacturing industries had become cartelised. Similarly, Baker (2003) provides evidence that periods of lax antitrust enforcement in the US were invariably followed by an increase in anticompetitive behaviour. Stricter enforcement (in whatever form), on the other hand, should contribute to greater deterrence. Miller (2009), for example, finds that the number of cartel discoveries increases around the date of leniency introduction and then falls below pre-leniency levels. He argues that this pattern is consistent with enhanced cartel detection and deterrence.

(iii) Overview

Table I.5 provides an overview of the methods used, coverage and main findings of studies evaluating the impact of cartel policy and fining practices. Meta-retrospectives of studies and other published documents reporting on overcharges resulting from cartels are the most commonly used method for evaluating the impact of cartel policy enforcement. The meta-retrospective studies appear to agree on the conclusion that the stronger enforcement and increased scope of cartel policies in the U.S. and the EU in particular has contributed to the observed decline in overcharges (with the notable exception of bid rigging cartels). There is also a considerable variation in the mean overcharge reported by the different meta-retrospectives, reflecting the extent to which outliers are taken into account. However, the use in the discussion on appropriate fine levels of a mean overcharge rate between 15% and 20% would seem to be a reasonable assumption. In this respect, there may also be an argument to impose higher fines on more durable and international cartels, as overcharges are higher in such cartels.

A number of papers have attempted to address the question whether current fines are sufficient to deter companies from joining cartels. Most of these papers retrospectively calculate the net benefits of joining cartels that are known to have existed in the past. Such net benefits depend on a number of factors including the level of overcharges, the duration of the cartel, the size of the market, the probability that the cartel will be detected by competition authorities and the likely level of fines imposed in case of detection. The probability of detection is very difficult to determine, because non-detected cartels are by definition unobservable. Nevertheless, researchers have developed methods aimed at overcoming this challenge and have come to the rough conclusion that four out of five cartels remain undetected.

Calculations of the net benefits of cartel participation remain very difficult. However, papers using the net-benefit approach come to the conclusion that current fining levels are insufficient to deter companies from joining cartels and need to be increased. Other authors conclude that a number of other actions can be taken to decrease the inclination of companies engage in collusive behaviour, including increasing the resources for cartel detection, payments for whistle-blowers and fostering a competition culture.
Table II.5  Evaluation of the impact of cartel policy enforcement

<table>
<thead>
<tr>
<th>Study</th>
<th>Method(s) used</th>
<th>Coverage / date</th>
<th>Cartel policy and fining practices</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connor (2014)</td>
<td>Meta-retrospective</td>
<td>700 studies / 1780 - 2010</td>
<td>Cartel policies worldwide</td>
<td>Overcharges have trended downwards since the end of the Second World War as antitrust enforcement regimes have become more severe</td>
</tr>
<tr>
<td>Connor and Lande (2008)</td>
<td>Meta-retrospective</td>
<td>674 cartels / 1780 - 2004</td>
<td>U.S. cartel policies and fines</td>
<td>However, for two types of cartels (i.e. bid rigging and ‘legal’ cartels) there is no significant decline in average overcharges</td>
</tr>
<tr>
<td>Connor and Bolotova (2006)</td>
<td>Meta-retrospective</td>
<td>385 cartel episodes / 18th century - 2004</td>
<td>Cartel policies worldwide</td>
<td>Overcharges tend to significantly higher for durable international cartels</td>
</tr>
<tr>
<td>Boyer and Kotchoni (2011)</td>
<td>Meta-retrospective</td>
<td>1120 cartel / past three centuries</td>
<td>Cartel policies worldwide</td>
<td>Estimates of median and mean overcharge equal 14% and 17½% of the benchmark price, respectively</td>
</tr>
<tr>
<td>Komninos et al. (2009)</td>
<td>Meta-retrospective</td>
<td>114 cartel / 1960 - 2004</td>
<td>Cartel policies worldwide</td>
<td>There is considerable variance in the overcharges caused by cartels</td>
</tr>
<tr>
<td>Smuda (2014)</td>
<td>Meta-retrospective</td>
<td>191 cartel / 1945 - 2009</td>
<td>European cartel policies and fines</td>
<td>EU fines are too low to effectively prevent firms from cartel participation</td>
</tr>
<tr>
<td>Schinkel (2007)</td>
<td>Back-of-the envelope calculation</td>
<td>1 hypothetical hard core cartel</td>
<td>EU cartel policies and fines</td>
<td>Cartel policy enforcement and cartel detection rates are insufficient to deter collusion</td>
</tr>
<tr>
<td>Combe and Monnier (2009)</td>
<td>Retrospective calculations</td>
<td>64 cartel / 1975 - 2009</td>
<td>EU cartel policies and fines</td>
<td>EU fines are below the amounts gained from cartel membership</td>
</tr>
<tr>
<td>Mariniello (2013)</td>
<td>Retrospective calculations</td>
<td>73 cartel / 2001 - 2012</td>
<td>EU cartel policies and fines</td>
<td>EU fines are well below the damage caused by discovered cartels</td>
</tr>
<tr>
<td>Motta (2008)</td>
<td>Retrospective calculations</td>
<td>43 cartel / 1990 - 2007</td>
<td>EU cartel policies and fines</td>
<td>A system of private rights of action combined with greater attention to fostering a culture of competition would be more suited to increase cartel deterrence than an increase in fines.</td>
</tr>
<tr>
<td>Connor and Lande (2012)</td>
<td>Meta-retrospective</td>
<td>15 studies / 1982 - 2011</td>
<td>Cartel policies worldwide</td>
<td>Cartel detection probabilities vary between 10% and 33%.</td>
</tr>
<tr>
<td>Combe et al. (2008)</td>
<td>Retrospective calculations</td>
<td>86 cartel / 1969 - 2007</td>
<td>EU cartel policies</td>
<td>The probability of a cartel being discovered within a given year is around 13%</td>
</tr>
<tr>
<td>Ormosi (2014)</td>
<td>Retrospective calculations</td>
<td>128 cartel / 1985 - 2005</td>
<td>EU cartel policies</td>
<td>Less than a fifth of cartels are detected</td>
</tr>
</tbody>
</table>
2.3 Areas for further research

Ex-post economic evaluations of competition policy decisions are a valuable tool for assessing the correctness of the decision taken so as to take better decisions in the future. Most ex-post evaluations concern merger or cartel decisions. Evaluations of antitrust decisions are exceedingly rare because of the complexity of the analytical framework and the lack of data. Nevertheless, from a policy perspective such evaluations could be worthwhile as valuable lessons might be learnt.

The current review shows a great variety of ex-post evaluations, both in terms of methods used and outcomes reported. However, one common element in all evaluations is the need to define an appropriate counterfactual (i.e. the scenario experienced by a ‘control’ group) to the actual course of events (i.e. the scenario experienced by the ‘treatment’ group). For example, when evaluating individual merger or cartel decision, the counterfactual describes what would have happened in the absence of the decision (or if a different decision had been taken) by the competition authority. At a more macro level, it describes what would have happened in the absence of the policy being evaluated. The common problem is that in reality we do not and cannot observe the counterfactual for parties affected by a decision or a policy. It is therefore essential to conduct sensitivity analyses on the choice of the counterfactual when evaluating merger and antitrust decisions. In principle, multiple counterfactual scenarios should be considered to arrive at a comprehensive assessment of the decision taken or policy enacted.

The parties in the treatment and control groups may have different characteristics leading to a selection bias, which may affect the outcome of the evaluation exercise. In order to limit such selection bias as much as possible, the evaluation literature suggests a number of statistical methods to select the parties in the treatment and control groups. However, even if carefully selected, the parties in the treatment and control groups are not necessarily representative of the total population of undertakings falling under competition rules. This is particularly a problem in the area of cartels because the samples used for the evaluation of anti-cartel enforcement policies are exclusively drawn from detected cases and exclude deterred and undetected cases.

Looking at list of merger cases having been subjected to an ex-post evaluation, there appears to be a selection bias as well. Most of the evaluated cases are borderline cases in which the decision whether or not to give the go-ahead to the merger was a close one. Consequently, when we look at all these cases together (by way of a literature review or a meta-study of merger retrospectives) the impression arises that most mergers have a negative effect on customer welfare, while this might not be the case for the large majority of (unproblematic) mergers. In spite of such potential bias, meta-studies of merger retrospectives carried out in the U.S. have delivered interesting results. The Kwoka (2013) meta-retrospective, for example, convincingly makes the point that behavioural remedies were inadequate. In this respect, it is regrettable that as of yet there is no similar meta-study in Europe, one of the reasons being that the number of published ex-post merger evaluations in Europe is still relatively small.

The Kwoka study also illustrates that ex-post evaluations tend to focus on the price effects of individual merger decisions, while investigations of the effects on market entry, markups or innovation are much less common, both in the EU and in the U.S. Most of the studies on the non-price effects of mergers use qualitative methods, including in particular surveys and interviews of market actors. As is the case for studies on the price effects of merger
decisions, these other studies would benefit from a combination of qualitative and quantitative methods in order to arrive at more robust results.

Analysing the impact of competition policy enforcement on innovation is particularly relevant in this period of slow productivity growth in Europe. Competition policy may contribute to strengthening the incentives for companies to engage in innovative activities. It is also necessary to be able to respond to the criticism that competition policy decisions do not sufficiently take into account their impact on the innovative performance of the parties or competitors concerned.

Innovation effects are already incorporated in the legal framework for assessing mergers, both in terms of anticompetitive effects and possible efficiencies. In practice, there are a number of cases for which the innovation effects have been analysed. An ex-post analysis of the impact of these decisions on the innovative activity in the market concerned could be a first step to better understand the complex interaction between competition policy and innovation.

Further work should also be done to better understand the effects of competition policy enforcement on market functioning more generally. A decision may affect not only the parties directly concerned, but other market participants as well. Moreover, multiple decisions within a single sector or market may have larger effects than the sum of each individual decision. In addition, the interactions between merger, cartel, antitrust and State aid decisions within a single sector are insufficiently explored. One of the first papers on this issue (see Davies et al (2014b)) finds a higher than normal rate of merger activity following cartel busts, which in a second instance could help reignite collusive behaviour in the market. Consequently, there would be an interest in investigating multiple decisions affecting a single market or sector. This would be true in particular for markets and sectors that are important for the economy as a whole. In addition, such studies may help in identifying the interrelations between competition policy instruments and between competition and regulation policy in key sectors, such as energy, transport and telecommunications.
Part III: Aggregate economic effects of competition policy

Measuring the aggregate economic effects of competition policy can contribute to defend its legitimacy and this issue has received an increased interest, both by CAs and in the academic world. Two main approaches are used to assess the aggregate effects of competition policy enforcement. The first approach is a bottom-up approach measuring the direct benefits of competition policy for consumers (customer savings approach). The second approach attempts to quantify the wider impact of competition policy on the economy as a whole and it relies on reduced form equations or macroeconomic models to assess the effect of competition policy on competition and (directly and indirectly) on GDP growth and other macroeconomic performance variables. While the first approach has been mostly used by CAs, the second approach has been more popular amongst academics.

1. Benefits of competition policy for consumers

Simple back-of-the-envelope simulations are often used to calculate the customer savings resulting from competition policy interventions, including in particular merger decisions and cartel interdictions. Customer savings calculations are often used for advocacy purposes, for example to justify public spending on competition policies. This section starts by presenting the methods used by the four CAs (DG Competition, NL, UK, US) most active in performing regular assessments of customer savings. Thereafter, it describes the results obtained.

1.1 Methodology

Most competition authorities measure customer savings by the estimated reduction in prices resulting from the competition policy enforcement in the market concerned multiplied by the estimated duration of the price reduction. Tables III.1 a) b) and c) give an overview of the assumptions used in the four agencies regularly assessing the customer savings associated with their interventions.

With respect to the scope of the affected turnover, it appears that broadly speaking for cartel and abuse of dominance cases only the turnover of the cartel members or of the firm(s) abusing their dominance is used, while for mergers a wider definition is used including the turnover of all firms in the relevant market (see OECD (2013a)).
Table III.1 Overview of assumptions used by 5 CAs

a) Cartel cases

<table>
<thead>
<tr>
<th>CA</th>
<th>DG COMP*</th>
<th>CMA*</th>
<th>ACM</th>
<th>DoJ</th>
<th>FTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected turnover</td>
<td>Turnover of cartel members</td>
<td>Turnover affected goods</td>
<td>Turnover affected goods</td>
<td>Volume of commerce</td>
<td>N/A</td>
</tr>
<tr>
<td>Yearly price effect*</td>
<td>10-15%</td>
<td>10-15%</td>
<td>10%</td>
<td>10%</td>
<td>N/A</td>
</tr>
<tr>
<td>Duration</td>
<td>1/3/6 depending on the stability of cartel</td>
<td>6</td>
<td>3</td>
<td>1 or number of months for shorter lived</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Source: OECD (2013a and 2014), Mudde (2012) and Kemp et al. (2014)

*DG COMP and the CMA discount future savings with a 3.5% discount rate.

In cartel cases, the surveyed CAs differ mainly regarding the assumptions made on the expected future life duration of cartels. At one end of the spectrum, the DoJ assumes just 1 year while, at the other end, the CMA assumes 6. DG Competition and the ACM lie in between. DG Competition uses 1, 3 or 6 years depending on its judgement of the future sustainability of the cartel at the date of detection. Cartels are judged to be either “unsustainable”, “fairly sustainable” or “very sustainable” (see CET (2010)). The ACM (see Kemp et al.) uses 3 years unless it has specific information indicating that the duration will be shorter than 3 years (in the case of commitments, e.g). Finally, where the case details are insufficient to use a case-specific estimate, a 10% cartel overcharge is generally considered, although DG Competition and the CMA sometimes employ a 15% overcharge.

Mudde (2012) and Davies (see OECD (2013a)) made an assessment of these assumptions. Mudde, using the lifetimes of cartel detected by DG Competition, found that the average life-time of cartels is 8 years and therefore he considers that the assumption of 1 year price increase might be too conservative. For Davies, the DG Competition case-dependent approach is quite persuasive given that there are various determinants of cartel duration, such as the severity of fines and leniency programmes, the type of industry and entry or other market conditions. However, this approach requires a significant judgemental input and if sufficient information is not available, Davies recommends using a single number, somewhere between 1 and 6 years. Regarding the cartel overcharge, the empirical evidence in the academic literature (see Bolotova and Connor (2006) and Smuda (2014)) suggests that the median cartel overcharge lies between 17 and 30%, which makes the 10% assumption conservative.
b) Abuse of dominance cases

<table>
<thead>
<tr>
<th>CA</th>
<th>DG COMP</th>
<th>CMA*</th>
<th>ACM</th>
<th>DoJ</th>
<th>FTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected turnover</td>
<td>N/A</td>
<td>Turnover affected goods</td>
<td>Turnover affected goods of the abusing company</td>
<td>Volume of commerce</td>
<td>Volume of commerce</td>
</tr>
<tr>
<td>Yearly price effect</td>
<td>N/A</td>
<td>10%</td>
<td>5%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Duration</td>
<td>N/A</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: OECD (2013a and 2014), Mudde (2012) and Kemp et al. (2014)
*The CMA discounts future savings with a 3.5% discount rate.

As already mentioned in Section I.1.2, CAs tend to assess much less abuses of dominance decisions because of the difficulties to test the assumptions made and the scarcity of final prohibition decisions. DG COMP no longer publishes estimates of its impact in this area, in particular because the small number of cases involved might create confidentiality problems. Table II.2 b) shows that one can distinguish the CMA on the one hand, which threat abuse of dominance cases as cartels regarding their duration and price effects, and the ACM, the DoJ and the FTC, which assume a 5%, 1% and 1% price increase respectively in abuse of dominance cases against 10% in cartel cases.

c) Merger cases

<table>
<thead>
<tr>
<th>CA</th>
<th>DG COMP*</th>
<th>CMA*</th>
<th>ACM</th>
<th>DoJ</th>
<th>FTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected turnover</td>
<td>Size of relevant market</td>
<td>Turnover of affected goods</td>
<td>Size of relevant markets</td>
<td>Volume of commerce</td>
<td>Volume of commerce</td>
</tr>
<tr>
<td>Yearly price effect</td>
<td>1-3-5%</td>
<td>Simulated if not, average of simulated + deadweight loss estimate</td>
<td>Simulated if not, rules of thumb</td>
<td>Simulated if not, 1% + deadweight loss estimate</td>
<td>1%</td>
</tr>
<tr>
<td>Duration</td>
<td>2-3-5 depending on entry barriers</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

*DG COMP and the CMA discount future savings with a 3.5% discount rate.

For mergers, all CAs surveyed define the affected turnover as that of all firms in the relevant markets, using a broader definition of the affected turnover than in cartels and abuse of dominance cases (except in the US). The reason is that the price effect of a merger is unlikely to be confined to just the parties involved as rivals will increase their price in response to an increase in price of the merging parties. This argument is also true for cartels and abuse of dominant positions, indicating that a narrow definition of the affected turnover will lead to an underestimation of the customer savings.

For the price effect, both the utilisation of model simulations or default assumptions are used. The models used are the ALM and PCAIDS model described above. Where simulation is not feasible –either because the models cannot describe adequately the nature of competition or because data for calibration are not available, a default assumption of a 1% or 3% price increase is made. From 2012, DG Competition decided to simplify the
methodology used to calculate the price increase, replacing the use of PCAIDS modelling techniques by a default assumption of 3% (but assumptions of 1% and 5% are also considered for sensitivity tests). The reason is that the sophistication of the previous methodology made the exercise quite costly and that, despite its sophistication, this methodology was not exempt from limitations (see European Commission (2013b)). Davies (see OECD (2013a)) considers that the 1% price increase assumption is too low and quotes studies reporting price increase of mergers ranging between 3 and 9%. He therefore suggests using a default price increase of 3%. The duration assumption is one or two years, except for DG Competition which classifies mergers in three groups depending on the assessment of the height of barriers to entry or rival expansion. Again, Davies considers that the 1-year duration is too conservative.

It is also interesting to underline that, especially for mergers, the ACM and the DoJ include the deadweight welfare loss averted by the intervention in their assessment. The price increase avoided thanks to the intervention of the CA benefits not only those consumers who would continue to buy post-merger but it would also deter some consumers from leaving the market and this positive effect should be included in the consumer surplus estimate.

On the basis of the analysis of the methods used by these CAs, the OECD has made some proposals for convergence in the general principles and assumptions chosen in calculating and reporting customers’ savings (see Box III.1).

**Box III.1 Guiding principles and methodology suggested by the OECD to calculate the customer savings**

The following principles have been endorsed by the Competition Committee of the OECD:

- Whenever possible use case specific information.
- Assume that no intervention will have a negative impact.
- Estimate static consumer benefits and when possible also include dynamic ones.
- Calculate and publish the estimates regularly.
- Present the results both as an annual figure and as an annual moving average over three years.
- Present the results by type of decisions (for example, separate the estimated impact of cartel decisions from that of merger decisions).

The OECD also suggests using a simple and easily-applicable methodology: the static consumer benefits resulting from each decision is the product of the size of the affected turnover, the price increase avoided and the expected duration of the price effect. When case-specific information is available on these three elements, this information should be used.

When such information is not available, the OECD suggests using the following assumptions:

<table>
<thead>
<tr>
<th></th>
<th>Cartel cases</th>
<th>Abuse of dominance cases</th>
<th>Merger cases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Affected turnover</strong></td>
<td>Ex-ante turnover of the companies under investigation in the affected market(s)</td>
<td>Ex-ante turnover of the companies under investigation in the affected market(s)</td>
<td>Ex-ante turnover of all firms in the affected market(s)</td>
</tr>
<tr>
<td><strong>Yearly price effect</strong></td>
<td>Overcharge of 10%</td>
<td>Price increase of 5%</td>
<td>Price increase of 3%</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>3-year</td>
<td>3-year</td>
<td>2-year</td>
</tr>
</tbody>
</table>

Source: OECD (2014a)
The assumptions that the OECD recommends using are rather conservative. Given the uncertainties regarding these assumptions, the OECD also recommends performing a sensitivity analysis and to present range of estimates. Finally, when publishing these estimates, it would be useful to include a clear explanation of the methodology used and of its limitations. Finally, the OECD recommends using case-specific information when this information is available. DG Competition follows this approach. Ex-post economic evaluations of the effects of mergers, cartels and abuse of dominance could provide in the future a more robust empirical backing for the default assumptions currently used.

1.2 Results

Table III.2 presents the latest data on the reported customer savings (expressed as a percentage of GDP) from four jurisdictions (i.e., the EU, the Netherlands, the UK and the US) that regularly publish their estimates of customer savings. This table should not been used to compare the performances of the four authorities but rather to compare the order of magnitude of the estimates, which vary widely over time and between jurisdiction. For example, over the period 2008-2013, the average yearly customer savings resulting from the CAs interventions range between 0.6 $10^{-2}$ % of GDP for the US FTC and 6.9 $10^{-2}$ % of GDP for the European Commission.

These differences in magnitude of customer savings are due to the fact that the sizes of the markets in which the CAs intervene, the scope and the number of cases can vary significantly from one year to another and across jurisdictions. Another reason for these differences in magnitude is that the assumptions and methodologies used for estimating customer savings, for example, regarding the price effect, its duration and the size of the affected market, vary from one jurisdiction to another, making it hard to compare the results of the different authorities and that is the reason why the OECD has made some proposals aimed at increased convergence of assumption used by different CAs.

A strength of this approach is that the customer savings are bottom-up estimates closely linked to the decisions taken by the CAs. But its main disadvantage is that customer savings only measure the direct price effects of interventions for consumers. Therefore, these estimates are very small, expressed in percentage of GDP. However, the total benefits extend beyond prices and include effects on quality, choice and innovation. The customer savings estimates also ignore the indirect consequences of the price reduction on the whole economy and the deterrent effects of competition policy which can be very significant (see for example, OFT (2012) and part II). For these various reasons, not all CAs in OECD jurisdictions calculate the customer savings resulting from their interventions. Some of them have expressed concern that these estimates oversimplify matters, giving external stakeholders a partial or distorted view of the value and purpose of competition law enforcement. This would argue in favour of using macroeconomic modelling to get an estimate of the price reduction effects for the whole economy.

15 The OECD considers that the customers' savings are not ex-post but ex-ante estimates because they relate to likely future effects that have yet to be observed or to averted effects that can only be estimated. However we believe that the customers' savings illustrate most often the averted price effects resulting from merger and cartel investigations. These averted effects correspond to the definition of the counterfactual in ex-post evaluations. Therefore, we think that the customers 'savings can be regarded as ex-post evaluations.

16 See OECD (2013a) for a summary of the assumptions made in the three jurisdictions.
<table>
<thead>
<tr>
<th></th>
<th>Cartels</th>
<th>Mergers</th>
<th>Other Antitrust</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>1.28 - 1.90 (10)</td>
<td>1.45 - 3.63 (6)</td>
<td>N/A</td>
<td>2.73 - 5.53</td>
</tr>
<tr>
<td>2013</td>
<td>3.62 - 4.19 (4)</td>
<td>0.22 - 0.52 (1)</td>
<td>N/A</td>
<td>3.84 - 4.70</td>
</tr>
<tr>
<td>2012</td>
<td>1.01 - 1.48 (5)</td>
<td>1.64 - 4.17 (5)</td>
<td>N/A</td>
<td>2.64 - 5.65</td>
</tr>
<tr>
<td>2011</td>
<td>1.37 - 2.01 (4)</td>
<td>3.04 - 4.40 (10)</td>
<td>N/A</td>
<td>4.40 - 6.41</td>
</tr>
<tr>
<td>2010</td>
<td>5.63 - 8.20 (7)</td>
<td>3.28 - 4.93 (4)</td>
<td>N/A</td>
<td>8.91 - 13.12</td>
</tr>
<tr>
<td>2009</td>
<td>1.33 (6)</td>
<td>4.57 (8)</td>
<td>1.69</td>
<td>7.59</td>
</tr>
<tr>
<td>2008</td>
<td>0.98 (7)</td>
<td>4.24 (13)</td>
<td>3.43</td>
<td>8.65</td>
</tr>
<tr>
<td><strong>US DoJ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>0.14 (50)</td>
<td>0.54 (15)</td>
<td>-</td>
<td>0.68</td>
</tr>
<tr>
<td>2012</td>
<td>0.28 (67)</td>
<td>5.55 (19)</td>
<td>-</td>
<td>5.83</td>
</tr>
<tr>
<td>2011</td>
<td>0.16 (90)</td>
<td>0.92 (20)</td>
<td>-</td>
<td>1.08</td>
</tr>
<tr>
<td>2010</td>
<td>0.03 (60)</td>
<td>0.13 (19)</td>
<td>-</td>
<td>0.16</td>
</tr>
<tr>
<td>2009</td>
<td>0.42 (72)</td>
<td>0.83 (12)</td>
<td>-</td>
<td>1.25</td>
</tr>
<tr>
<td>2008</td>
<td>0.01 (54)</td>
<td>0.34 (16)</td>
<td>-</td>
<td>0.35</td>
</tr>
<tr>
<td><strong>US FTC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>N/A</td>
<td>0.33 (23)</td>
<td>0.27 (4)</td>
<td>0.60</td>
</tr>
<tr>
<td>2012</td>
<td>N/A</td>
<td>0.32 (20)</td>
<td>0.27 (5)</td>
<td>0.59</td>
</tr>
<tr>
<td>2011</td>
<td>N/A</td>
<td>0.34 (12)</td>
<td>0.29 (2)</td>
<td>0.63</td>
</tr>
<tr>
<td>2010</td>
<td>N/A</td>
<td>0.39 (16)</td>
<td>0.34 (6)</td>
<td>0.73</td>
</tr>
<tr>
<td>2009</td>
<td>N/A</td>
<td>0.55 (13)</td>
<td>0.13 (7)</td>
<td>0.68</td>
</tr>
<tr>
<td>2008</td>
<td>N/A</td>
<td>0.24 (20)</td>
<td>0.02 (11)</td>
<td>0.26</td>
</tr>
<tr>
<td><strong>UK CMA (OFT)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013/14</td>
<td>0.88</td>
<td>0.14</td>
<td>-</td>
<td>1.02</td>
</tr>
<tr>
<td>2012/13</td>
<td>0.82</td>
<td>0.15</td>
<td>-</td>
<td>0.97</td>
</tr>
<tr>
<td>2011/12</td>
<td>0.93</td>
<td>0.07</td>
<td>-</td>
<td>1.00</td>
</tr>
<tr>
<td>2010/11</td>
<td>0.53</td>
<td>0.81</td>
<td>-</td>
<td>1.34</td>
</tr>
<tr>
<td>2009/10</td>
<td>0.57</td>
<td>2.09</td>
<td>-</td>
<td>2.66</td>
</tr>
<tr>
<td>2008/2009</td>
<td>0.51</td>
<td>2.06</td>
<td>-</td>
<td>2.57</td>
</tr>
<tr>
<td><strong>ACM (NMa)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>10.75 (5)</td>
</tr>
<tr>
<td>2012</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>3.69 (8)</td>
</tr>
<tr>
<td>2011</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>6.13 (16)</td>
</tr>
<tr>
<td>2010</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1.47 (15)</td>
</tr>
<tr>
<td>2009</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.10 (22)</td>
</tr>
<tr>
<td>2008</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.69 (19)</td>
</tr>
</tbody>
</table>

Source: Own calculations based on national sources

*The numbers in brackets are the number of cartel convictions, merger interventions and other antitrust interventions.
**Mergers and other antitrust are reported together.
***CC + OFT until 2012. Cartels and other antitrust are reported together.
****In 2013, the ACM decided to change the method used to calculate the customer savings to take into account the recommendations made by the OECD. As a result, the estimates for the period 2008-2012 cannot be compared with those for 2013 onwards17.

Customer savings calculations are often used to justify public spending on competition policies as they allow showing the good performance of CA as measured by their benefits-to-costs ratio. For example, the UK CMA has an objective of a benefit-to-cost ratio of 10:1 and it uses the customer savings to assess the direct benefits of its interventions. But the

17 The change having the largest impact on the estimates of customer savings is that the ACM does no longer use the 3-years moving average but instead calculates the annual effect of its interventions and assumes that these effects will last for 3 years.
self-evaluation of CAs on the basis of the direct customer savings resulting from the
detection of cartels and the prohibition of anticompetitive mergers creates a risk of over-
enforcement because of the incentive for the authorities to achieve large figures. This may,
for example, lead CAs to block too many mergers. Moreover, over-reliance on such
estimates could distort decisions on the allocation of resources within a CA. This may lead
the CA to disregard legal violations in low-value markets where enforcement would be
important because of indirect deterrent effects. However, such indirect effects are more
difficult to measure.

2. Macroeconomic impact of competition policy

Besides the calculation of customer savings, information on the impact of competition
policy on macroeconomic variables, such as GDP growth and productivity, are also
important for the political debate on competition and deregulation. Although there is a
consensus in the literature that competition provides welfare gains, it is less clear cut from
an empirical perspective that the strength of competition policy fosters competition and
that competition policy increases economic growth.

This section starts by proposing an integrated framework for the analysis of the
macroeconomic impact of competition policy, distinguishing the impact of competition
policy from that of competition and identifying the main transmission channels through
which competition has a positive impact on growth. Three channels can be distinguished, i.e.
changes in allocative, productive and dynamic efficiency.

The implementation of this integrated framework requires the definition of indicators
measuring: (i) the strength of competition policy, as characterised by the quality of
competition laws and institutions as well as interventions of CAs; and (ii) the strength of
competition. Sub-section III.2.2 offers a critical review of these indicators and concludes
that improving these indicators would be essential to further develop the empirical work on
the macroeconomic impact of competition policy. The next sub-sections describe the main
and most recent empirical results, making a distinction between the macroeconomic effects
of competition policy and that of competition.

2.1 Analytical framework

The economic theory explaining why competition contributes to productivity and growth is
well established. But to ensure fair conditions of competition, interventions by public
authorities may be required, which explains why most countries have adopted competition
legislation and created a competition authority to enforce such legislation.

A comprehensive analysis of the impact of competition policy needs to analyse the impact
of competition policy on competition and then, to assess the resulting effects of the
increased in competition on macroeconomic performance. This sub-section proposes an
integrated framework for such analyses.
2.1.1 Effects of competition policy

Competition policy is defined here as competition legislation covering the prohibition of cartels and abuse of dominant position and the control of mergers. The strength of competition policy depends on multiple factors, including the human and budgetary resources available for its implementation, competition laws and institutions, and on the quality and number of the policy interventions (i.e. competition policy decisions and competition advocacy) made by the competition authorities.

Competition policy interventions are expected to have a direct positive effect on the conditions of competition, for example, by eliminating a cartel or by prohibiting a merger which would have reduced competition and led to an increase in prices for consumers. However, other policies, such as trade liberalisation and better regulation, also promote competition. Disentangling the impact of competition policy from other policies affecting competition and growth is not straightforward.

Moreover, competition policy interventions have not only direct positive effects on competition but they also have an indirect benefit via their deterrent effects. For example, imposing high fines in cartels is expected to deter other companies from entering into such illegal agreements. Analyses of the macroeconomic impact of competition policy focus on the direct effects of policy interventions and ignore the more difficult to measure deterrent effects. Ignoring these effects underestimates the aggregate impact of competition policy.

2.1.2 Effects of competition

The increase in competition resulting from the enforcement of competition policy affects macroeconomic performance via three channels, i.e. changes in allocative, productive and dynamic efficiency.

First, competition will lead to an improvement in the allocative efficiency of firms via the entry of new firms and the exit of the least efficient firms from the market (‘across firms’ effects). An increase in the number of competitors or the threat of entry of new competitors reduce the market power of incumbents and incite them to set prices closer to marginal costs. As a consequence, mark-ups tend to decline while the allocation of both inputs (labour and capital) and outputs becomes more efficient, i.e. scarce resources are allocated to the production of the goods and services corresponding the most to the needs of consumers. More competition can also lead to increased allocative efficiency as less productive firms exit and market share moves from less productive to more productive firms.

Second, competition will improve the productive efficiency of firms (‘within firms’ effects). Productive efficiency is the capacity for any given firm to allocate its internal resources in such a way that makes it possible to reduce or eliminate the under-utilisation of its production factors. Productive efficiency results from the introduction of better production methods within the firm, including organisational changes as managers and workers have greater incentives to reduce slack, trim fast and structure the workplace more efficiently. Incentives to improve productive efficiency result from the fact that the benefits of greater

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18 The UK and Dutch competition authorities have tried to measure the size of the deterrent multiplier of their competition enforcement activities on the basis of surveys (see OFT (2007) and Baarsma et al. (2012)). However, neither the OFT nor the ACM have used the figures obtained in making an assessment of the macroeconomic impact of their interventions.
efficiency in terms of market share and profits is higher in competitive markets where the price elasticity of demand is great and that the probability of bankruptcy is higher in a more competitive environment.

Third, competition will increase the dynamic efficiency of firms by pushing them to innovate (dynamic effects). An increase in competition can act as a stimulus for firms to develop product and process innovations and hence to speed up the move to the modern technology frontier. However, the link between competition and innovation is a hotly debated issue. There is evidence of an inverted U-shape relationship between competition and innovation, with too little or too much competition reducing innovation. In addition, the technological gap and the type of industry will influence this relation: the positive impact of competition on innovation is greater in countries closer to the technology frontier and in less product differentiated industries (see Section III.2.4.3).

2.1.3 An integrated framework

Graph III.1 describes an integrated analytical framework which can be used for assessing the macroeconomic impact of competition policy. Three main steps can be distinguished. First, it is necessary to define indicators of the strength of competition policy and of the intensity of competition. Second, one needs to empirically establish a causal link between competition policy and competition. Finally, one should measure the impact of competition on macroeconomic performance, such as productivity and growth, via the three transmission channels.

Graph III.1 Macroeconomic impact of competition policy
2.2 Indicators

The analysis of the macroeconomic impact of competition policy requires appropriate measures of the strength of competition policy being enforced as well as indicators of competition. This section focuses initially on how best to measure the strength of competition policy. Thereafter, it describes various indicators of competition.

2.2.1 Indicators of the strength of competition policy

As indicated by Nicholson (2008), various indicators have been used to assess the strength of competition policy. They can be divided into three main categories: input indicators, output indicators and composite indicators combining input and output variables. Input indicators include binary variables measuring whether an antitrust regime is in place or not, variables measuring the human and budgetary resources employed by CAs or variables related to the quality of competition laws and institutions. Output indicators include survey results on the perceived effectiveness of competition policy and variables describing the interventions made by the CAs. These different variables are based on objective data or subjective information resulting from surveys amongst business leaders. Table III.3 proposes a typology of these indicators, making a distinction between what the indicator aims to measure and the method used to obtain the information (objective data or subjective information).

<table>
<thead>
<tr>
<th>Method used</th>
<th>Variable measured</th>
<th>Input variable</th>
<th>Output variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective indicator</td>
<td></td>
<td>Antitrust regime (Y/N)</td>
<td>Interventions made by the CAs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resources (budget, staff) of the CAs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>De jure/de facto characteristics of competition laws</td>
<td></td>
</tr>
<tr>
<td>Subjective indicator</td>
<td></td>
<td>-</td>
<td>Surveys about the perceived effectiveness of competition policy</td>
</tr>
</tbody>
</table>

Work has been done to construct input or composite indicators and to collect views of business leaders on their perceived effectiveness of competition policy and to use these indicators to measure the broader impact of competition policy. But only very few attempts have been made to define and use output indicators measuring the number of interventions made by the CAs. Hereafter, a description of these different indicators is made.

(i) Input indicators

Input indicators have been most often used in empirical work on the macroeconomic impact of competition policy. The input indicators presented in Table III.4 measure the human and budgetary resources of the CAs, the de jure characteristics of competition laws and institutions (laws in the book) and de facto characteristics of competition laws and institutions (laws as they are implemented in practice). These input indicators are based on hard data. However, this does not exclude value judgement on what are best practices
regarding competition laws and institutions. The most recent indicators in this category are the OECD competition law and policy (CLP) indicators, which measure the strength and scope of competition policy in 34 OECD and 15 non-OECD jurisdictions in 2013.

Table III.4 Input indicators

<table>
<thead>
<tr>
<th>Author</th>
<th>Type of indicators</th>
<th>Period/country</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resources of CA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Global Competition Review</strong></td>
<td>11 indicators (relying on information provided by CA) on the staff and 2 indicators on the budget of the CA.</td>
<td>Annual survey 2000-2014. 37 CAs from developed and developing countries (20 CAs from the EU).</td>
</tr>
<tr>
<td><strong>De jure characteristics of competition laws</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nicholson (2004 and 2008)</strong></td>
<td>Antitrust Law Index based on 31 criteria distinguishing three broad dimensions of competition policy: (i) regime structure, i.e. the breadth to which the laws apply; (ii) merger policy and (iii) dominance and restrictive trade practices anti-competitive practices.</td>
<td>Laws in effect in 2003. 52 jurisdictions.</td>
</tr>
<tr>
<td><strong>Hylton and Deng (2007)</strong></td>
<td>Scope Index based on the same approach than Nicholson The classification of competition laws only differs in the &quot;Merger assessment&quot; (the possibility to prohibit a merger if it runs contrary to ‘public interests’ is taken into account).</td>
<td>Laws in effect from January 2001 to December 2004. 102 countries.</td>
</tr>
<tr>
<td><strong>Borrell and Jiménez (2008)</strong></td>
<td>13 indicators related to (i) the independence of the CAs; (ii) cartel policy; (iii) the abuse of dominance policy and (iv) the merger policy.</td>
<td>Laws in effect in 2004. 47 countries.</td>
</tr>
<tr>
<td><strong>De jure and de facto characteristics of competition laws and institutions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Voigt (2006 and 2009)</strong></td>
<td>Four competition policy indicators: (i) substantive contents of competition laws; (ii) economic approach included in competition laws; (iii) formal independence of the CA; and (iv) factual independence of the CAs.</td>
<td>Laws in effect in 2000 and factual implementation over 1990-2000. 58 countries having competition laws + 34 countries without competition laws. 2013. 34 OECD and 15 non-OECD jurisdictions (including 26 CAs from the EU and the EC).</td>
</tr>
<tr>
<td><strong>OECD (2013b)</strong></td>
<td>Four composite indicators subdivided in 12 indicators. The four composite indicators include three indicators measuring the effectiveness of competition regimes and one indicator on competition advocacy. Indicators based on information provided by the CAs.</td>
<td></td>
</tr>
</tbody>
</table>
Binary variables

Binary variables indicate whether an antitrust regime exists or not. This is a very simple indicator which just measures the presence of certain competition policy instruments. A weakness of this indicator is that it does not take into account for heterogeneity in the laws (see Nicholson (2004)). Another disadvantage of this approach is that in some cases, the binary variable has the value of one because the country has an antitrust regime but this regime is totally ineffective. Sometimes, this binary variable is supplemented with a variable describing the experience of the application of competition policy, as measured by the number of years of application of competition legislation.

Resources of the CAs

The resources of the CAs are the budget and staff available to undertake their activities. Since 2000, the "Global Competition Review" annually provides 11 input indicators on the staff and the budget of 37 CAs from developed and developing countries. However, the resources invested by a country in its competition regime may simply reflect the size of the economy. Therefore to control for market size, the input indicators also refer to budget per staff member and budget as a percentage of GDP. These data are combined with output measures and information collected by survey to construct a global ranking of CAs (see Section iii). Even after controlling for market size, the resource-based measures are not as objective as they may seem: Gutmann and Voigt (2014) consider that we should not ignore the variability in the tasks of competition agencies and that the comparability of employees in terms of qualification and work time equivalent is difficult.

De jure and de facto characteristics of competition laws and institutions

Nicholson (2004 and 2008) has developed an Antitrust Law Index (ALI), which is an input indicator, describing de jure characteristics of competition laws in 52 jurisdictions in 2003. One of the weaknesses of this index is that there may be a disparity between the formal scope of the competition laws and their effectiveness in practice and that the index does not permit to take into account detailed differences in the competition laws among countries, which can have a significant impact on their effects. A very similar indicator (the “Scope Index”) has been built by Hylton and Deng (2007). Borrell and Jiménez (2008b) use a similar approach but they consider a more limited number of criteria to qualify the competition legislation.

The aggregate ALI per country is obtained by assigning binomial scores for the presence of particular laws in a jurisdiction and then by summing the individual scores. Three broad dimensions of competition policy are distinguished - regime structure, merger policy and anticompetitive practice - and they are further disaggregated in 31 criteria. For each of these criteria, one point is given if the competition law has certain characteristics. For example, the regime structure includes the scope of competition laws, available remedies and the role of private enforcement and one point is given to a CA having the power to control activities of foreign firms, another point if it has the power to impose fine and if it gives a role to private enforcement.
The ALI only deals with the competition laws in the books and is not concerned with enforcement. **Voigt** (2006 and 2009) tries to address this problem by setting up an index that measures the effectiveness of an antitrust regime in practice for 58 countries. Based on questionnaires sent to CAs, he constructs four competition policy indicators dealing with: (i) the substantive contents of competition laws; (ii) the degree to which they incorporate an economic approach; (iii) the formal independence of the CA and (iv) the factual independence of the CAs. Each of the 30 variables used for the construction of the four indicators can take values between zero and one with greater values indicating a higher degree of competition mindedness or independence and an equal weight is attached to each variable.

The **OECD** has recently developed indicators characterising competition regimes on the basis of information collected towards CAs. The new OECD competition law and policy (CLP) indicators measure the strength and scope of competition regimes in 34 OECD and 15 non-OECD jurisdictions in 2013. An indicator for the EC is provided. A previous attempt to calculate these indicators took already place in 2007. Three CLP indicators cover different aspects of the effectiveness of competition regimes – the scope of action, the policy followed on anti-competitive behaviours, the probity of investigation – and one indicator concerns competition advocacy (see Box III.2 for the definition of the OECD CLP indicators). A more disaggregated set of indicators (including 12 indicators) is also available.

As shown by Box III.2, the OECD CLP indicators capture many dimensions of competition policy. However, these indicators are only available for one point in time. They are based on answers directly provided by the CAs to a very detailed questionnaire. A score on a 0-6 scale (from the most to the least effective competition regime) is assigned to each possible answer but most jurisdictions are scored between 0 and 2 (see, for example, Table A.1 in Annex 1). An effort has been made to define criteria based on a broad consensus on what constitutes a ‘good’ competition policy leading to more competition while allowing efficiency gains. The indicators also aim at capturing not only de jure characteristics of competition policy but also de facto information showing how the rules are effectively implemented.

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19 See Høj (2007).
Box III.2: Definition of the OECD Competition and Law Indicators.

The four CPL indicators cover the following features of competition policy:

Scope of action to deter, discover, stop and punish anticompetitive behaviours and mergers: These are measured by the extent of exemptions from the competition law for public and foreign firms, the powers of the institutions enforcing the competition law to investigate and impose sanctions on competition law infringements and to investigate and remedy or block anticompetitive mergers, and the possibility for individuals, firms or group of consumers to take legal action against firms whose actions have caused them economic or financial harm.

Policy on anticompetitive behaviours: An effective competition law and policy regime is one where anticompetitive behaviours and mergers that result in welfare and productivity losses are punished or blocked. This requires that during the investigation of an allegedly antitrust infringement or of a merger, the economic impact of each case is assessed and potential efficiencies generated are taken into account. The ‘policy on anticompetitive behaviours’ indicator assesses whether anticompetitive behaviours and anticompetitive mergers are prohibited and what factors are considered when assessing them. It also captures whether in the last five years there have been interventions against such behaviours and mergers (e.g. by blocking an anticompetitive merger, or by imposing sanctions on a firm for its exclusionary conduct).

Probity of investigation: The degree of probity of an investigation measures the quality, soundness and transparency of competition law enforcement. It is measured here in terms of three main sub-components: the independence of the institutions enforcing competition law (i.e. whether governments interfere with the investigations or the decisions taken on antitrust infringements and mergers); the fairness of the procedure (i.e. the right of investigated firms to be heard and to receive information on the procedures); and the accountability of the competition regime (i.e. whether the activities and the decisions of the agency are transparent and could be appealed to in court).

Advocacy: This indicator captures the capacity of the competition regime to advocate for a more competitive environment at different government levels, by reviewing new regulation for its impact on competition, and performing market studies that deliver recommendations on how to foster competition.

Each of these four components is further disaggregated into 12 indicators. The more disaggregate set of 12 indicators cover the following features of competition law and policy: competences, powers to investigate, powers to sanction and remedy, private enforcement, policy on horizontal agreements, policy on vertical agreements, policy on mergers, policy on exclusionary conducts, independence, accountability, procedural fairness, advocacy.

Source: OECD (2013b)

The OECD CLP indicators show that, in 2013, competition regimes were broadly similar across countries in the policy areas covered by these indicators, with OECD countries having competition policy regimes closer to best practice than non-OECD countries. The EC has the highest score for the three indicators on the effectiveness of competition regimes but advocacy. As noted by the OECD (OECD (2013b)), this convergence in performances might be due to the fact that most competition regimes have adopted all or a large number of the ‘good’ policy settings captured by the indicators. However, it might also be the case the indicators do not sufficiently reflect the complexity of these policy settings. The limited variability across countries reduces the usefulness of these indicators for empirical work aiming to link the quality of competition policy regimes to macroeconomic variables.

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20 The EC scores 0.4 for the indicator on advocacy, which is the second highest score. The best score is 0.0 obtained by Denmark and the UK.
The indicators on the quality of competition regimes presented in this section are based on a vast amount of information, which is highly valuable. However, they suffer from a number of drawbacks. First, they involve many value judgements which are debatable. This is particularly the case for the indicators assessing the quality of laws: for example, in the case of abuses of dominance, the debate between a per se prohibition and the rule of reason standard is still open. Second, the construction of these indices is additive and does not allow taking into account that the features of an optimal institutional design are often interdependent. For example, characteristic A may be better than characteristic B if and only if characteristic C is also met. Similarly, some elements of a competition policy regime may be more important for one country than another, depending on its characteristics (size, openness to trade,). Finally, the usefulness of these indexes for cross-country comparisons is poor, due to the limited variation across countries.

(ii) Output indicators

Output indicators include indicators based on hard and soft data. On the hand, they concern the results of surveys describing the perceived effectiveness of competition policy. On the other hand, they also cover data on the interventions made by the CAs (see Table III.5).

Table III.5 Output indicators

<table>
<thead>
<tr>
<th>Author</th>
<th>Type of indicators</th>
<th>Period/country</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surveys</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMD (2014)</td>
<td>One indicator on the effectiveness of competition legislation and one indicator on distortions created by subsidies based on annual executive opinion survey (6,200 respondents).</td>
<td>Annual Survey 1989-2014. 60 countries (26 CAs from the EU but no aggregate indicator for the EC).</td>
</tr>
<tr>
<td><strong>Interventions of the CAs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Competition Review (2013)</td>
<td>14 indicators (relying on information provided by CA) on the number of investigations and their main characteristics (in the area of mergers, cartels and abuse of dominance).</td>
<td>Annual survey 2000-2013 37 CAs from developed and developing countries (20 CAs from the EU)</td>
</tr>
</tbody>
</table>
Surveys

Surveys evidence enables a comparison of regimes across countries using the experience of individuals working in these countries. The "World Economic Forum"\textsuperscript{21} (WEF) conducts for more than 30 years an annual survey on around 140 countries that includes a valuation by local business leaders on the conditions of competition and the effectiveness of competition policy in their country. To that end, these local business leaders are invited to rank on a scale of 1 to 7 (i) the intensity of local competition; (ii) the extent of market dominance; and, (iii) the effectiveness of anti-monopoly policy\textsuperscript{22}. Only the third variable concerns the quality of competition regimes, while the two others rather describe the degree of competition in the country\textsuperscript{23}. No indicator for the EC is provided by the WEF. This survey covers a wider range of issues than competition, such as infrastructure, innovation, financial environment, foreign trade and investment, environment, etc... The results of the survey are used to calculate the Global Competitiveness Index and other Forum indexes\textsuperscript{24}. The indicator on the effectiveness of antimonopoly policy calculated on the basis of this survey has been widely used in academic publications (see Sub-sections III.2.2.2 and III.2.3.1 on empirical results).

Since 1989, the IMD World Competitiveness Yearbook publishes an annual report on the competitiveness of nations covering 60 economies (including 26 EU countries). This report combines hard and soft data and proposes three indicators in the area of competition policy. A first indicator describes government subsidies to private and public companies as a percentage of GDP. The two other indicators are based on the answers provided by a representative sample of executives in top and middle management in the economies covered by the report. These business executives are invited to assess on a scale of 1 to 6 (i) whether subsidies distort fair competition and economic development and (ii) whether competition legislation is efficient in preventing unfair competition. This last indicator is very similar to the one provided in the WEF report and as shown in the next section, there is indeed a high correlation (0.9) in the performances of EU countries as measured by the WEF and the IMD indicators.

These survey indicators are based on the subjective assessment of the effectiveness of competition policy by local business leaders. They have weaknesses as highlighted by several authors (see OECD (2013b), Petersen (2013) and Buccirossi et al. (2011)). They are simplistic, very often based on a single question. They show a high volatility for the same country for different years. Finally, they may also be biased by executives’ beliefs or economic conditions as local business people may not be familiar with competition regimes in other countries and may have difficulties in performing a meaningful comparison.

\textsuperscript{21} See World Economic Forum (2010).
\textsuperscript{22} Business executives are asked to what extent ant-monopoly policy promotes competition in their country (answer choices range from 1 for "does not promote competition" to 7 for "effectively promotes competition").
\textsuperscript{23} Krakowski finds that the perceived effectiveness of antimonopoly policy is highly correlated with the perceived intensity of local competition. See Krakowski (2005).
Interventions of the CAs

The interventions of the CAs are their decisions and advocacy interventions. Sometimes, appeals against the agency decisions are also considered. A priori, these indicators should be easy to obtain. However, several authors (for example, Kee and Hoekman (2007), Kovacic (2006), Bergman (2008), Buccirossi (2011)) complain about the lack of transparency of the CAs and a regular track record of the number of infringements detected and sanctions imposed is not available. Moreover, there are two caveats regarding the use of output indicators. First, a distinction should be made between different types of decisions, according to their complexity and the corresponding time and resources devoted to this decision. For example, a simplified phase I merger decision taken by the EC should not have the same weight than a complex phase II decision. Second, the number of decisions taken by a CA is influenced by its resources and may reflect the size of the economy. Therefore, it is necessary to control for resources and for country size.

The GCR distinguishes 14 output indicators related to the merger cases (e.g., number of mergers filed, % of mergers going in depth reviews...), cartels (number of leniency applications, fines) and dominance investigations. Clougherty (2010) also uses the increase in the number of notified mergers over the period 1992-2007 to compare workload across 32 jurisdictions and to see whether there is a parallel increase in the budget. He concludes that this is the case. Other empirical work has sometimes used the number of decisions as instrumental variables to measure competition to avoid endogeneity problems (see for example, Aghion et al. (2005 and 2009)). Work in progress by Guenster and Klein (2013) which attempts to measure the impact of European antitrust enforcement on competition intensity in industry is based on output indicators of enforcement measuring the European collusion and vertical restrains cases decided under articles 101 and 102 over the period 1998-2008. These output indicators have been collected by a survey made by Carree et al. (2010) of European Antitrust law enforcement.

Finally, although data on the number of interventions made by CAs are used to construct more complex indicator combining input and output variables, they are rarely used in isolation in empirical analysis.

(iii) Indicators combining input and output variables

There are also indicators combining input and output variables to give an overview of the quality of competition regimes. Some of these indicators even mix information on the quality of competition regimes with information on the conditions of competition (see for example, the indicator developed by Aiginger). This makes the interpretation of these indicators very difficult. Table III.6 describes these indicators.
### Table III.6  Indicators combining input and output variables

<table>
<thead>
<tr>
<th>Institutions</th>
<th>Type of indicators</th>
<th>Period/country</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global Competition Review (2014)</strong></td>
<td>Ranking of the performances of CAs based on input and output indicators and views of users of CAs’ services.</td>
<td>Annual survey 2000-2014. 37 CAs from developed and developing countries (20 CAs from the EU + EC).</td>
</tr>
<tr>
<td><strong>Alginner (2008)</strong></td>
<td>Ranking of the performances of countries based on 13 indicators (WEF and IMD surveys, GCR star rating, product market regulation and ex-post performances in terms of price-cost margin, openness)</td>
<td>Mid 2000 26 countries (22 EU countries)</td>
</tr>
<tr>
<td><strong>Buccirossi et al. (2011)</strong></td>
<td>Indicator combining input data (resources, <em>de jure</em> and <em>de facto</em> characteristics of competition laws and institutions) and output data (number of cartel cases opened and mergers examined).</td>
<td>Composite indicator measuring the deterrence properties of CP on the basis of 6 categories of criteria: (i) the degree of independence of the CA, (ii), the separation between adjudicator and prosecutor, (ii) the quality of law on the books, (4) the scope of investigative powers of the CA, (5) the sanctions which can be and are effectively imposed and (6) the level of activity of the CA and the amount and quality of human and financial resources of the CA.</td>
</tr>
<tr>
<td></td>
<td>1995-2005 13 OECD jurisdictions (including 9 EU countries + the EC)</td>
<td></td>
</tr>
</tbody>
</table>

Since 2000, the *Global Competition Review* (GCR) publishes every year an annual survey ‘Rating Enforcement’, ranking the performances of CAs in several jurisdictions on the basis of input and output indicators as well as views of “users” of CAs’ services. The methodology used to obtain this ranking is not precisely defined. To assess the results of the work of each CA, GCR uses two main sources of information. First, it sends a detailed questionnaire to the CAs, covering a broad range of features of these authorities. The questionnaire includes questions on input measures, such as the staff and budget of the CA, output measures such as the number of interventions (mergers, cartels and dominance investigations), cartel fines and duration of cartel and dominance interventions. Second, it seeks feedback from people who know the authority best: antitrust lawyers and economists, academics and local journalists who routinely cover the agency works. Local competition lawyers are asked to fill out an online survey giving their views on the CA’s performance in each of its enforcement duties, as well as the level of professionalism and independence of the agency.

On that base, each CA is rated on a scale from one to five and it can compare its score to its international counterparts. However, as each CA has very different resources (for example, the combined budget of the two US antitrust agencies is more than double the combined budgets of the 20 most poorly funded CAs), a performance indicator is provided in addition to the star ranking. If an agency is considered to have made an excellent use of its resources and has surpassed its previous accomplishments, this is indicated with an “up” arrow. In the 2014 GCR survey, DG Competition got a five star and a horizontal arrow,
indicating that, on the basis of this survey, it is at the top of the ranking and has performed as expected.

**Aiginger** (2008) has also constructed a very heterogeneous composite indicator on the "toughness of competition". This indicator combines 13 variables of very different nature: survey results on the intensity of competition and the effectiveness of competition policy, star rating from the GCR and indicators of ex-post performances\(^{25}\). The composite indicator is obtained by ranking the countries for the 13 indicators and then taking average ranks over the indicator set. This indicator is not *stricto sensu* an indicator of the quality of competition regime as it also includes information on the conditions of competition and other indicator of ex-post performances. Finally, it also integrates the GCR star rating, which is itself a composite indicator. For all these reasons, this indicator is very difficult to interpret and its quality is doubtful.

Very recently, **Buccirossi et al.** (2011) developed another set of composite indicators, the Competition Policy Indexes (CPI), which aim at measuring the deterrence properties of a jurisdiction’s competition policy. The idea is that the quality of a competition regime is measured by its ability to deter all those market actions that harm social welfare. The authors identify three key determinants of deterrence: (i) the size of sanctions; (ii) the expected probability of detection and conviction and (iii) the expected probability of errors in the investigation. Six categories of policy variables for four competition areas (cartel, abuses of dominant positions, other practices and mergers), representing altogether 53 indicators, are considered to affect these three key determinants: (i) the degree of independence of the CA; (ii) the separation between adjudicator and prosecutor; (iii) the quality of law on the books; (4) the scope of investigative powers of the CA; (5) the sanctions which can be and are effectively imposed; and (6) the level of activity of the CA and the amount and quality of human and financial resources of the CA. The CPI combine thus input data on the resources of the CA and on the characteristics of competition laws and institutions (*de jure* and *de facto*) but also output data on the level of activity of the CA, such as the number of cartel cases opened and the number of mergers examined.

The data necessary to calculate the CPI indexes were directly obtained from the CAs operating in 13 OECD jurisdictions on the basis of a questionnaire. The information is collected for the period 1995-2005. Each piece of information on each policy feature receives a score on a scale of 0 to 1 against a benchmark of generally agreed-upon best practice. All the information is then aggregated into four summary CPI measuring the quality of antitrust policy, merger control, institutional and enforcement features\(^{26}\). A weakness of the aggregate CPI index is that it shows little variation across countries (as it is the case for the OECD index) and over time.

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\(^{25}\) More precisely, the "Aiginger" indicator combines the following 13 indicators: 4 WEF survey indicators (intensity of local competition, effectiveness of antitrust policy, extent of market dominance and time required to start a new business), 3 IMD survey indicator (Government subsidies, state ownership, competition legislation), the star rating of the GCR, the OECD indicator of product market regulation and 4 indicators of ex-post performances (wage share, price cost-margin, persistence of price-cost margin, openness).

\(^{26}\) As any other composite indicator, the construction of these indices can be criticised regarding the weights used to calculate the aggregate index; however, the authors have tested the sensitivity of the index to alternative weighting schemes using three alternative weighting schemes, equal weights, weights based on factor analysis and random weights.
2.2.2 A critical view of the indicators of the strength of competition policy

This section attempts to qualify the robustness of the different indicators described above. It starts by summarising the strengths and weaknesses of these indicators. Then, it analyses the correlation between these indicators and shows that there is no correlation between input and output indicators. Finally, it presents econometric work which attempt to analyse the link between input indicators and the perceived effectiveness of competition policy. Some of these analyses find that the quality of competition laws and institutions has a positive impact of this perceived effectiveness.

(i) Pros and cons of the different indicators

Table III.7 gives an overview of the pros and cons of the different indicators described above.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antitrust regime (Y/N)</td>
<td>Simplicity.</td>
<td>Indicator does not allow taking into account the heterogeneity of competition laws. Measurement error if binary variable has the value of one because the country has an antitrust regime and this regime is totally ineffective.</td>
</tr>
<tr>
<td>Input indicators on the staff and budget of the CAs (GCR indicator)</td>
<td>Greater objectivity but need to control for country size and the scope of tasks of the CAs.</td>
<td>Very partial view of the quality of a competition policy. Assumes that there is a positive relationship between the resources of CAs and the quality of competition policy, which is not necessarily right.</td>
</tr>
<tr>
<td>De jure characteristics of competition laws (Nicholson)</td>
<td>Bottom-up indicators based on well-defined features of competition laws. Transparency about the benchmark generally based on agreed-upon best practice.</td>
<td>Risk of disparity between the formal scope of competition laws and their enforcement. Value judgement on the benchmark when there is no agreed-upon best practice. Aggregation problems (weights).</td>
</tr>
<tr>
<td>De jure and de facto characteristics of competition laws and institutions (Voigt, OECD)</td>
<td>Idem de jure. Very often based on the expertise of the CAs.</td>
<td>Value judgement on the benchmark when there is no agreed-upon best practice (more critical issue than for de jure indicators). Aggregation problems (weights). Does not allow taking into account interdependence between laws and enforcement. Little variation across countries.</td>
</tr>
<tr>
<td>Surveys based on the views of local business leaders (WEF, IMD indicators)</td>
<td>Simplicity.</td>
<td>Over-simplistic (very often based on a single question). High volatility from one year to another for the same country. May be biased by executives ‘s beliefs.</td>
</tr>
<tr>
<td>Interventions of the CAs</td>
<td>Greater objectivity but need to control for country size.</td>
<td>Need to take into account the various degree of complexity of decisions. Limited empirical analysis made on the basis of these indicators, raising doubts about the ability to find significant relationship between these indicators and competition and/or macroeconomic performances.</td>
</tr>
<tr>
<td>Composite indicators (combining, input, output and survey results) (GCR, Buccirossi)</td>
<td>Idem de jure and de facto. Summarise a vast amount of information.</td>
<td>Idem de jure and de facto. Very often combines oranges and peers making it difficult to interpret the indicator.</td>
</tr>
</tbody>
</table>
Table III.7 shows that there is a trade-off between the apparent simplicity and objectivity of the indicators and the specificities of the various dimensions of competition policy which can be covered. Nicholson (2004) considers that there is a trade-off between the geographic coverage and the depth of the analysis of competition regime. However, the recent work done by the OECD seems to contradict this statement as these indicators cover many features of competition policy for 34 OECD and 15 non-OECD jurisdictions but these data are only available for 2013.

Overall, one can conclude that the indicators measuring the quality of competition regimes are not yet satisfactory. Summarising the content of complex competition laws and characterising enforcement across countries is difficult. At one extreme, one finds over simplistic indicators (binary variables) and at the other, complex indicators combining very different elements of competition regimes and therefore difficult to interpret. One avenue which is so far relatively unexplored is the one of the output indicators measuring enforcement of competition laws. This would require a better recording by CAs of their interventions as well as increased transparency on such matters.

(ii) Correlation between different indicators

There is little correlation between the performances of countries as measured by the different indicators. For example, Nicholson calculated the correlation between its ALI and the WEF indicator and he found a small negative correlation. He concludes that strong laws do not necessarily represent effective antitrust policy. However, it remains very surprising to find a negative correlation, which implies that the effectiveness of anti-monopoly policy would be lower in countries with strong competition laws. He also found that that input measures, such as budget and budget per staff, do not have a significant impact on the ALI, meaning that adding more resources to a CA does not necessarily increase the quality of competition laws.

Voigt (2009) also calculated the correlation amongst the four indicators he has developed and between these indicators and the WEF and IMD indicators. He found that the correlation is high amongst his four indicators. This is particularly the case between the two indicators measuring *de jure* and *de facto* independence. By contrast, the correlation between the ‘Voigt’ indicators and WEF and IMD indicators is much lower (but not negative, as it is the case for the ALI developed by Nicholson). According to Voigt, this can mean either that the ‘competition friendliness’ of a competition agency cannot be grasped by only focusing on the legal basis or that the subjective indicators are biased, for example, because business executives think that competition policy is effective when the economy displays a good overall performance. Voigt also confirms the high correlation between the WEF and IMD indicators.

We have also calculated correlations between the four indicators for which we have data for 2013: the two survey indicators on the perceived effectiveness of competition policy, the GCR ranking and the OECD CPL indicators (see Table III.8).
Table III.8  Correlation between the OECD, GCR and WEF indicators

<table>
<thead>
<tr>
<th>Scope of action</th>
<th>OECD policy on anti-comp behaviour.</th>
<th>OECD probity of investigation</th>
<th>OECD advocacy</th>
<th>GCR</th>
<th>WEF</th>
<th>IMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.51***</td>
<td>0.35*</td>
<td>0.46**</td>
<td>-0.34</td>
<td>0.42**</td>
<td>0.39**</td>
</tr>
<tr>
<td>Policy on anti-comp behaviour.</td>
<td>1</td>
<td>0.07</td>
<td>0.61**</td>
<td>-0.02</td>
<td>0.06</td>
<td>-0.1</td>
</tr>
<tr>
<td>Probity of investigation</td>
<td>1</td>
<td>0.43**</td>
<td>-0.21</td>
<td>0.03</td>
<td>-0.08</td>
<td></td>
</tr>
<tr>
<td>Advocacy</td>
<td>1</td>
<td>-0.1</td>
<td>0</td>
<td>-0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GCR</td>
<td>1</td>
<td>0.27</td>
<td>0.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEF</td>
<td>1</td>
<td></td>
<td>0.88***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMD</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*, ** and *** indicate the significance level (10%, 5% and 1%) of the correlation coefficients.

Table III.8 shows that most of the four OECD CLP indicators are positively correlated with each other, but with a relatively low correlation varying between 0.3 and 0.5. The OECD CLP indicators are not correlated with the GCR, WEF and IMD indicators (with the exception of the OECD indicator on the scope of action). The OECD indicator is an input indicator, while the results of the two surveys are output indicators and the GCR combines both. Finally, there is a very high positive correlation between the WEF and IMD indicators and a small positive correlation between the GCR and WEF indicator.

To be less demanding, we have classified the countries into four groups according to their performances on the basis of these 4 indicators (see Annex 1 for raw data and explanation of the grouping of countries). Table III.9 presents the ranking of EU countries into these four groups. This table shows that overall there is little consistency between the grouping of countries according to these indicators (with the exception of the WEF and IMD indicators). The correlations between the grouping based on the GCR survey and that of the WEF is low (0.36) and there is no correlation between the grouping according to these two surveys and that of the OECD.

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27 These results are consistent with those obtained by the OECD (see OECD (2013b)) for OECD countries.
Table III.9  Ranking of countries according to the four surveys *

<table>
<thead>
<tr>
<th>Countries</th>
<th>WEF 2013-2014</th>
<th>IMD 2013</th>
<th>OECD 2013***</th>
<th>GCR 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Belgium</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>na</td>
</tr>
<tr>
<td>Croatia</td>
<td>4</td>
<td>3</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Cyprus</td>
<td>2</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Denmark</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Finland</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>na</td>
</tr>
<tr>
<td>France</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Germany</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Greece</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Hungary</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Ireland</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Italy</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Latvia</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>na</td>
</tr>
<tr>
<td>Lithuania</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Luxemburg</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>na</td>
</tr>
<tr>
<td>Malta</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>na</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Poland</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Portugal</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Romania</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>na</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>na</td>
</tr>
<tr>
<td>Slovenia</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>na</td>
</tr>
<tr>
<td>Spain</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Sweden</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>United Kingdom**</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

* Group 1 is the group of the best performing CAs
**Average ranking of the OFT and of the CC
*** Based on the indicator ‘Probity of investigation’

The OECD reaches the same conclusion that there is no or little correlation between these different indicators28. It considers that this is due to the fact that the indicators do not cover the same policy areas (the OECD indicator is an input indicator, while the results of

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28 See OECD (2013b).
the two surveys are output indicators and the GCR combines both) and that the GCR and WEF indicators rely on subjective assessments. While some credit can be given to this conclusion, it should be said that the four indicators pursue the same objective, which is to measure the quality of competition regimes across jurisdictions. Further work is necessary to better understand the reasons for this lack of correlation between these different indicators. Even though there is no correlation between these indicators because they capture different aspects of competition regimes, they may nevertheless remain useful for empirical work, if used in combination in empirical work.

(iii) **Determinants of the perceived effectiveness of competition policy enforcement**

It is interesting to look at studies using more sophisticated econometric techniques to analyse the link between the input and output indicators of competition policy. Several studies have attempted to analyse the determinants of the effectiveness of competition policy, using the results from the WEF survey as dependent variable. These studies are presented in Table III.10.

**Table III.10 Selected studies on the determinants of the perceived effectiveness of competition policy**

<table>
<thead>
<tr>
<th>Study</th>
<th>Dependent variable</th>
<th>Independent variables</th>
<th>Sample/period</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive link between the strength of competition laws and institutions and the perceived effectiveness of competition policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Krakowski (2005)</td>
<td>WEF indicator on the perceived effectiveness of competition policy (WEFCP).</td>
<td>Binary variables measuring the existence of competition laws (CL) and experience with CL+ a control variable on the overall effectiveness of government policy.</td>
<td>101 countries. 2003-2004</td>
<td>The existence of CL and the experience in the application of CL have a large impact on the effectiveness of CL.</td>
</tr>
<tr>
<td>Rodriguez and DeNardis (2007)</td>
<td>WEFCP.</td>
<td>Common law, perceived intensity of competition (as measured by the WEF indicator), experience with modern competition law, corruption, size and GDP per capita.</td>
<td>102 countries. 2003-2004</td>
<td>The competition agencies in nations characterised by vigorous competition and less corruption perform comparatively well.</td>
</tr>
<tr>
<td>Borell and Jimenez (2008b)</td>
<td>WEFCP.</td>
<td>Authors’ indicators of sound anti-trust policy (cartel, abuse of dominance and mergers) + control variables (GDP per capita and EU membership).</td>
<td>47 countries. 2004</td>
<td>Different institutional and policy characteristics drive the effectiveness of competition policy but other variables (GDP per capita and EU membership) also have an impact.</td>
</tr>
<tr>
<td>Gutmann and Voigt (2014)</td>
<td>WEFCP.</td>
<td>Binary variable taking a value 1 if a competition law has been introduced.</td>
<td>More than 100 developed and developing countries. 2004-2010</td>
<td>High and significant impact of the introduction of competition law on the effectiveness of competition policy.</td>
</tr>
</tbody>
</table>
No significant relationship between the strength of competition laws and institutions and the perceived effectiveness of competition policy

<table>
<thead>
<tr>
<th>Study/Method</th>
<th>Variables</th>
<th>Sample Size</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalkir (2007)</td>
<td>WEFCP. FDI inflows.</td>
<td>47 countries. Data relate to 2001 or 2003</td>
<td>The effectiveness of competition policy is not influenced by (i) the strength of CL and (ii) the amount of resources allocated to competition policy. The effectiveness of competition policy has a positive impact on the FDI attractiveness of a country.</td>
</tr>
<tr>
<td>Nicholson (2004 and 2008)</td>
<td>Antitrust law index (ALI) measuring de jure characteristics of CL.</td>
<td>52 jurisdictions. Laws in effect in 2003</td>
<td>Counterintuitive results: large, poor countries have the strongest laws and no significant relationship between strong CL and effectiveness of competition policy.</td>
</tr>
</tbody>
</table>

Some studies find a positive impact of the existence or strength of competition laws on the perceived effectiveness of competition policy. Krakowski (2005) undertakes a two-steps analysis: first, he analyses the determinants of the effectiveness of competition policy and second, he examines whether the effectiveness of competition policy influences, inter alia, the intensity of competition. For the first-step analysis, he uses two WEF survey indicators on the effectiveness of antitrust policy as dependent variables. The independent variables include a binary variable indicating whether a competition policy is in place or not and an indicator describing the experience of the application of competition policy as measured by the number of years of application. He finds that the effectiveness of competition policy is strongly related to the existence of competition laws. A similar result is obtained by Gutmann and Voigt (2014). However, Krakowski highlights that the WEF indicator on the perceived effectiveness of competition policy shows positive values even in countries where no competition legislation exists. His explanation is that these countries nevertheless apply some kind of sectoral or indirect competition policy. His regression also reveals that the perception regarding the effectiveness of competition policy is positively influenced by the experience of the CA in the application of competition laws.

Rodriguez and DeNardis (2007) aim at explaining cross-country variation in the perceived effectiveness of competition policy, as measured by the WEF indicator. They conclude that CAs operate poorly in jurisdictions characterised by corruption and poor competition intensity. However, contrary to Krakowski, they fail to find a large significant effect of the experience in the application of competition policy.

Finally, Borrell and Jimenez (2008b) want to go deeper into the institutional features of competition policy which determine its effectiveness. To that end, they have constructed an indicator summarising de jure characteristics of competition laws. Their conclusion is that the design of antitrust policy has an impact on its effectiveness. In particular, having an economic approach to dominance investigation, leniency policy and authority independence makes antitrust policy more effective.
However, other studies fail to find a statistically robust link between the strength of competition policy and its perceived effectiveness. For example, Dalkir (2007) does not find a statistically significant relationship between the perceived effectiveness of competition policy and the strength of competition laws (as measured by de jure characteristics of competition law). He also concludes that the resources of CAs do not influence the effectiveness of competition policy and calculates effectiveness gaps (measured as the difference between the actual and predicted level of effectiveness – the predicted level being the level of effectiveness expected on the basis of the resources of the CA and the scope of competition laws). The study concludes that there are gaps between developing versus developed countries, between EU versus non-EU countries and between recent EU members/candidates versus more senior EU members. These effectiveness gaps could be due to the strong enforcement technologies available to agencies in developed countries.

Nicholson (2004 and 2008) analyses the determinants of its Antitrust Law index (ALI), a measure of the de jure characteristics of competition laws. He finds counterintuitive results, such as “small, rich economies may have the weakest laws on the books; large poor countries may have the strongest” and he did not find a significant relationship between the strength of competition laws as measured by the ALI and the effectiveness of competition policy as measured by the WEF, which would imply that the effectiveness of competition policy is independent of its legal foundation. These counterintuitive results might be due to the lack of robustness of the econometric method (ordinary least square regression, no correction for endogeneity), a problem shared by many empirical work. They also put into question the quality of the ALI, as an indicator of the strength of competition policy. Nevertheless, many authors have used this index in their empirical work. Moreover, it is also surprising to regress the indicator of the strength of competition laws on the effectiveness of competition policy while we would rather expect the opposite, i.e. that the effectiveness of competition policy is influenced by the strength of the laws in the books and, as shown by the review presented in this section, this second relationship has been more often tested than the one chosen by Nicholson.

In conclusion, most studies find that the introduction of competition laws and/or the quality of competition laws and institutions has a positive impact on the perceived effectiveness of competition policy. The institutional features of competition policy which seem to influence the most its effectiveness are an economic approach to dominance investigation, an effective leniency policy and an independent CA.

However, not all studies find a statistically robust, positive link between the strength of competition laws and the perceived effectiveness of competition policy (see Dalkir (2007) and Nicholson (2004 and 2008)) while others do. This ambiguous conclusion might be due to two factors. First, it is not sufficient to have appropriate competition laws. They also have to be effectively enforced to have an impact. Unfortunately, we have not found studies linking the effectiveness of competition policy and indicators combining de jure and facto characteristics of competition laws. Second, the effectiveness of competition policy is measured in this literature by a survey based indicator of the effectiveness as perceived by business leaders. This is a subjective indicator which may not provide a fully correct picture of the actual effectiveness of competition policy.
2.2.3 Indicators of the intensity of competition

If one wants to measure the impact of competition policy on competition, one also needs to find indicators of competition. Competition cannot be observed directly. Therefore, indirect measures of competition are commonly used, often in combination, as effective competition is a multidimensional concept which cannot be fully captured by a single measure (see Ilzkovitz et al. (2008)). The indicators capture different dimensions of competition reflecting elements of market structure (measured by market concentration, market openness, entry barriers), market conduct (volatility in market shares, entry/exit, business dynamism, management quality) and market performance (mark-ups, profitability), as well as other dimensions (number of competition law infringements). Survey indicators describing the perceived intensity of competition by business leaders are considered as well. These indicators are presented in Table III.11.

Table III.11 Measures of competition

<table>
<thead>
<tr>
<th>Dimension of competition</th>
<th>Indicators</th>
<th>Correlation with competition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market structure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market concentration</td>
<td>HHI, market share of the n largest firms</td>
<td>Ambivalent</td>
</tr>
<tr>
<td>Market openness</td>
<td>Import penetration</td>
<td>Positive</td>
</tr>
<tr>
<td>Entry barriers</td>
<td>Sunk costs</td>
<td>Negative</td>
</tr>
<tr>
<td><strong>Market Conduct</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbulence in the market</td>
<td>Volatility of market shares Entry and exit Ratio of the number of firms that have belonged to the group of the 8 largest firms in a given period over the maximum number of different firms that could have potentially been included in this group in this period(^{29}).</td>
<td>Positive Positive The closest is the ratio to 1, the highest is the degree of competition</td>
</tr>
<tr>
<td>Business dynamism</td>
<td>Dynamism of the distribution of business growth: a more dynamic business growth distribution is characterised by more growing and shrinking firms and less static firms(^{30}).</td>
<td>Positive</td>
</tr>
<tr>
<td>Management quality</td>
<td>Survey on management performance: indicators of management performance have been developed by Bloom et al. (2007, 2010 and 2012) on the basis of a survey carried out amongst 10,000 medium-sized firms across Asia, Europe and the Americas over the last decade.(^{31})</td>
<td>Positive</td>
</tr>
</tbody>
</table>

\(^{29}\) See Ilzkovitz et al. (2008).

\(^{30}\) See Bravo-Biosca (2010 and 2011).

\(^{31}\) Management performance is measured on the basis of eighteen basic management practices covering three broad areas: monitoring (e.g., product quality), target setting (e.g., production targets) and people (reward of best employees).
Market performance

<table>
<thead>
<tr>
<th>Market performance</th>
<th>Marginal costs are difficult to measure. Proxies are: inverse of the labour income share in GDP\textsuperscript{32} or difference between price and average costs or econometric estimations (see Roeger, Christopoulou and Vermeulen\textsuperscript{33})</th>
<th>Negative</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Profit (defined as the difference between total revenues and total costs)</th>
<th>Profit margin = operating surplus over output Return on capital</th>
<th>Ambivalent</th>
</tr>
</thead>
</table>

| Link between profit and efficiency\textsuperscript{34} | Boone indicator = elasticity of profit to cost efficiency Relative Profit Difference | Negative (the more competitive are the markets, the smaller is the elasticity) Positive (an increase in competition means that the most efficient firms gain more relative to the less efficient firms) |

Other dimensions

<table>
<thead>
<tr>
<th>Indication of competition problems</th>
<th>Number of competition law infringements</th>
<th>Negative</th>
</tr>
</thead>
</table>

| Perceived local competition | Annual survey of local business leaders organised by the ‘World Economic Forum’ in around 140 countries including questions on the conditions of competition\textsuperscript{35} | Positive |

Some of these indicators are more used than others in the empirical work analysing the macroeconomic impact of competition. This is the case for indicators of market openness, mark-ups, business dynamism and management quality. Authors use various methods to calculate competition indicators including direct calculations from financial and accounting data, surveys or econometric techniques. For example, mark-ups, which are used as a proxy of imperfect competition, may be calculated by regressing output on the factors of production. Survey indicators on the perceived local competition are mainly utilised in empirical analysis aiming to measure the macroeconomic impact of competition policy.

The classic structure–conduct–performance (S-C-P) paradigm holds that market structure determines competitive conduct and hence performances. According to this paradigm, the changes in competition affect the market structure, leading to an increase in the number of firms, a decrease in the concentration on the market and increased market openness. This changes market conduct, as measured by volatility in market shares, entry and exit, greater business dynamism and better management quality and this in turn leads to a reduction in mark-ups and profitability and an increase in efficiency of firms.

\textsuperscript{32} See, for example, Przybyla and Roma (2005).

\textsuperscript{33} Roeger (1995) and Christopoulou and Vermeulen (2012).

\textsuperscript{34} The main advantage of this indicator over the conventional ones (like the profit) is that it allows integrating the efficiency effects of competition while this is not the case for the profit. For example, an increase in profit can be due to a decrease in costs instead than to an increase in market power. However, this indicator is still under development and empirical proof of its usefulness is limited. See Boone, van Ours and van der Wiel (2007), Boone (2008) and Boone and Van Leuvensteijn (2010).

\textsuperscript{35} Local business leaders are invited to rank on a scale of 1 to 7: (i) the intensity of local competition; and (ii) the extent of market dominance.
However, the interactions between these variables are more complex than those depicted by the S-C-P causality and, in some cases, the correlation between a given indicator and competition can be positive or negative. For example, the link between competition and concentration is ambivalent: on the one hand, less competition is expected in more concentrated markets but, on the other hand, a higher degree of concentration may be an indication of intense competition, with more efficient firms increasing their market share by pushing less efficient firms from the market. Similarly, in some cases, markets can be very competitive even with only a few firms if customers see little difference between their products.

The correlation between competition and profits can also be positive or negative. Stronger competition is expected to reduce profits as prices become closer to marginal costs. But competition may also affect profits in a positive way by encouraging companies to reduce their costs and by leading to the exit of less efficient firms from the market. The Boone indicator allows integrating the efficiency effects of competition but this indicator is still under development.

2.3 Macro-econometric modelling of the effects of competition policy

This section describes empirical work analysing the macroeconomic impact of competition policy, focusing on empirical work from 2000. Direct comparisons between the various studies are difficult without organising these studies on the basis of the main effect analysed. A distinction is made between two categories of studies: studies analysing the impact of competition policy on the degree of competition and studies analysing the impact of competition policy on economic performance at the national or sectoral level.

The challenge for researchers is that national or sectoral growth rates are influenced by many factors. Isolating the effects of competition policy interventions from other ‘regulatory’ product market reforms is very difficult. Moreover, as there is relatively little cross-country variation in competition policy enforcement (at least between EU Member States), the researcher is typically reduced to estimating the effect of competition policy on intermediate variables that are only indirectly related to overall consumer welfare measures. Therefore, cross-sectional and panel data analyses are often essential to get the bigger picture.

Most of the studies covered here use reduced form estimation methods. They will be differentiated according to the dependent variable used to measure the strength of competition policy. However, comparisons between studies remain fragile because of the variety of variables used and of the different period and country coverage.

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36 See Bikker (2009).

37 Sometimes, a given study covers two different issues. To avoid repetitions and not arbitrarily divide the empirical work, we will quote it once and refer to the different issues altogether.
2.3.1 Impact of competition policy on competition

There are a few studies analysing the link between the strength of competition policy and the perceived intensity of local competition as measured by the WEF survey. These studies are presented in Table III.12. They come to the conclusion that the strength of competition policy (as perceived by business leaders or as measured by the quality of competition laws and institutions) has a positive impact on the perceived competition intensity. Other variables, such as the size of the economy, its degree of openness and GDP per capita also, have a positive impact on competition, suggesting that having wealthy, large and open markets is as important for competition as competition laws. However, these results are not always robust, in particular, if corrected for endogeneity. Again, the measure of competition is based on a subjective assessment of competition by business leaders.

Table III.12 Selected studies on the impact of the strength of competition policy on competition

<table>
<thead>
<tr>
<th>Study</th>
<th>Dependent variable</th>
<th>Independent variables</th>
<th>Sample/period</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krakowski (2005)</td>
<td>WEF indicator on the intensity of local competition (WEFC).</td>
<td>WEFCP indicator + control variables on external protection and size of the economy.</td>
<td>101 countries. 2003-2004</td>
<td>The effectiveness of CL has a significant impact on the intensity of local competition. Size of the economy has an impact as well.</td>
</tr>
<tr>
<td>Hylton and Deng (2007)</td>
<td>WEF, PPP exchange rate</td>
<td>Scope index measuring <em>de jure</em> characteristics of CL, age of competition, budget of the CA in % of GDP + control variables (GDP per capita, population, imports as % of GDP government consumption as a % of GDP).</td>
<td>102 countries. 2003</td>
<td>Positive impact of the quality of competition laws, GDP per capita, imports as % of GDP and population on the perceived intensity of competition. But results regarding the positive impact of competition policy not robust if instrumental variables regressions are used for correction of endogeneity bias.</td>
</tr>
<tr>
<td>Sama (2013)</td>
<td>WEF indicators on the perceived intensity of local competition and the perceived extent of market dominance.</td>
<td>Voigt indicator on de jure and de facto characteristics of CL</td>
<td>79 developed and developing countries. 2008</td>
<td>The quality of competition regimes has a positive impact on the perceived intensity of local competition. Results are less robust if instrumental variables regressions are used to correct for endogeneity bias.</td>
</tr>
</tbody>
</table>

Krakowski (2005) analyses the link between the two WEF survey indicators, the one measuring the perceived effectiveness of competition policy and the one measuring the perceived intensity of competition. He shows that the perceived intensity of local competition is positively affected by the perceived effectiveness of competition policy. The size of the economy has also a significant impact on the perceived intensity of local competition but indicators of external protection do not have an impact.
**Hylton and Deng** (2007) analyse whether the strength of competition laws has an impact on the perceived intensity of competition. The strength of competition laws is measured by their “Scope Index” combining de jure characteristics of competition law. Two other input indicators of the quality of competition regimes are considered: the “age of competition law” as a proxy for an enforcement culture and the enforcement budget relative to GDP. Two variables are used to appraise the intensity of competition: the first is the WEF survey measure on the perceived intensity of local competition and the second is the Purchasing Power Parity exchange rate as a proxy of the effect of competition on prices.

Using Ordinary least squares regression, they find that a wider scope of competition laws is associated with an increase in perceived intensity of competition, as measured by the WEF survey indicator\(^{38}\). However they find no significant effect for the age of competition and the budget. Three other variables have a positive impact on the intensity of competition, the GDP per capita, the population of the country and imports in percentage of GDP. If a correction is made to take into account of the endogeneity issue (the strength of competition laws influence the intensity of competition but the intensity of competition can also impact the strength of competition laws), they do not find a statistically significant impact of the strength of competition laws on the perceived intensity of competition while the positive impact of GDP per capita, population and imports in percentage of GDP persist.

**Sama** (2013) analyses the impact of the strength of de jure and de facto competition laws (indicator built by Voigt) on the perceived intensity of local competition, as measured by the WEF survey. He confirms the result obtained by Hylton and Deng, i.e., that the strength of institutional features of competition laws (de jure and de facto) has a positive impact on competition.

### 2.3.2 Impact of competition policy on macroeconomic performances

A number of relatively recent studies attempt to assess whether countries with competition laws or more effective competition laws achieve faster growth (see Table III.13). A distinction is made between studies analysing the impact of competition policy on mark-ups, productivity and GDP (GDP per capita) growth or other intermediate growth drivers, such as investments or foreign direct investments (FDI).

**Table III.13 Selected studies on the macroeconomic impact of competition policy**

<table>
<thead>
<tr>
<th>Study</th>
<th>Dependent variable</th>
<th>Independent variables</th>
<th>Sample/period</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mark-ups</strong></td>
<td></td>
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</tr>
<tr>
<td>Kee and Hoekman (2007)</td>
<td>Industry mark-up and number of firms.</td>
<td>Binary variable measuring the adoption of a competition law.</td>
<td>42 developed and developing countries and 28 industries. 1981-1998. Information on competition laws from 2000.</td>
<td>The direct effect of competition law adoption on industry mark-up is unclear. Competition laws have a significant effect (+ 29% over 25 years) in increasing the number of firms in the longer run, which indirectly lowers industry mark-ups, especially in highly concentrated industries.</td>
</tr>
</tbody>
</table>

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\(^{38}\) They find no impact of their Scope Index on the PPP exchange rate proxy for the intensity of competition.
<table>
<thead>
<tr>
<th><strong>Mc Cloughan et al. (2007)</strong></th>
<th>Price-cost margin.</th>
<th>Effectiveness of CP, as measured by the GCR ranking + control variables (market growth, spare capacity, import penetration).</th>
<th>19 countries. 1999-2003</th>
<th>Statistically negative relation between the strength of competition policy and the price-cost margin.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Productivity</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Borrell and Tolosa (2008a)</strong></td>
<td>Total Factor Productivity (TFP).</td>
<td>WEF perceived effectiveness of competition policy.</td>
<td>85 countries.</td>
<td>Positive effect of competition policy effectiveness on TFP. Important to take into account the endogeneity of competition policy.</td>
</tr>
<tr>
<td><strong>Ma (2011)</strong></td>
<td>Average annual growth rate of productivity.</td>
<td>Hylton and Deng scope index measuring de jure characteristics of CL interacted with a variable measuring the efficiency of government + Solow control variable.</td>
<td>101 countries. (developed and developing countries) 1990-2004</td>
<td>No statistically significant impact of the competition law index but positive impact of the effective enforcement of competition law in rich countries (upper-middle income plus high-middle income countries according to the World Bank classification). Statistically significant positive relationship between the strength of competition policy and TFP. Negative impact between the strength of competition policy and mark-up but results less robust</td>
</tr>
<tr>
<td><strong>Buccirossi et al. (2008b, 2013)</strong></td>
<td>Mark-up and TFP.</td>
<td>Competition policy indexes combining input and output variables + control variables (product market regulation, trade openness, R&amp;D spending and institutional quality).</td>
<td>12 OECD countries. 22 industries 1995-2005</td>
<td>Statistically significant positive relationship between the strength of competition policy and TFP. Negative impact between the strength of competition policy and mark-up but results less robust</td>
</tr>
<tr>
<td><strong>Voigt (2006 and 2009)</strong></td>
<td>Growth rate of TFP.</td>
<td>Strength of competition policy measured by a ‘Voigt index’ summarising de facto and de jure characteristic of competition policy.</td>
<td>Around 100 countries. 2000</td>
<td>No robust or strong impact of competition policy of TFP.</td>
</tr>
<tr>
<td><strong>Other indicators of macroeconomic performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dalkir (2007)</strong></td>
<td>FDI inflows.</td>
<td>WEFCP + control variables (inflation, economic liberalisation, market size).</td>
<td>47 countries. Data relate to 2001 or 2003</td>
<td>The effectiveness of competition policy has a positive impact on the FDI attractiveness of a country.</td>
</tr>
</tbody>
</table>
Aiginger (2008) Composite indicator of macroeconomic performances. Composite indicator of the toughness of competition combining 13 indicators from surveys (WEF, IMD and GCR) with indicators of product market regulation and indicators of effective competition. 29 countries. Averages 1995-2005 or 2005 (depending on the indicators) Positive relation between the composite indicator of competition and a composite indicator of economic performance. Positive impact of the toughness of competition on macroeconomic performances. Robustness of the result need to be tested.


Petersen (2013) GDP per capita or growth of GDP per capita. Introduction of antitrust law as measured by a binary variable and the Nicholson ALI + control variables. 154 countries. 1960-2005 Study analysing the impact of antitrust law on democracy (no significant impact) and on development and growth (positive long-term effect).

Gutmann and Voigt (2014) Growth rate of GDP per capita Growth rate of TFP Investment as share of GDP FDI as share in GDP Binary variable and strength of competition policy as measured by the Voigt index. 179 countries. 1971-2012 Strong effect on growth and investment. No effect on productivity growth and FDI.

Kee and Hoekman (2007) analyse the impact of competition policy on industry mark-up and on the number of firms. They use a binary variable binary indicating whether a competition policy is in place or not, as a second best as time series, cross-country data on enforcement of competition laws are not available. In the short term, with a fixed number of firms in the industry, the effect of the adoption of competition laws on mark-up is theoretically ambiguous: on the one hand, the adoption of competition laws should increase competition between domestic firms and reduce industry mark-ups but, on the other hand, competition laws may lead to higher mark-ups if competition encourages firms to innovate, creating new products priced above marginal costs. In the long run, an increase in competition reducing entry barriers should lead to an increase in the number of firms (as measured by the number of establishments) in the industry. The empirical results show that import competition and the number of firms are important determinants of industry mark-
ups but that the contemporaneous effect of adoption of competition laws on mark-ups is unclear. However, the introduction of competition laws has a high positive and long lasting effect on the number of firms in the industry: after 25 years, the number of firms increases by 29%.

A similar study has been carried out by McCloughan et al. (2007), using the GCR ranking as an indicator of the strength of competition policy. Contrary to the previous study, McCloughan finds that countries in which competition policy is judged more effective are characterised by lower price-cost margin. Other variables, such as market growth, have a positive effect on price-cost margin, which is counterintuitive because market growth should stimulate the arrival of new competitors. There is also little evidence suggesting that import penetration is associated with lower price-cost margins. Moreover, a more disaggregated analysis made at sector level identifies a number of markets in which there is no apparent relation between the quality of competition policy and the price-cost margin, including printing and publishing, chemicals and tobacco. This is a counterintuitive result as these sectors are highly concentrated and thus, competition policy should have a higher impact on these sectors.

Other studies analyse the effect of competition policy on productivity. Borrell and Tolosa (2008a) rely mostly on the WEF subjective indicator to assess the impact of the perceived effectiveness of competition policy across countries on productivity. They find that antitrust enforcement has a strong positive impact on total factor productivity (TFP). An important contribution of this paper is to show that it is important to consider antitrust as an endogenous policy: a more effective enforcement of antitrust policy can increase productivity but more productive countries are also more prone to enforce antitrust. More precisely, these two authors quantify the endogeneity bias: treating antitrust across countries as an exogenous policy overestimates the impact of competition on productivity by as much as 18%. The paper also shows that countries with effective antitrust policy do open their economies more strongly, while open economies do have moderately less effective antitrust policy.

Ma (2011) conducts a cross-country study using a sample of 101 countries to analyse the impact of competition policy on productivity growth. Contrary to the previous study, he concludes that there is no statistically significant impact of the quality of competition law (as measured by the Hylton and Deng scope index) on productivity growth. However, he finds a positive relationship between the effective enforcement of competition law (as measured by an interaction term between the indicator of the strength of competition policy and an index of the efficiency of government) and productivity growth in rich countries. He concludes that the existence of a competition laws is a pre-condition for tough competition but a supporting institutional framework is essential for an effective enforcement of the laws. The robustness of these results has been assessed on the basis of a battery of tests.

Buccicrossi et al. (2013) adopted a three-dimensional panel data approach (including an industry, country and time dimension) to determine the impact of the strength of competition policy (as measured by a composite index of its deterrence properties described in Table III.6) on competition (as measured by mark-ups) and TFP. The empirical results show that competition policy has a statistically significant positive effect on TFP growth. For example, the improvement in competition policy in the UK is responsible for as much as 20% of the increase in TFP in 2002. The expected negative relationship between competition policy and the mark-up is also confirmed but these results are less robust and
not presented in the latest versions of their work. The more disaggregated indexes allow to measure the effects of institutional (such as independence, separation of powers, quality of the law, sanctions) and enforcement features (resources of the CA and number of cases) and to distinguish the impact of merger control and antitrust. Their conclusion is that institutional features and antitrust appear to have the strongest impact on productivity growth. The study also shows that there are complementarities between competition policy and the quality of the legal system. A number of tests have been used to check the robustness of the results and to deal with the problem of endogeneity. However Gutmann and Voigt (2014) seems to question the validity of these tests, while appraising the novelty of the approach chosen in the paper and the effort made to calculate new indicators to measure the strength of competition policy.

Voigt (2006, 2009) have used the indicator he has built on de facto and de jure characteristics of competition laws and institutions policy to analyse the effects of competition policy on TFP. In the 2006 paper, he finds that the index measuring the strength of competition policy has a positive effect on TFP but this result is not robust as the effect vanishes when indicators representing the quality of institutions are introduced in the model. In the subsequent study, the focus was on developing countries and the result was quite similar: controlling for standard economic variables as well as institutional variables, the effect of competition policy on TFP is not particularly strong.

Finally, a last group of studies analyses the impact of competition policy on growth or other growth drivers, such as investments or foreign direct investments (FDI). Aiginger (2008) finds a very high correlation (0.6) between two composite indicators: a composite indicator of the toughness of competition (see definition in Table III.6) and a composite indicator of macroeconomic performance. He also introduces the composite indicator of the toughness of competition in an equation linking GDP growth to innovation (R&D ratio) and investment (share of physical investment in GDP) and finds a strong positive effect of its indicator on the macroeconomic performance. However, the introduction of the competition variable reduces the coefficients (and destroys the significance) of the other determinants. We have doubts about the validity of this approach. First, as already mentioned, the “Aiginger” indicator of the toughness of competition is difficult to interpret as it combines variables of very different nature and second, as highlighted by the author, more elaborated econometric work, testing for endogeneity and multicollinearity, should be carried out to get more robust results.

Clougherty (2010) uses the annual budget of competition authorities as a measure of a country’s commitment of resources to competition policy and he finds a positive relation between this variable and growth. For example, the UK strongest commitment of resources to competition policy compared to France should allow the UK growth to be 0.14 pp higher than in France (all other things constant).

In a study aiming to measure the impact of antitrust law, Petersen (2013) shows that antitrust law has a positive long-term effect (after 10 years) on economic development (measured by GDP per capita) and economic growth. He failed to find any significant effect on democracy. As the effects of antitrust law take place after 10 years, he concludes that institutions take time to run effectively and to have a noticeable effect on the economy.

Gutmann and Voigt (2014) estimate the effects of competition policy (as measured by a binary variable indicating whether a competition policy is in place or not and the “Voigt” index) on the growth rate of GDP per capita, the growth rate of TFP, investment and FDI.
This paper also provides an interesting discussion of the methodological difficulties associated with the measurement of the impact of competition policy. The authors confirm the previous results of Voigt (2006, 2009) that competition policy has no effect on TFP growth. However, they obtain a very substantial effect of competition policy on investment and growth of GDP per capita. They also find that there is no effect on FDI and this result is different from the one found by Dalkir (2007) who shows that the attractiveness of a country, as measured by FDI inflows, is positively influenced by the perceived effectiveness of competition policy.

To conclude, the majority of the studies described in this section find a positive impact of competition policy on growth (Clougherty (2010), Petersen (2013), Gutmann and Voigt (2014)), mainly due to a positive effect on productivity (Borrell and Tolosa (2008), Ma (2011), Bucchirossi et al. 2013)) Other studies show positive effects of competition laws on other intermediate variables such as the number of firms (Kee and Hoekman (2007)), mark-ups (McCloughan (2007)), investments (Gutmann and Voigt (2014)) and FDI (Dalkir (2007)). The impact of competition policy is significant, as, for example, a study finds that an improvement in competition policy can lead to one fifth of the increase in productivity in the UK. However, again, the conclusions are not clear-cut as other studies fail to find a significant impact of competition policy on productivity (Voigt (2006, 2009)) and Gutmann and Voigt (2014)), on mark-ups (Kee and Hoekman (2007)) or on FDI (Gutmann and Voigt (2014)). Therefore, empirical work analysing the impact of competition policy should continue to be developed. Particular attention should be given to the measure of the strength of competition policy, to the problem of endogeneity (while the strength of competition policy may have a positive effect on growth, countries with faster growth and a higher GDP per capita are likely to have a better competition policy as well) and to the risk of spurious correlations due to the fact that other factors than competition policy affect growth.

2.4 Macro-econometric modelling of the effects of competition

Contrary to the macroeconomic impact of competition policy, the macroeconomic benefits of increased competition are widely recognised and there is a plethora of empirical work in this area, based on reduced form estimations or simulations using more elaborated models. In this section, we present the most recent empirical work (from 2000) and the most telling results that illustrate the macroeconomic effects of competition via the three transmission channels described in Section III.2.1.2: (i) reduction in mark-ups and increase in business dynamism; (ii) improvement in the efficiency within firms due to improved performance of managers; and (iii) increase in innovation and total factor productivity. By contrast, the studies analysing the effects of pro-competitive regulatory reforms (such as trade liberalisation, liberalisation of previously regulated monopolies) are not analysed here.

2.4.1 The mark-up and business dynamism channels (allocative efficiency)

Over the recent period, there has been an extensive amount of empirical work scrutinising the causal link between mark-ups and/or business dynamism, on the one hand, and...
productivity and growth, on the other hand. A selection of these studies is presented in Table III.14.

These studies show that the degree of competition (as measured by the mark-up) is still lower in Europe than in the United States, especially in the services. For example, Gomes et al. (2013) find that the mark-up in services is 44% higher in the euro area than in the United States. Bouis and Klein (2008) also conclude that mark-ups are higher and more dispersed in services than in manufacturing. Röger (1995) finds that manufacturing sector mark-ups are generally small and homogeneous across countries, while service sector mark-ups are high. The empirical studies are based on various types of data, ranging from micro firm-level data to more macroeconomic data and different indicators of mark-ups are considered, such as rents, sales over operating costs and econometric estimates.

Table III.14 Selected studies on the mark-up and business dynamism channels

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample/period</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disney et al. (2000)</td>
<td>UK 1980-1992</td>
<td>An increase in competition (measured by change in market share, level of rent or entry/exit) has a significant positive effect on labour and total factor productivity growth.</td>
</tr>
<tr>
<td>IMF (2003)</td>
<td>Euro area Long term effects</td>
<td>Improving competition in the euro-area to US levels would lead to a 4.3% increase in real GDP in the long term.</td>
</tr>
<tr>
<td>Bayoumi et al. (2004)</td>
<td>Euro area Long term effects t</td>
<td>Differences in competition in product and labour markets account for half the gap in GDP between the euro area and the US.</td>
</tr>
<tr>
<td>Bouis and Klein (2008)</td>
<td>11 OECD countries 1993-2004</td>
<td>A reduction in mark-ups by 0.1 pp in low-competition sectors (like services) would lead to an increase of 0.4 pp in the annual growth rate of labour productivity over the last following 10 years.</td>
</tr>
<tr>
<td>Ospina and Schiffbauer (2010)</td>
<td>27 Eastern Europe and Central Asia</td>
<td>Firms that have 20% higher mark-ups have, on average, 1.2% lower TFP levels and 8% lower labour productivity.</td>
</tr>
<tr>
<td>Bravo-Biasca (2010 and 2011)</td>
<td>11 OECD countries 2002-2005</td>
<td>A greater share of both growing and shrinking firms is associated with faster productivity growth.</td>
</tr>
<tr>
<td>Gomes et al. (2013)</td>
<td>Germany, Portugal and rest of the euro area Long term effects</td>
<td>A unilateral reduction of mark-up by 5 pp (or 10%) in the German services sector leads to an increase in real GDP in the long-term by 1.3% and a reduction by 15 pp (or 30%) to an increase in real GDP by 4.4%.</td>
</tr>
<tr>
<td>Varga et al. (2013)</td>
<td>Southern Europe Medium to long term effects</td>
<td>If Southern Europe countries close the gap with the average of the three lowest mark-ups in the euro area, , real GDP growth is, after 5 years, more than 3% higher in Greece, between 2.5-3% higher in Spain and Portugal and 0.5% in Italy. In the long-run GDP gains range between 1.4% (Italy) and 39.2% (Greece).</td>
</tr>
</tbody>
</table>
The empirical studies confirm the positive effects of a decrease in mark-ups on productivity and growth. The macroeconomic impact of a mark-up reduction is significant. For example, Bayoumi et al. (2004) found that differences in competition between the euro area and the United States account for half their gap in GDP per capita. Another study (see Gomes et al. (2013)) concludes that a reduction of mark-ups (by 30%), aligning the mark-up in services in the euro area to that in the United States, could increase real GDP in the long term (by 4.4%). The IMF (2003) had found a similar order of magnitude (4.3%) for a similar scenario. Varga et al. (2013) analyse the effects of a reduction in mark-ups in Southern Europe closing the gap with the average of the three lowest mark-ups in the euro area. They show that the benefits after 5 years in terms of real GDP growth ranges between 0.5% for Italy, 2.5-3% for Spain and Portugal and more than 3% for Greece.

Most of these empirical studies also conclude that the positive effects of a reduction in mark-ups on productivity are higher in low-competition sectors (such as services) and low-competition countries. However, in sectors characterised by relatively high competition and sunk costs, more intense competition could slow productivity gains (see Bouis and Klein (2008)). Therefore, there would be an inverted U-shape relationship between competition and productivity, with too low and too high competition reducing productivity. The reason is that mark-ups need to be sufficiently high to cover sunk costs, such as R&D investment costs. If competition is very intense, new firms will be reluctant to innovate and enter into the market because they will not have the guarantee to be able to cover their R&D investments costs. Another caveat is that the gains associated to a reduction in mark-ups are generally seen in the medium to long term. For example, Varga et al. find that in the first years of a mark-up decline, GDP and employment fall slightly below the baseline.

Business dynamism, as characterised by the distribution of business growth (see definition in Table III.8), is also still lower in the EU than in the United States (see Bravo-Biosca (2010 and 2011)). As shown in Graph III.2, the proportion of firms experiencing very modest or zero growth is much higher in Europe than in the United States while this is the opposite regarding the share of fast shrinking and fast growing firms. The share of static firms in the United States was almost a third lower than in the average European country (9.2% versus 13.6%) and the share of high growth firms almost 30% higher over the period 2002-2005 (4.3% versus 5.9%). This more dynamic business environment reflects, inter alia, a more competitive environment in the United States than in the EU but other factors can play a role, such as bankruptcy laws.

40 Static firms are defined as those that did not expand or contract. More precisely, firms with a growth rate between -1% and 1% per annum on average over the period 2002-2005. Broadening the definition to include firms that grow or shrink by less than 5% per annum leads to a similar conclusion regarding the difference between the United States and Europe.

41 High growth firms are defined with average annualised growth greater than 20% over a three-year period.
Empirical work mainly analyses the link between business dynamism and productivity growth, using reduced form estimations based on firm level data. In this respect, it is worthwhile to refer to a new database which provides micro aggregated data drawing on individual records by 6 million firms in 11 OECD countries and describes the distribution of business growth for all established firms in these countries, broken by size, sector and, whenever available, by age (see Bravo-Biosca (2011)).

Empirical work confirms that business dynamism is a key driver of productivity growth. For example, Disney et al. found that external restructuring defined as the process by which less efficient establishments exit and more efficient establishments enter and increase market share, accounts for 50% of labour productivity growth and 90% of TFP growth in the UK over the period 1980-1992. Similarly, Bravo-Biosca (2010 and 2011) concludes that a 5 pp increase in the share of static firms is associated with 1 pp lower annual TFP growth. This means that reducing the share of static firms in Europe to the US level would contribute to a significant reduction in the EU-US gap in TFP growth. Both a large share of growing and shrinking firms is associated with higher productivity growth. Moreover, the

More precisely, reducing the share of static firms in Europe to the US level (4.4 pp gap) would lead to a 0.9 pp increase in TFP growth in Europe, while over the period 1995-2004, the decade preceding the financial crisis, Europe's annual TFP growth lagged the United States by 1.1 pp on average (see Van Ark, O’Mahony and Timmer (2008)). On the basis of this result, the contribution of business dynamism to TFP growth seems very high. However, a study on the retail trade in the United States shows that virtually all of the productivity growth in the U.S. retail trade sector over the 1990s is almost exclusively accounted for by the exit of less efficient single-store firms and their replacement with more productive national chain store affiliates. See Foster et al. (2002).
impact of the firm growth distribution is stronger as countries converge to the technology frontier. This may contribute to explain why the lower business dynamism in Europe was not a major obstacle to Europe’s catching up with the US until early 90s but it became so once Europe converged to the technology frontier with the United States.

2.4.2 The management channel (productive efficiency)

Empirical studies analysing the effects of competition on management practice and the resulting impact on macroeconomic performance are relatively scarce (see a selection of these studies in Table III.15). The main reason is that productive efficiency is difficult to measure as it depends on many factors, some of them not being observable, such as organisational changes within companies.

Table III.15 Selected studies on the management channel

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample/period</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuñat and Guadalupe (2005)</td>
<td>UK 1992-2000</td>
<td>A higher level of product market competition increases the performance pay sensitivity of compensation schemes, in particular for managers. Sharper incentives are associated to more effort of managers.</td>
</tr>
<tr>
<td>Bloom et al. (2007 and 2010)</td>
<td>20 OECD countries 2002-2007</td>
<td>An increase in competition has a positive impact on the management performance in manufacturing but other factors, such as flexibility in the labour market, availability of skilled people, equity ownership and multinational character of companies have also an impact of management performances.</td>
</tr>
<tr>
<td>Van Reenen (2011)</td>
<td>20 OECD countries 2002-2010</td>
<td>The value added of this paper in comparison with the papers written by Bloom et al. is that it describes more extensively the theoretical models explaining the link between competition and management performances.</td>
</tr>
<tr>
<td>Bloom et al. (2012)</td>
<td>20 OECD countries 2002-2012</td>
<td>Extension of the work on manufacturing to some services (hospitals, schools and retail trade). The conclusions for manufacturing hold for services.</td>
</tr>
<tr>
<td>Ospina and Schiffbauer (2010)</td>
<td>27 Eastern Europe and Central Asia countries 2004</td>
<td>Firms that have 20% higher mark-ups have, on average, 1.2% lower TFP levels and 8% lower labour productivity.</td>
</tr>
</tbody>
</table>

A classic reference in the literature is the paper of Nickell (1996) which suggests that product market competition has a disciplining effect on managers. More recent empirical work has related competition to effort exerted by managers: an increase in competition raises the sensitivity of pay to the managers’ performances and this encourages them to make more effort to improve the results of the company (see, for example, Cuñat and Guadalupe (2005)). However, the most significant contribution to this kind of empirical analysis comes from Bloom et al. (2007, 2010, and 2012). These authors have developed indicators of management performance43 on the basis of a survey carried out amongst 10,000 medium-sized firms across Asia, Europe and the Americas over the last decade.

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43 The management performances are measured on the basis of eighteen basic management practices covering three broad areas: monitoring (e.g., product quality), target setting (e.g. production targets) and people (reward of best employees).
According to this survey, the United States has the highest management practice scores in manufacturing, on average, followed by Germany, Japan and Sweden (see Bloom (2010), (2012) and Van Reenen (2011)). However, there is a wide dispersion of scores between countries and at the bottom of the ranking are countries in Southern Europe (Greece and to a lesser extent Portugal) and developing countries, such as Brazil, China and India (see Graph III.3).

There is also a huge variation of management practices within countries and this variation within countries is far larger than any cross-country variation (for example, the best third of Indian companies outperform the European average). The share of badly managed firms is much greater in Greece and Portugal than in the US, Germany and Sweden. This leads Van Reenen to suggest that one factor causing cross country differences in productivity is the strength of the forces of selection which eliminate from the market badly managed firms, i.e., the allocative efficiency effect analysed in the previous section. More recent work (Bloom (2012) has also analysed management differences in some services (hospitals, schools and public retails) and the conclusions are very similar than for manufacturing.

Graph III.3 Management practice scores in manufacturing

The global survey on management practices has led to the publication of several papers analysing the reasons for differences in management practices across firms and countries and the effects of these differences in the quality of management (see Bloom et al. (2007), (2010) and (2012), Syverson (2011), Van Reenen (2011)). These papers suggest that more intense competition in the firm’s market, measured in several ways (number of rivals, surveys, trade openness or average profits over sales ratio) is positively correlated with best-practice management (see Graph III.4)\textsuperscript{44}. This could be due to two effects: first, good practice spreads quickly in highly competitive environments as the fear of bankruptcy is higher and incumbents are pushed to improve their practices and second, poor practice is

\textsuperscript{44} The possible endogeneity bias has been tested and Van Reenen (2011) concludes that the positive effects of competition are stronger when endogeneity is taken explicitly into account.
eliminated as poorer performing companies are removed from the market place. But the study shows that other factors than competition contribute to explain better management practices, such as flexible labour markets, availability of skilled people, private equity ownership and multinational character of the company and the study does not quantify the relative importance of these different factors.

**Graph III.4 The link between competition and management performances**

Another interesting conclusion is that better management practices are significantly associated with higher productivity and other indicators of corporate performance, including return on capital employed, sales per employee, sales growth and survival. The impact is large as management practices account for up to a third of the differences in productivity between firms and countries.

**2.4.3 The innovation and TFP channel (dynamic efficiency)**

Market structure and conduct may affect the supply of new products and the incentives to improve existing products or production processes. Over the recent period, these effects have received an increased attention from the CAs. For example, while the DoJ and the FTC rarely mentioned innovation as a reason to challenge a merger until the mid-1990s, this is not any more the case: from 1990 to 1994 innovation was mentioned as a reason to challenge a merger in only about 3% of all merger challenges and this was the case in 38% of merger challenges from 2000 to 2003 (see Gilbert (2007)). As economic theory does not describe an unambiguous link between competition and innovation, it is all the more important to turn to the lessons to be drawn from empirical work in this area (see a selection of these studies in Table III.16).

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By contrast, family ownership and the traditional practice of primogeniture — handing down the CEO position to the eldest son — are associated with bad management practises.
Table III.16  Selected studies on the innovation channel

<table>
<thead>
<tr>
<th>Study</th>
<th>Sample/period</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahn (2002)</td>
<td>Survey of literature End 80s-2002</td>
<td>Empirical studies do not support the conclusion that market concentration is conducive to innovation. Rather, they confirm that the link between product market competition and productivity growth is positive and robust.</td>
</tr>
<tr>
<td>Aghion et al. (2005 and 2009)</td>
<td>UK 1973-1994 1987-1993</td>
<td>Confirmation of an inverted-U shape relationship between competition and innovation. Competition is defined as mark-ups (2005 paper) and foreign entry (2009 paper) and instruments are used to avoid the endogeneity problem.</td>
</tr>
<tr>
<td>World Bank Survey (2005 and 2010)</td>
<td>27 Eastern Europe and Central Asia countries</td>
<td>Firms reporting that they face significant competitive pressure are also those which are more likely (50 percent more than firms reporting no competitive pressure) to introduce new products, to update products and to introduce new technology. Positive impact of competition on innovation confirmed by the 2008 survey.</td>
</tr>
<tr>
<td>Gilbert (2007)</td>
<td>Survey of literature 1980-2005</td>
<td>No empirical support for the Schumpeterian hypothesis and for the conclusion that competition is uniformly a stimulus to innovation. Need to consider industry and innovation (drastic/ non-drastic, process/product) characteristics.</td>
</tr>
<tr>
<td>Vivès (2008)</td>
<td>Theoretical models and survey of literature</td>
<td>The effects of an increase in competition depends on the nature of innovation (product/process) and the cause of the increase in competition (increase in the number of competitors for a given market size, increase in market size or an increase in the degree of product substitutability)</td>
</tr>
<tr>
<td>Schmutzler (2010)</td>
<td>Theoretical model</td>
<td>A positive effect of competition on R&amp;D investments is more likely for leaders than for laggards. No general case can be made that an inverse relation between competition and R&amp;D investment is more likely than an inverted U-shaped relation; However, an increase in the number of firms has a clear negative effect.</td>
</tr>
<tr>
<td>Bourlès et al. (2013)</td>
<td>15 OECD countries 1984-2007</td>
<td>Increasing competition in upstream sectors by completely eliminating anti-competitive regulations would increase multi-factor productivity growth by 1 to 1.5% per year in the observed OECD countries.</td>
</tr>
<tr>
<td>Cassiman and Vanormelingen (2013)</td>
<td>Spain 1990-2008</td>
<td>Mark-ups are 3.8 pp higher for firms realizing a process innovation and 5.1 pp higher for firms realising a product innovation. Innovation only affects positively mark-ups in less competitive markets.</td>
</tr>
<tr>
<td>Aghion et al. (2014)</td>
<td>Short to long term effects</td>
<td>Laboratory experiment showing that competition leads to a significant increase in R&amp;D investments. However, there is a negative effect of competition in lagging sectors where firms are very different. This effect varies with time and is stronger if the time horizon considered by firms is short.</td>
</tr>
</tbody>
</table>

However, measuring innovation is at least as challenging as measuring competition. Various proxy variables are found in the empirical literature, such as indicators of R&D investments defined as R&D expenditures, R&D employment or R&D intensity (R&D expenditures over value added), innovation counts, patents counts or total factor productivity. All these indicators have drawbacks: R&D indicators represent rather inputs into innovative activities than innovation outputs, innovation counts are rarely used because it is difficult to identify significant innovations comparable across different industrial sectors and firm-size groups, the propensity to patent can vary across industries and firms and TFP is rather a result of innovation than a measure of innovation per se. More sophisticated models link innovative activity to R&D efforts, assume that innovation is sequential and cumulative and that there is a patent race (see Denicolo and Zanchettin (2004)).
Empirical work sometimes makes a distinction between process and product innovation\textsuperscript{46}. Process innovation consists in improving production processes, leading to a reduction in variable costs of production while product innovation consists in the introduction on the market of a new or significantly improved product.

Another difficulty in measuring the link between competition and innovation is that competition is not exogenous relative to innovation. While the pressures of competition can influence the intensity of innovation, innovation can also have an impact on the degree of competition. It can give the innovator an advantage over competitors and companies investing in innovation expect to be able to seize a part of the returns of their investment. For example, \textit{Cassiman and Vanomerlingen} (2013) show that companies investing in R\&D are able to appropriate a part of the value added created in the form of higher price-cost margins: mark-ups are 3.8 pp higher for firms realizing a process innovation and 5.1 pp higher for firms realising a product innovation. But the ability of firms to appropriate returns from innovation through higher mark-ups is affected by the competition it faces: innovation only impacts mark-ups in less competitive markets\textsuperscript{47}.

This endogeneity problem makes it difficult to isolate the causal link between competition and innovation without using specific econometric techniques. \textit{Aghion et al.} (2005 and 2009) address this problem by using instrumental variables: major EU and UK policy reforms that aimed at increasing competitive pressures and reducing entry costs during the 1980s and early 1990s, such as the EU Single Market Programme, the UK privatisation programme and the UK merger cases triggering an intervention, are exploited to instrument mark-up and foreign entry. More recently, \textit{Aghion et al.} (2014) applies a randomised experimental approach to analyse the link between R\&D investments and competition.

Empirical work shows that the relation between competition and innovation is complex and that the effects of competition on innovation are not always statistically significant. For example, \textit{Dutz et al.} (2011) do not find any statistically significant effect of proxies of competition at the firm level, such as number of domestic and foreign competitors, on R\&D investment, product and process innovation and TFP. However, the Schumpeter view that market concentration or large firm size is associated with a higher level of innovation does not appear to be supported by empirical finding (\textit{Ahn} (2002), \textit{Gilbert} (2007)).

By contrast, empirical work tends to corroborate the view that there is an inverted-U shape link between competition and innovation, with too little or too much competition reducing innovation (see \textit{Ahn} (2002), \textit{Aghion et al.} (2005 and 2009), \textit{Sacco} (2008))\textsuperscript{48}. This inverted U-shape relationship holds if competition is measured by several indicators, such as mark-ups or foreign entry (instrumented by policy reforms to avoid the endogeneity problem referred above).

The gains from an increase in competition are non-linear and stronger in ‘neck to neck’ industries, i.e. industries with the same technological level, and for firms and industries

\footnote{46 However, the OECD defines four types of innovation: product innovation, process innovation, marketing innovation and organisational innovation.}

\footnote{47 It is not clear whether these results are robust precisely because of the endogeneity problem.}

\footnote{48 However, Schmutzler (2010) who developed a theoretical model to analyse the link between competition and R\&D investment is very cautious in his conclusion: “no general case can be made that an inverse relation between competition and investment is more likely than a U-shaped relation”. He agrees with the conclusion of Aghion that a positive effect of competition is more likely for leaders than for laggards.}
closer to the technological frontier. In neck to neck industries (or levelled industries with a low technology spread), an intensification of competition is positive for innovation because it reduces pre-innovation rent, thereby increasing the incremental profits from innovation. This is known as the ‘escape-competition effect’. But, for firms in unlevelled sectors (sectors with a high technology spread), higher competition reduces the post-innovation rents and thus their incentive to catch up with the current leader in the sector (see Aghion (2005)). Similarly, Aghion shows that reducing barriers to entry to foreign products and firms has a more positive effect on innovation and growth for firms and industries close to the technology frontier because incumbent firms close to the technology frontier can deter entry by innovating. By contrast, for firms and industries far from the technology frontier, an increase in entry threat reduces the expected payoff from innovation. In this framework, competition policy is particularly beneficial in industries with firms that are technologically advanced. Another strand of the literature (see Denicolo and Zanchettin (2004)), which allows for sequential and cumulative innovations, confirms the existence of the inverted U-shape relationship.

Other authors support the conclusion that there is not a uniform linear relation between competition and innovation and that this relation can be influenced by several factors. Vivès (2008) shows that the impact of competitive pressure on innovation depends on the type of innovation considered (process or product) and on the cause of the increase in competition (increase in the number of competitors, greater product substitutability, increase in market size, reduction in entry barriers). For example, he concludes that an increase in market size and in the substitutability of products will have a positive effect on process innovation because a unit reduction in cost will allow a higher output impact, while a decrease in entry barriers will have a negative effect because the unit cost reduction will benefit a diminished output. Increasing the market size may increase or decrease product innovation (although the former is more likely than the latter), lowering the entry barriers will increase it and increasing product substitutability will decrease it.

Similarly, Gilbert (2007) identifies a number of conditions that would make more likely a positive link between competition and (process and product) innovations. He finds that an increase in competition has a more positive impact on innovation if: (i) inventor gains exclusive rights as this raises profits from innovation; (ii) competition in the old product is intense as this lowers the pre-innovation profit; (iii) the new product is such a major improvement relative to existing products that it would make the existing product obsolete; (iv) the innovation does not increase the ability of the monopolist to price discriminate among consumers because he would continue to offer old and new products.

Bourlès et al. (2013) analyse the influence of upstream competition on productivity outcomes in downstream markets for fifteen OCDE countries and twenty sectors over the period 1985–2007. The main prediction of their model is that weak upstream competition

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49 Low competition is associated to levelled industries, since when the industry is unlevelled, there is a relatively high incentive for laggards to catch up with the leader and level the industry.

50 This model identifies three effects of an increase in competition: the price effect (more intense competition reduces the equilibrium price, thus reducing the innovator’s prospective rents), the front loading of profits (in more competitive markets, a larger fraction of the innovator’s rent accrues in early stages of the innovative firms life cycle) and the productive efficiency effect (in more competitive markets, low-cost firms have a large market share). The model also defines circumstances in which the productive efficiency effect dominates the price effect, namely when the size of innovations is large (almost drastic) and/or competition is strong.
can curb productivity growth in downstream markets as firms will have fewer incentives to innovate or adopt new technology. The authors identify two channels through which a lack of competition in upstream sectors can negatively affect the innovation and productivity of sectors downstream. First, higher costs (or lower quality) of intermediate inputs produced upstream frustrate efforts of firms that purchase these goods and services to improve efficiency as the rents the downstream firms expect from efficiency improvement are likely to be partially captured by the suppliers of the intermediate inputs upstream. Second, a lack of competition in upstream market can generate entry barriers limiting competition downstream if access to downstream markets requires using intermediate inputs produced upstream. These negative spill overs can be particularly important in case of services, less exposed to global competition. The results suggest that increasing competition in upstream sectors by completely eliminating anti-competitive regulations would increase multi-factor productivity growth by 1 to 1.5% per year in the observed OECD countries. This shows the positive gains to be obtained by ensuring good conditions of competition in sectors which produce goods intensively used as intermediate inputs in other sectors of the economy.

A very recent paper (Aghion et al. (2014)) uses a new experimental approach to test the impact of competition on R&D investments. As mentioned above, the main advantage of this method is that it allows eliminating the possible bias resulting from the endogenous character of the mark-ups in relation to R&D investment and, therefore, demonstrates the causal rather than correlational relationship between competition and innovation. This experiment confirms the previous result. First, an increase in competition leads to a significant increase in R&D investments (R&D investments on average increase by 10% as competition increases by 50%) by neck-and-neck firms (‘escape competition’ effect). Second, an increase in competition decreases R&D investments by laggard firms but this ‘Schumpeterian effect’ is stronger in the short time horizon treatment than in long horizon treatment because in the latter an anticipated escape competition effect is at work. Third, as competition increases, companies are more likely to be technologically different from each other and the average technology level of the leading firm increases.

### 2.5 Areas for further research

This part of the paper has shown that most of the existing empirical work has concentrated on the macroeconomic impact of competition. Less work has been done regarding the macroeconomic impact of competition policy as this type of work is very challenging for several reasons.

First, it is not straightforward to find appropriate competition policy indicators. A distinction can be made between input indicators measuring the *de jure* and *de facto* characteristics of competition laws and institutions, on the one hand, and output indicators reflecting the interventions made by the CAs, on the other hand. Similarly, as competition cannot be observed directly, indirect measures of competition have to be used, sometimes in combination. Second, it is difficult to establish a causal relationship between competition policy and competition. Third, it is harder to track the chain of events which may follow a competition policy intervention in the medium to long term than to look at the immediate impact of a specific competition decision in a given market. Finally, disentangling the

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51 See Davies (2012b) who emphasised the importance of studies analysing the impact of competition policy interventions in the long-run, recognizing the difficulties of this work.
effect of competition policy from other factors affecting competition and growth is also very demanding. For example, other policies, such as trade policy or regulations, can also have an impact on the conditions of competition and growth performance of a country.

There are a number of improvements which should be made to improve the robustness of the analysis of the macroeconomic impact of competition policy. In particular, further work has to be done to improve the quality of competition policy indicators. So far, most of the work has focused on indicators measuring the inputs necessary to conduct competition policy interventions, such as the resources of the CAs or the main characteristics of competition laws and institutions. Subjective indicators based on surveys amongst local business leaders on the effectiveness of competition policy and composite indicators, difficult to interpret because they combine a large number of elements, have also been used in empirical analysis. By contrast, there are very few indicators measuring the output of the CAs, i.e. their decisions and advocacy interventions, while this aspect would seem to be essential when assessing the contribution of CAs.

Further reflection is thus needed to develop better output indicators, taking into account the varying complexity of the decisions taken by CAs and controlling for their resources or the country size. However, this would require a better recording by CAs of their interventions as well as an increased transparency on such matters. Moreover, there is very little correlation between the performances of countries as measured by different indicators. While this might be due to the fact that the indicators do not cover the same policy areas, they nevertheless pursue the same objective, which is to measure the quality of competition regimes across jurisdictions. This also illustrates some of the limitations of current analyses that compare the performances of CAs.

As shown by this section, two main approaches are used to assess the aggregate effects of competition policy. The first approach – microeconomic or bottom-up – consists in calculating customer saving resulting from competition policy interventions, mainly in the area of merger control and cartel investigations. The main advantage of this approach is that the customer savings estimates are closely linked to the key decisions taken by the CAs. However, these estimates only measure the direct price effects of competition policy interventions. They ignore non-price effects, such as quality and innovation, and indirect effects of the price reduction on the whole economy and the deterrent effects of these interventions. Therefore, they underestimate the aggregate effects of competition policy.

The second approach which takes a macroeconomic perspective attempts to quantify the impact of competition policy and competition on macroeconomic performance. However, while a lot of empirical analysis can be found on the impact of competition on macroeconomic performance, there are fewer empirical studies analysing the impact of competition laws and institutions or of competition policy enforcement actions on the conditions of competition. Similarly, although there is a consensus in the empirical literature that competition promotes growth, it is less easy to find robust empirical evidence showing that competition policy fosters economic growth. It is also surprising that these two related issues are very often analysed separately and that there are only a very few papers attempting to combine them.

In this section, we present an integrated framework combining these different types of analysis. For further research, two options could be considered. The first option would consist in using the microeconomic calculations of the customer savings to obtain macroeconomic estimates. For example, the estimated price reductions resulting from
competition policy interventions could be aggregated on the basis of the size of the markets affected and used as inputs in macroeconomic models. A similar approach has already been used by van Sinderen and Kemp (2008). These two authors try to bridge the gap between the outcome of competition policy as measured by customer savings and the longer term and wider effects of competition policy on growth and employment. To that end, they interpret the effects of competition policy on consumer surplus as “a cut in the market power wedge or non-tax wedge” which can be modelled in a similar way than a cut in the tax wedge. They consider that reducing market power and fighting against cartels in the product market correspond to a cut in the non-tax wedge between the gross and net income in the labour market. They use a general equilibrium model called MESEMET-2, which is suited to estimate the macroeconomic impact of microeconomic interventions having an effect on the wedge between gross and net income, to estimate the effects of competition law enforcement and sector specific regulations by the competition authorities. They show that these effects are high in the long term (0.4% additional growth of GDP; by comparison, the effects of the Single Market Programme are assessed to be around 2%).

The second option would be to better link the two strands of empirical analysis, the one on the effects of competition policy and the one on the effects of competition. There are a few papers which attempt to carry-out a two-step analysis considering these two types of effects. Generally, the empirical papers either measure the impact of competition on growth drivers, such as a decline in mark-ups, entry/exit and innovation or, more rarely, measure the impact of the competition policy on macroeconomic performance directly. This task would be very challenging for the reasons mentioned above but it could certainly contribute significantly to our understanding of the channels through which competition policy affects macroeconomic performance.

Finally, analysing the effects of competition policy on inequality is another issue deserving further research. Existing evidence seems to suggest that an increase in competition is particularly beneficial for low-income people because the higher prices resulting from a lack of competition is more damaging for the poorest people. However, the literature in this area remains in its infancy and there are a number of topics deserving further research. In particular, when analysing the macroeconomic impact of higher prices resulting from a lack of competition, one could attempt to go a step further and analyse these effects on inclusive growth.
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## Annexes

### Annex 1: Ranking of countries according to the quality of their competition regime

<table>
<thead>
<tr>
<th>Countries</th>
<th>GCR 2013</th>
<th>WEF 2013-2014</th>
<th>IMD 2013</th>
<th>OECD 2013**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>3*</td>
<td>4.7</td>
<td>5.81</td>
<td>1.80</td>
</tr>
<tr>
<td>Belgium</td>
<td>2.5*</td>
<td>5.1</td>
<td>6.47</td>
<td>0.00</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>3.3</td>
<td>3.02</td>
<td>0.00</td>
<td>na</td>
</tr>
<tr>
<td>Croatia</td>
<td>3.8</td>
<td>5.02</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Cyprus</td>
<td>4.7</td>
<td>na</td>
<td>na</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>3*</td>
<td>4.1</td>
<td>5.35</td>
<td>0.00</td>
</tr>
<tr>
<td>Denmark</td>
<td>2.5*</td>
<td>4.9</td>
<td>7.69</td>
<td>0.00</td>
</tr>
<tr>
<td>Estonia</td>
<td>4.6</td>
<td>5.27</td>
<td>1.80</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>3*</td>
<td>5.6</td>
<td>7.32</td>
<td>0.30</td>
</tr>
<tr>
<td>France</td>
<td>5*</td>
<td>4.7</td>
<td>6.39</td>
<td>0.00</td>
</tr>
<tr>
<td>Germany</td>
<td>5*</td>
<td>5.1</td>
<td>7.17</td>
<td>0.60</td>
</tr>
<tr>
<td>Greece</td>
<td>3*</td>
<td>3.8</td>
<td>4.14</td>
<td>0.00</td>
</tr>
<tr>
<td>Hungary</td>
<td>3*</td>
<td>3.9</td>
<td>3.84</td>
<td>1.20</td>
</tr>
<tr>
<td>Ireland</td>
<td>3*</td>
<td>4.8</td>
<td>7.25</td>
<td>0.30</td>
</tr>
<tr>
<td>Italy</td>
<td>3.5*</td>
<td>3.7</td>
<td>4.61</td>
<td>0.00</td>
</tr>
<tr>
<td>Latvia</td>
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<td>5.58</td>
<td>1.50</td>
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<tr>
<td>Lithuania</td>
<td>2*</td>
<td>3.8</td>
<td>5.33</td>
<td>0.90</td>
</tr>
<tr>
<td>Luxemburg</td>
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<td>5.0</td>
<td>6.57</td>
<td>1.71</td>
</tr>
<tr>
<td>Malta</td>
<td></td>
<td>4.8</td>
<td></td>
<td>0.30</td>
</tr>
<tr>
<td>Netherlands</td>
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<td>5.4</td>
<td>7.28</td>
<td>0.30</td>
</tr>
<tr>
<td>Poland</td>
<td>3*</td>
<td>4.1</td>
<td>6.44</td>
<td>0.90</td>
</tr>
<tr>
<td>Portugal</td>
<td>3*</td>
<td>4.1</td>
<td>4.65</td>
<td>0.00</td>
</tr>
<tr>
<td>Romania</td>
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<td>4.69</td>
<td></td>
<td>0.30</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>3.8</td>
<td>4.21</td>
<td></td>
<td>0.90</td>
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<tr>
<td>Slovenia</td>
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<td>4.0</td>
<td>3.79</td>
<td>1.80</td>
</tr>
<tr>
<td>Spain</td>
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<td>4.4</td>
<td>5.17</td>
<td>0.15</td>
</tr>
<tr>
<td>Sweden</td>
<td>3*</td>
<td>5.5</td>
<td>7.40</td>
<td>1.20</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>4.5*</td>
<td>5.0</td>
<td>6.80</td>
<td>0.15</td>
</tr>
</tbody>
</table>

* Average ranking of the OFT and of the CC.
** Based on the OECD indicator “Probity of investigation”, taking only into account national competition law (impact of EU regime not incorporated).
To obtain Table III.8, the countries have been grouped in four groups as described in Table A.2.

**Table A.2**  
**Grouping of countries according to their performances**

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GCR</strong></td>
<td>5 stars</td>
<td>4.5 – 4 stars</td>
<td>3.5 – 3 Stars</td>
<td>2.5 – 2 Stars</td>
</tr>
<tr>
<td><strong>WEF</strong></td>
<td>Range 5.6-5.0</td>
<td>Range 4.9-4.4</td>
<td>Range 4.3-3.9</td>
<td>Range 3.8-3.3</td>
</tr>
<tr>
<td><strong>IMD</strong></td>
<td>Range 7.7-7.2</td>
<td>Range 6.8-6.4</td>
<td>Range 5.8-5.0</td>
<td>Range &lt; 5.0</td>
</tr>
<tr>
<td><strong>OECD</strong></td>
<td>Range 0.00-0.30</td>
<td>Rank 0.60-0.90</td>
<td>Range 1.20-1.50</td>
<td>Range &gt;1.50</td>
</tr>
</tbody>
</table>

The correlation coefficients between the performances of the EU CAs on the basis of the OECD, GCR and WEF indicators are described in Table A.3.

**Table A.3**  
**Correlation between the OECD, GCR and WEF indicators**

<table>
<thead>
<tr>
<th></th>
<th>OECD scope of action</th>
<th>OECD policy on anti-comp behaviour</th>
<th>OECD probity of investigation</th>
<th>OECD advocacy</th>
<th>GCR</th>
<th>WEF</th>
<th>IMD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope of action</strong></td>
<td>1</td>
<td>0.51***</td>
<td>0.35*</td>
<td>0.46***</td>
<td>-0.34</td>
<td>0.42**</td>
<td>0.39**</td>
</tr>
<tr>
<td>Policy on anti-comp behaviour</td>
<td>1</td>
<td>0.07</td>
<td>0.61***</td>
<td>-0.02</td>
<td>0.06</td>
<td>-0.1</td>
<td></td>
</tr>
<tr>
<td><strong>Probity of investigation</strong></td>
<td>1</td>
<td>0.43***</td>
<td>-0.21</td>
<td>0.03</td>
<td>-0.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advocacy</td>
<td>1</td>
<td>-0.1</td>
<td>0</td>
<td>-0.14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GCR</strong></td>
<td>1</td>
<td>0.27*</td>
<td>0.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WEF</strong></td>
<td>1</td>
<td>0.88***</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>IMD</strong></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*, ** and *** indicate the significance level (10%, 5% and 1%) of the correlation coefficients.

Table A.3 shows that most of the four OECD CLP indicators are positively correlated with each other, but with a relatively low correlation varying between 0.3 and 0.5. The OECD CLP indicators are not correlated with the GCR, WEF and IMD indicators (with the exception of the OECD indicator on the scope of action but this indicator has a negative correlation with the GCR and IMD indicators). These results are consistent with those obtained by the OECD (see OECD (2013b)) for OECD countries. Finally, there is a very high positive correlation between the WEF and IMD indicators and a small positive correlation between the GCR and WEF indicator.
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