DOES EU COMPETITION POLICY SUPPORT INCLUSIVE GROWTH?

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ABSTRACT
This article proposes a novel methodology to strengthen the micro-foundations of a macroeconomic assessment of EU competition policy. A unique database containing case-specific information on merger and cartel decisions is exploited to conduct macroeconomic policy simulations using a Dynamic Stochastic General Equilibrium model. The model has been extended to allow investigating the effects of EU competition policy interventions not only on standard macroeconomic variables such as GDP and employment, but also on distributional outcomes across households with different skill levels and across different types of income earners (capital owners, wage earners, and benefit recipients). The policy simulations presented include both direct and indirect (deterrent) effects of competition policy interventions. They show that competition policy has a sizeable impact on GDP growth, job creation, and the distribution of consumption across different types of households.

JEL: L4; K21; C68; O43

I. INTRODUCTION

Competition authorities usually measure the macroeconomic impact of their market interventions by estimating the direct benefits of merger and cartel
decisions for customers in terms of savings through price reductions on the markets affected by these decisions. Such estimates, which are expressed in terms of customer savings from price reductions on the markets affected by these decisions, are commonly used to illustrate the benefits for society of their activities and to legitimize competition policy interventions towards the larger public. Recently, there has been an increasing interest in this type of impact analysis, both by competition authorities and academics. This is partly in response to an increased skepticism about the benefits of competition policy, which became evident around the turn of the century. The Great Recession has reinforced the need to assess the effects of competition policy not only on economic growth but also on inequality.

Little empirical analysis has been done on the macroeconomic impact of EU competition policy, at least in comparison with that of other EU policies affecting the conditions of competition, such as internal market or trade liberalization policies. Similarly, it is often argued that the poorest in society are more affected by higher prices and lower quality and choice resulting from a lack of competition. Paul Krugman, for example, makes the argument that a rise in market power would be a strong explanatory factor for the increase in income inequality. The corollary of this statement is that competition policy, which aims at avoiding that companies accumulate and abuse market power, contributes to inclusive growth. However, macroeconomic and distributional effects of competition policy have been little studied. This article attempts to fill this gap and proposes a novel methodology to assess the distributional macroeconomic effects of important merger and cartel decisions taken by the European Commission.

The lack of empirical analysis on the macroeconomic and distributional impact of competition policy may be explained by the difficulties associated with this type of work. First, it is not straightforward to find appropriate competition policy indicators. In the literature, the strength of competition policy is measured by a binary variable indicating the existence of competition laws

or authorities, composite indexes taking into account the characteristics of competition laws and institutions, the size of the budget and staff of the competition authorities, or surveys of business leaders on the perceived effectiveness of competition policy. In this article, the strength of competition policy is measured by the number of important merger and cartel decisions taken by the competition authorities and their market impact in terms of the avoided increase in prices. This information is obtained from a unique database that has been used by the European Commission to calculate estimates of the customer savings resulting from its merger and cartel decisions.

Second, it is difficult to establish empirically a causal relationship between competition policy and competition, which is essential to make the link with macroeconomic outcomes. The approach taken in this article is to use the information on avoided price increases available in the above database to calibrate markup shocks, which are then applied to a Dynamic Stochastic General Equilibrium (DSGE) model—that is, the QUEST III model. This model has been extended for this analysis in order to allow investigating the effects of competition policy not only on standard macroeconomic variables, such as GDP and growth, but also on distributional outcomes.

Third, it is harder to track the chain of events which may follow a competition policy intervention in the medium to long term and to attempt measuring its distributional macroeconomic impact than to look at the direct impact of a specific decision in a given market. However, a DSGE model that (1) assumes that goods markets are imperfectly competitive; (2) disaggregates employment into various skills categories; and (3) considers different types of income earners (capital owners, wage earners, and benefit recipients) is well-suited for this task and can be used to get an indication of the distributional macroeconomic effects of competition policy.

Finally, very often, the methods used to assess the aggregate effects of competition only look at the direct price effects and ignore the deterrent effects of competition policy. These deterrent effects, which discourage future anticompetitive behavior, are difficult to assess because they are not felt immediately and cannot be measured directly. Nevertheless, there appears to be a consensus in the literature that these effects are considerable and that a competition policy decision affects not only the companies directly concerned but other companies in related markets. This article makes the assumption that, for each important merger and cartel decision taken by the European Commission, the avoided price increase covers not only the relevant market directly affected by the decision (direct effects) but also the whole subsector concerned by this decision (deterrent effects). However, the multiplying factor of the deterrent effects over the direct effects of a given decision is subjected to a maximum threshold reflecting results reported in the literature on the size of deterrent effects.

In addition to such sectoral spillover effects, the article also considers intertemporal deterrence effects, which arise from companies’ expectations that the European Commission will continue its competition policy interventions at the same pace into the foreseeable future. The results of the simulations measuring the total (that is, the direct plus the sectoral and intertemporal deterrent effects) of EU competition policy are then compared with those of other competition-friendly structural policies.

The article is organized as follows. Part II presents the integrated framework used in this article to move from the microeconomic data on decisions made by the European Commission to their macroeconomic effects. Part III describes how the direct and deterrent effects of competition policy decisions have been determined, summarizing what can be learnt from the work done by competition authorities and the academic literature. Part IV contains a short description of the QUEST III model used to run the simulations and explains how the macroeconomic and distributional effects of competition policy are calculated in this model. Part V describes how the markup shocks have been calibrated reflecting both the direct and deterrent effects of the competition policy interventions. This Part also presents the results of the model simulations and the robustness tests of the macroeconomic results. The final section concludes and offers some ideas for further research.

II. THE INTEGRATED FRAMEWORK

Two main approaches may be used to assess the aggregate effect of competition policy: (1) a bottom-up approach aimed at measuring the direct benefits of competition policy for consumers (the customer savings approach), and (2) a macro-modeling approach analyzing the impact of competition policy on competition and (directly and indirectly) on GDP growth or other macroeconomic variables. In this article, we try to integrate the two approaches by using the data and assumptions used to calculate the customer savings to calibrate markup shocks that are then applied to a DSGE Model.

A. Empirical Work Analyzing the Macroeconomic Impact of Competition Policy

The literature includes empirical work analyzing the macroeconomic impact of competition policy. Fabienne Ilzkovitz and Adriaan Dierx make a distinction between: (1) studies analysing the impact of competition policy on the degree of competition; and (2) studies analysing the impact of competition policy on economic performance at the national or sectoral level.

6 ILZKOVITZ & DIERX, EX-POST ECONOMIC EVALUATION OF COMPETITION POLICY ENFORCEMENT, supra note 1; (offering a comprehensive survey of this latter literature).

7 ILZKOVITZ & DIERX, EX-POST ECONOMIC EVALUATION OF COMPETITION POLICY ENFORCEMENT, supra note 1.
Michael Krakowski, Keith Hylton and Fei Deng, and Danilo Samà 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 also have 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, in particular if corrected for endogeneity.

Articles by Hiau Looi Kee and Bernard Hoekman, Joseph Clougherty, Niels Petersen, and Paolo Buccirossi, Lorenzo Ciari, Tomas Duson, Giancarlo Spagnolo, and Cristiana Vitale aim to make a link between the strength of competition policy and various measures of economic growth. Kee and Hoekman, for example, find that the introduction of competition laws has had a high positive and long lasting effect on the number of firms in a sample of 28 industries in 42 countries. Clougherty 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 real per capita GDP growth. Petersen, however, concludes that antitrust law has a significant positive effect after ten years only, as new institutions take time to run effectively and have a noticeable effect on the economy as a whole. Buccirossi, Ciari, Duson, Spagnolo, and Vitale estimate the impact of competition policy on total factor productivity growth for 22 industries in twelve OECD countries over 1995 to 2005. They find a positive and significant relationship between composite competition policy indexes (measuring the deterrent properties of a jurisdiction’s competition policy) and TFP growth.

15 Kee & Hoekman, supra note 11.
16 Clougherty, supra note 12.
17 Petersen, supra note 13.
18 Buccirossi, Ciari, Duson, Spagnolo & Vitale, supra note 14.
19 Id.
The survey of the literature shows that the strength of competition policy is measured by a binary variable,\textsuperscript{20} the annual budget of competition authorities,\textsuperscript{21} the results of surveys on the perceived effectiveness of competition policy,\textsuperscript{22} and composite indexes taking into account the characteristics of competition laws and institutions.\textsuperscript{23} However, in this literature, there are no studies that attempt to measure the strength of competition policy by its output—that is, the number of decisions taken and the impact of these decisions in terms of lower prices in the market concerned.

B. An Integrated Macro-modeling of the Impact of Competition Policy

The macro-modeling approach analyzing the impact of competition policy is less developed than the body of literature analyzing the impact of competition and although there is a consensus that competition offers macroeconomic benefits, it is less clear cut from an empirical perspective that competition policy increases economic growth. In this article, we propose a framework to integrate the information used in the bottom-up customer savings approach in a top-down macro-modeling approach. This framework is described in Figure 1.

An integrated macro-modeling of the impact of competition policy should first analyze the impact of competition policy on competition and second, the impact of competition on macroeconomic performance. This requires indicators of competition policy and of competition.

Competition policy is defined here as the enforcement of competition policy legislation covering the prohibition of cartels and the control of mergers. The strength of the European Commission’s competition policy is measured by the number and importance of its interventions in these areas. Due to data limitations other aspects of competition policy such as the prohibition of abuse of dominant position or State aid control are not covered here.

Competition cannot be observed directly and therefore, indirect measures of competition are commonly used. Here, competition is measured by the markup of prices over marginal costs, an indicator often used in empirical work. The price effect of important merger and cartel decisions by the European Commission and the size of the market affected by such decisions are used to calculate markup shocks reflecting the impact of competition policy interventions. The deterrent effects of these interventions are taken into account as well. The QUEST III model simulations are then used to assess the macroeconomic and distributional effects of these shocks.

The economic logic of the QUEST III simulations can shortly be explained as follows. The reduction in mark-ups contributes to lower prices, which in

\textsuperscript{20} See, e.g., Kee & Hoekman, supra note 11.
\textsuperscript{21} See, e.g., Clougherty, supra note 12.
\textsuperscript{22} See, e.g., Krakowski, supra note 8.
\textsuperscript{23} See, e.g., Hylton & Deng, supra note 9; Buccirossi, Ciari, Duso, Spagnolo & Vitale, supra note 14.
turn stimulate consumer demand. In order to satisfy this greater demand, firms invest in production capacity and better technology (leading to an increase in labor productivity) and hire more workers (leading to an increase in employment). Investment and employment are increasing because the negative direct effect of reduced profitability is dominated by the positive effect of increasing demand due to lower prices. All these changes are then reflected in an increase in GDP.

III. MEASURING THE MICROECONOMIC EFFECTS OF IMPORTANT MERGER AND CARTEL DECISIONS

A. Direct Price Effects

Some competition authorities (in the EU, Netherlands, U.K., and U.S.) measure the direct impact of their interventions by customer savings. These are the direct customer benefits resulting from the avoided price increases associated with important competition policy decisions. The strength of this approach is
that it is relatively easy to understand by a wider public. Moreover, the customer savings estimates can be directly associated with important decisions taken by the competition authorities. The assumptions made regarding the avoided price increase and its duration, for example, are based on the characteristics of the markets concerned by the decisions and are corroborated by the literature.

However, the customer savings estimates only measure the direct price effects of competition policy interventions and do not take into account the effects on product quality, customer choice, product and process innovation, and the like. Moreover, they do not consider the deterrent effects on competitor behavior as well as the broader macroeconomic effects on growth and employment. As a result, the customer savings provide only a partial view of the benefits of competition policy.

For these various reasons, not all competition authorities 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 favor of using a more comprehensive approach such as the one adopted by this article.

This article uses the same data and assumptions used by the European Commission to calculate the customer savings from its merger and cartel decisions to calculate markup shocks. Customer savings from a given decision are computed by multiplying the estimated reduction in prices resulting from the decision by the estimated duration of the price reduction and the affected turnover. The values of these different parameters depend on the characteristics of the case and are a rather conservative reflection of the relevant literature.

For cartels, a 10-percent price overcharge is generally applied to calculate customer savings from cartel decisions, although a 15-percent overcharge is sometimes used if it can be justified. Regarding the duration of the effect, 1, 3, or 6 years are considered reflecting the European Commission’s judgment of the future sustainability of the cartel at the date of detection. Cartels are

<p>| Table 1. Overview of data and assumptions used by the European Commission |</p>
<table>
<thead>
<tr>
<th>Competition policy intervention</th>
<th>Cartel prohibition</th>
<th>Merger decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly price effect</td>
<td>10–15%</td>
<td>1–3–5%</td>
</tr>
<tr>
<td>Duration</td>
<td>1/3/6 depending on the stability of cartel</td>
<td>2/3/5 depending on entry barriers</td>
</tr>
<tr>
<td>Affected turnover</td>
<td>Turnover of cartel members</td>
<td>Size of relevant market</td>
</tr>
</tbody>
</table>

Source: European Commission.

See infra Table 1.
judged to be either “unsustainable,” “fairly sustainable,” or “very sustainable,” depending on a case-by-case analysis of market conditions, the lifespan of the cartel and the ease of reaching and renewing the agreements. Finally, only the turnover of the cartel members directly concerned is used as an estimate of the scope of the competition policy intervention.  

Stephen Davies offers an assessment of these various assumptions. He considers the European Commission’s case-dependent approach to cartel duration quite persuasive given that it has various determinants, such as the severity of fines, the existence of a leniency program, the type of industry, or the ease of entry. However, the European Commission’s approach requires a significant judgmental input and if sufficient case-specific information is not available, Davies recommends using a single number for duration, somewhere between 1 and 6 years. This recommendation appears rather conservative in light of Jan Mudde’s finding that the average life-time of cartels detected by the European Commission is 8 years. Similarly, Emmanuel Combe and Constance Monnier report that the average duration of cartels detected by the European Commission from 1969 to 2009 (111 cartels) is around 7 years. Moreover, it appears likely that these numbers underestimate the average duration of cartels in the absence of competition policy, because interventions by the European Commission make cartels harder to sustain and therefore reduce their average duration.

Regarding the cartel overcharge, the empirical evidence in the academic literature suggests that the median cartel overcharge lies between 17 and 30 percent. For the cartels detected by the European Commission, Combe and Monnier conclude that the average overcharge is 34 percent. Therefore, the 10-percent assumption most commonly used is rather conservative.

The merger decisions included in the sample considered for the calculation of customer saving are important decisions—that is, Phase 1 and Phase 2 merger decisions with remedies or Phase 2 merger prohibitions. These
are all mergers considered as having net anticompetitive effects, which explain why they have been subject to remedies or prohibited.

The affected turnover is defined as that of all firms in the relevant markets, using a broader definition of the affected turnover than in cartels. 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 by the merging parties. This argument can also be made for cartels, indicating that the narrow definition of the affected turnover in cartels may lead to an underestimation of the customer savings. The duration of the price effects is generally 3 years, but sometimes an assumption of 2 or 5 years is made depending on the size of market entry barriers.  

For the price effect, a default assumption of 3 percent has been made from 2012 onward, but assumptions of a 1-percent and 5-percent price overcharge are also used as sensitivity tests. Before 2012, the European Commission used Proportionally Calibrated Almost Ideal Demand Systems (PCAIDS) model simulations to calculate the price effects of merger decisions. PCAIDS models are simple representations of competitive interaction of firms, allowing the prediction of the price effects of merger decisions. The reason why the European Commission services decided to simplify the method used is that the sophistication of the PCAIDS methodology made the exercise quite costly and that, despite its sophistication, this methodology did have limitations. For example, in some cases, model simulations were not feasible, either because the models could not adequately describe the nature of competition, or because data required for the model calibration were not available and, therefore, a default assumption of a 1-percent or 3-percent price overcharge was already made. Davies considers that a 1-percent price overcharge is too low as assumption and quotes studies using default price overcharges from mergers ranging between 3 and 9 percent. He therefore suggests using a default price overcharge of 3 percent, which is the baseline scenario used by the European Commission.

in Phase 1, a Phase 2 merger investigation is opened. Phase 2 is an in-depth analysis of the merger’s effects on competition and requires more time (at least 90 working days from the opening of a Phase 2 investigation). Following the Phase 2 investigation, the Commission may either unconditionally clear the merger or approve the merger subject to remedies or prohibit the merger if no adequate remedies to the competition concerns have been proposed by the merging parties.

Klaus Gugler, Dennis Mueller, Burcin Yurtoglu, and Christine Zulehner used a large set of merger data gathered from around the world between mid-1980s and 2000 to show that the increased market power effect of an averagely profitable merger lasts at least five years. Klaus Gugler, Dennis Mueller, Burcin Yurtoglu & Christine Zulehner, The Effects of Mergers: An International Comparison, 21 Int’l J. Indus. Org. 625 (2003). This underpins the conservative nature of considering 3 years as the expected duration of harm.


Davies, supra note 26.

A study by Peter Ormosi, Franco Mariuzzo, Richard Havell, Amelia Fletcher, and Bruce Lyons for the European Commission systematically reviews ex-post evaluations of the price
B. Deterrent Effects

1. Definition and Determinants of Deterrent Effects

A primary goal of competition policy enforcement is to deter anticompetitive behavior by enterprises, thereby maintaining a level playing field in product markets to the benefit of the end consumer.

The deterrent effects of cartel enforcement depend on the perceived likelihood of detection, on the expected punishment following detection and on the “reputation” of the competition authority in detecting cases ex officio. For a punishment to be effective in deterring anticompetitive behavior it needs to be transparent and be imposed on the undertakings that committed the infringements.

Cartel prohibitions and fines are supposed to deter new cartel formation, limit overcharges and reduce the stability of undetected cartels. A number of articles have attempted to address the question whether current fines are sufficient to deter companies from joining cartels and most researchers consider that EU antitrust fines are insufficient for cartel deterrence. Massimo Motta, however, argues that fines set according to the relevant EU Guidelines are not necessarily inadequate to achieve deterrence.\(^\text{36}\) 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. More recent work shows that cartel enforcement is most likely to deter smaller cartels for which the benefits of the cartel to the participants are low, and to incentivize more harmful cartels to lower their prices in order to reduce the likelihood of being detected.\(^\text{37}\)

Looking at developments over time, Ari Hyytinen, Frode Steen, and Otto Toivanen find that at the end of a period during which cartels in Finland were legal (1951 to 1990), almost all manufacturing industries had become

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Similarly, Jonathan Baker provides evidence that periods of lax antitrust enforcement in the U.S. were invariably followed by an increase in anticompetitive behavior. Therefore, stricter enforcement (in whatever form) should also contribute to greater cartel deterrence.

Although the deterrent effects of cartel prohibitions are clearly extremely important—cartels are illegal activities that would take place in the absence of supervision and possible intervention by the competition authority—the deterrent effects of merger control are less evident. The literature on merger deterrence, which is defined as the extent to which companies modify or abandon their merger plans in order to take out anticompetitive elements, is therefore more limited than that of cartels.

The value added by competition authorities comes from their ability to distinguish anticompetitive mergers from the ones that enhance welfare, as well as from their ability to deter anti-competitive mergers. However, merger deterrence 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 may be welfare enhancing because it deters future anticompetitive mergers. Such a strict policy will likely result in a reduction in the number of anticompetitive mergers notified with the competition authorities. It is very well possible therefore that an effective merger control shows relatively limited direct effects in terms of customer savings from blocked anticompetitive mergers or mergers cleared with remedies. On the other hand, 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. The implicit assumption of the literature that all notified mergers are anticompetitive and that therefore the reduction in the number of notified mergers can be considered as a measure of the deterrent effect of the merger control is not well founded.

In addition, there is a debate regarding the type of actions (Phase 1 remedies, Phase 2 remedies or prohibitions) having the greatest deterrent effects. Paolo Buccirossi, Lorenzo Ciari, Tomaso Duso, Giancarlo Spagnolo, and Cristiana Vitale consider that the most common reasons for abandoning a merger are the risk that it would not be approved and the high cost of

41 See Looking Beyond the Direct Effects of the Work of Competition Authorities, supra note 37.
remedies. Jo Seldeslachts, Joseph Clougherty, Pedro Barros, however, consider that blocked mergers have significant deterrent effects, whereas there is no impact from merger settlements or ongoing monitoring. Tomaso Duso, Klaus Gugler, and Florian Szücs consider that since the 2004 EU merger control reform prohibitions have had no deterrent effects, whereas aborted mergers in either Phase 1 or Phase 2 have had such effects. In a more recent article, Joseph Clougherty, Tomaso Duso, Miyu Lee, and Jo Seldeslachts find that of the various EU merger control actions, only Phase 1 remedies have a deterrent effect. These diverging results show that further work is necessary before drawing robust conclusions on the type of actions having the strongest deterrent effects on anticompetitive mergers.

2. Measurement of Deterrent Effects

The deterrent effects of a competition policy intervention are difficult to measure because they are not felt immediately and cannot be measured directly. Therefore, there is more work on optimal deterrence from a theoretical perspective than work which tackles the problem of measuring deterrent effects. Nevertheless, attempts have been made to get rough estimates of the deterrent effects of merger control and cartel punishment. These estimates are very often based on surveys directly asking businesses and legal advisors about the deterrent effects of competition authorities’ work across different areas (such as cartel policy enforcement or merger control). These surveys have limitations: there is no certainty about the reliability of the information provided by the respondents and the surveys may be biased. Still, this is the only way to obtain direct information on deterrent effects of competition policy decisions. Moreover, there is some statistical support for the survey-based information, which is presented towards the end of this section. To start off, a summary of the results of recent EU surveys is given in Table 2.

Surveys of competition lawyers have been used in a number of studies commissioned by competition authorities to evaluate the deterrence effect of their merger decisions. The Twynstra Gudde study asked competition lawyers in the Netherlands about their follow-up of 475 merger proposals from 2000 to 2003.
Around 6 percent of such proposals were abandoned due to concerns about possible infringements of competition rules, whereas another 12 percent were modified. For each merger enforcement action by the Dutch competition authority, 7.5 mergers are deterred. According to U.K. competition lawyers, 6 percent of notified mergers are abandoned and 12 percent modified. For every merger blocked or remedied, 7.5 are abandoned or modified.

<table>
<thead>
<tr>
<th>Source</th>
<th>Method</th>
<th>Conclusion</th>
<th>Number of cases deterred per case investigated/detected</th>
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<tbody>
<tr>
<td>Twynstra Gudde (2005)</td>
<td>Interviews with 16 competition lawyers and companies in the healthcare, energy and publishing industries about the follow-up of 475 merger proposals from 2000 to 2003.</td>
<td>6 percent of notified mergers are abandoned and 12 percent modified.</td>
<td>For every merger blocked or remedied, 7.5 are abandoned or modified.</td>
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<td>Deloitte (2007)</td>
<td>30 interviews with competition lawyers, economists, and companies, and questionnaire completed by 234 competition lawyers and 202 large firms (200+ employees) from 2004 to 2006.</td>
<td>According to lawyers, 8 percent of qualified mergers are abandoned and 7 percent modified. According to companies, 8 percent are abandoned and 4 percent modified.</td>
<td>For every merger blocked or remedied, 5 are abandoned or modified according to lawyers. For every cartel detected, 5 are deterred according to lawyers and 16 are deterred according to companies.</td>
</tr>
<tr>
<td>London Economics (2011)</td>
<td>27 interviews of professionals from legal firms &amp; survey based on questionnaire completed by 501 large firms (200+ employees) and 308 small firms (under 200 employees) from 2003 to 2011.</td>
<td>18 percent of qualified mergers are abandoned and 15 percent modified (based on a small sample).</td>
<td>For every merger blocked or remedied, 1.8 are abandoned (based on a small sample). For every cartel detected, 28 are deterred (but only 20 percent of cartels are detected).</td>
</tr>
<tr>
<td>SEO survey (2011)</td>
<td>Online survey completed by 512 companies and 97 advisers on competition law (mainly lawyers) from 2005 to mid-2010.</td>
<td>13 percent of notified mergers are abandoned and 5 percent modified.</td>
<td>For every cartel detected, 5 are deterred (but only one third of cartels are detected).</td>
</tr>
</tbody>
</table>


Around 6 percent of such proposals were abandoned due to concerns about possible infringements of competition rules, whereas another 12 percent were modified. For each merger enforcement action by the Dutch competition authority, 7.5 mergers are deterred. According to U.K. competition lawyers, 6 percent of notified mergers are abandoned and 12 percent modified. For every merger blocked or remedied, 7.5 are abandoned or modified.

A qualified merger is a merger over which the UK competition authority could take jurisdiction.
four out of five harmful mergers in the U.K. are deterred as a result of competition policy enforcement. 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 shows that for each merger enforcement action by the OFT, 5 mergers are deterred. A more recent survey made by London Economics finds a lower deterrent effect of 1.8 mergers deterred for each merger enforcement action. Finally, a study carried out for the Dutch competition authority by SEO (2011) reports that 5 percent of notified mergers are modified prior to notification and that 13 percent are deterred in anticipation of a possible intervention by the Dutch competition authority. In sum, according to these surveys, between 12 percent and 33 percent of notified/qualified mergers are either abandoned or modified due to concerns about possible infringements of competition rules and between 1.8 and 7.5 mergers are deterred per merger enforcement action by the competition authorities.

Various methods have been used to measure the deterrence effects of cartel policy enforcement actions. The aim of this research is to determine the effects of enforcement on the observable population of cartels and ultimately to make an 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, Peter Ormosi 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 the basis of this approach, he finds that less than a fifth of EU cartels between 1985 and 2005 were detected. This result is similar to the survey result reported by London Economics. The survey by SEO, however, obtains a detection rate of one third. The surveys by London Economics and SEO have also been used to estimate the ratio of cartels deterred over cartels detected. They find that there are between 5 and 28 cartels deterred per cartel detected. Ongoing model simulations of cartel enforcement and behavior in the presence of enforcement activities by a competition authority also show that the fraction of harm removed by cartel policy

52 London Economics, supra note 49.
53 SEO, supra note 50.
54 London Economics, supra note 49; SEO, supra note 50.
enforcement may reach 85 percent, provided that the competition authority is able to prevent the recreation of detected cartels.\textsuperscript{55}

Using the above survey information to determine the deterrent effects of competition policy enforcement is not straightforward. As highlighted by Ormosi in the case of cartels, even if the ratio of deterred cartels over detected cartels is 5 to 1, we cannot deduce that the harms from the deterred cartels are five times greater than the competition authorities’ estimates of the savings achieved from the detection of cartels.\textsuperscript{56} The reason is that the observed sample of cartels detected may not be representative of the full population of cartels. Stephen Davies and Peter Ormosi consider that this sample selection bias is likely to be substantial because the unobserved cases could well be those which are the most harmful.\textsuperscript{57}

In particular, undetected cartels are likely to be more harmful than the detected ones, because the latter are less sustainable or more prone to whistleblowers. Similarly, mergers with clear anticompetitive effects are more likely to be discouraged by merger control. Davies and Ormosi estimate that the total cartel harm is between 10 and 30 times what is detected and recorded by competition authorities.\textsuperscript{58} For mergers, this multiplying factor ranges between 6 and 17.

In the calculation of the markup shocks including the deterrent effects of competition authorities’ interventions, we have used another, sector-based approach to estimate the deterrent effects.\textsuperscript{59} However, based on the above literature, we have applied a multiplying factor of 20 as an upper bound for the deterrent effects of cartel decisions and a multiplying factor of 10 as an upper bound for the deterrent effects of merger decisions, taking into account that the harm which would have been potentially created by deterred anticompetitive mergers and cartels is likely to be larger than that resulting from controlled mergers and detected cartels.

IV. QUEST MODEL

A. Short Description of the QUEST Model

The macroeconomic assessment presented in this article is based on an extended version of the European Commission’s QUEST III model.\textsuperscript{60} This model was extended to allow investigating the effects of EU merger control and cartel policy not only on standard macroeconomic variables but also on the distributional effects of competition policy. Standard

\textsuperscript{55} See Looking Beyond the Direct Effects of the Work of Competition Authorities, supra note 37.

\textsuperscript{56} Peter L. Ormosi, A Tip of the Iceberg?, supra note 51.


\textsuperscript{58} Id.

\textsuperscript{59} See infra Part V.A.1.b.

\textsuperscript{60} Ratto, Roeger & in’t Veld, supra note 5.
modern macroeconomic models, so called Dynamic Stochastic General Equilibrium models, go in the direction of meeting the requirement of rigorous micro foundations and they also include imperfections in goods and labor markets by modeling these markets as imperfectly competitive. Nevertheless, these models typically lack sufficient detail to make a link between product market reforms and their distributional consequences. We overcome this limitation by introducing two skill-groups, low-skilled and high-skilled into the DSGE model of Marco Ratto, Werner Roeger, and Jan in’t Veld.\(^{61}\)

The model version used here is a two-region, open-economy setup calibrated for the European Union and the rest of the world. For each region, the model economy is populated by households, final goods producing firms and there is a monetary and fiscal authority, both following rule-based stabilization policies. The domestic and foreign firms produce a continuum of differentiated goods. The number of firms is fixed and firms are homogeneous in terms of production technology. The goods produced in the home country are imperfect substitutes for goods produced abroad. The level of competition among firms is captured by the inverse elasticity of substitution between the goods varieties which can be directly linked to the markup that firms charge over the marginal cost of production. Competition policy in the model acts as an instrument to decrease these markups and therefore increase competition among the firms.

From the consumers’ side, we distinguish between households that are liquidity-constrained and consume their disposable income and non-liquidity-constrained (so-called Ricardian) households who have full access to financial markets. The latter group of households makes decisions on financial and real capital investments. The model is a fully forward-looking dynamic model in which all investment decisions are based on the expected future stream of income. Households also differ in terms of their skills and wages. In standard DSGE models liquidity and non-liquidity-constrained households earn the same wage which makes these models less suitable for the purpose of the article. In order to measure the distributional consequences of competition policies we introduce two skill groups into our model with different wages. Additionally, we identify the liquidity-constrained households as low-skilled and the non-liquidity-constrained households as high-skilled. By using the ISCED 1997 education classification, we define the share of population with up to lower

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\(^{61}\) Id. Despite its complexity, the DSGE framework can offer a comprehensive modeling of major functional income categories such as wages, profits, return on financial and physical assets, transfers, and benefits. See Matthias Burgert \& Werner Roeger, *Fiscal Devaluation: Efficiency and Equity* (Eur. Econ., Econ. Papers, Paper No. 542, 2014). The transmission mechanisms of these models can be explored by analyzing the impulse responses from standardized shocks. See Ratto, Roeger \& in’t Veld, supra note 5; Werner Roeger, Janos Varga \& Jan in’t Veld, *Structural Reforms in the EU: A Simulation-Based Analysis Using the QUEST Model with Endogenous Growth* (Eur. Econ., Econ. Papers, Paper No. 351, 2008).
secondary education (ISCED 2) as low-skilled and the rest of the population as high-skilled. Particularly, in our calibration for the European Union this means that around 25 percent of the population is classified as low-skilled and liquidity-constrained, while the remaining share is considered high-skilled and non-liquidity-constrained at the same time.  

We calibrate our model by selecting behavioral and technological parameters so that the model can replicate important empirical ratios such as labor productivity, investment, consumption to GDP ratios, the wage share, the employment rate, given a set of structural indicators describing market frictions in goods and labor markets, tax wedges, and skill endowments. Data for national account and fiscal variables are taken from the AMECO database. Skill-specific population shares, wages, participation and employment rates are obtained from the Labour Force Survey (EUROSTAT). Product market markups are calibrated on the basis of Anna Thum-Thysen and Erik Canton, whereas the crucial labor market parameters, particularly the elasticity of substitution between labor skills and the elasticity of labor supply are adopted from the seminal articles of Lawrence Katz and Kevin Murphy and Raj Chetty, respectively. Monetary policy parameters and labor and product market adjustment parameters are taken from Ratto, Roeger, and in’t Veld. The remaining parameters are tied down by the mathematical relationship of the model equations.

The model closely follows Ratto, Roeger, and in’t Veld. Therefore, the following two subsections will focus on those parts of the model which are crucial for understanding the transmission mechanism of markup shocks and their distributional consequences. In order to focus on the main transmission mechanism, for illustration purposes we present a slightly simplified set of equations from the model in these sections.

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62 It is a simple but reasonable assumption to identify “low-skilled” households as liquidity-constrained, even though the degree of constraint can arguably vary across households. Future research can relax this simplistic assumption by introducing more heterogeneous households in terms of their access to finance and to other income sources. In the literature, the share of liquidity-constrained households is typically in the ballpark of the 25-percent population share imposed in our calibration. This ratio is also in line with the estimates reported in Guenter Coenen and Roland Straub’s work for the euro area. Guenter Coenen & Roland Straub, Does Government Spending Crowd in Private Consumption? Theory and Empirical Evidence for the Euro Area, 8 INT’L FIN. 435 (2005).


66 Ratto, Roeger & in’t Veld, supra note 5.

67 Id.

68 See infra Part IV.B.

69 See infra Part IV.C.
B. Modeling the Macroeconomic Effects of Markup Shocks

Competition policy measures are translated into the model as markup shocks that are interpreted as resulting from interventions made by the competition authority to increase the level of competition among domestic firms. We assume that final goods producers work under monopolistic competition setting and each firm produces a variety of the domestic good which is an imperfect substitute for varieties produced by other firms. Final output of firm \( j \) at time \( t \) \( (Y^j_t) \) is produced using capital \( K^j_t \) and a labour aggregate \( (L^j_t) \) in a Cobb-Douglas technology, subject to a fixed cost \( FC^j_t \):

\[
Y^j_t = (L^j_t - FC^j_t)^\alpha (u^j_t K^j_t)^{1-\alpha} - FC^j_t \quad (1)
\]

with

\[
L^j_t = \left( \Lambda_L \left( \chi_L L^j_{L,t} \right)^{\mu-1} + \Lambda_H \left( \chi_H L^j_{H,t} \right)^{\mu-1} \right)^{\frac{1}{\mu-1}}, \quad (2)
\]

where \( L^j_{L,t} \) and \( L^j_{H,t} \) denote the employment of low and high-skilled by firm \( j \) respectively. Parameter \( \Lambda_s \) is the corresponding share parameter \( s \in \{L, H\} \), \( \chi_s \) is the efficiency unit, and \( \mu \) is the elasticity of substitution between different labor types.\(^{70}\) The term \( FC^j_t \) represents overhead labour and \( u^j_t \) is the measure of capacity utilization.

The objective of the firm is to maximize the present discounted value of profits \( (PR^j_t) \):

\[
PR^j_t = P^j_t Y^j_t - W^j_t L^j_{L,t} - W^j_t L^j_{H,t} - i^j_t, K^j_t \quad \text{with} \quad (3)
\]

where \( P^j_t \) is the producer price, \( W^j_{s,t} \), \( s \in \{L, H\} \) is the wage for low-skilled and high-skilled labor, respectively, and \( i^j_t \) denotes the rental rate of capital.\(^{71}\)

It can be shown that in a symmetric equilibrium, when \( P^j_t = P^j, \forall j \), firms charge a markup over the marginal cost of production (MC):

\[
P^j_t = (1 + \tau^j_t)MC^j_t \quad (4)
\]

\(^{70}\) The elasticity of substitution between different labor types \( (\mu) \) is one of the major parameters addressed in the labor economics literature. We rely on the seminal reference for this elasticity parameter by Katz and Murphy. Katz & Murphy, supra note 64. We use their estimated elasticity of substitution between skilled and unskilled labor which is about 1.4.

\(^{71}\) Note, that following Ratto, Roeger, and in’t Veld’s work, we assume that economic agents (firms and households) face technological constraints which restrict their price and wage setting, investment, employment and capacity utilisation decisions. Ratto, Roeger & in’t Veld, supra note 5. These constraints are captured by the corresponding adjustment costs but for easier tractability we omit these terms in the following sections.
where $\tau^j_t$ is the price markup, which is defined as a function of the elasticity of substitution between product varieties $\sigma^d$, and a markup shock $\epsilon_{mkp,t}$:

$$
\tau^j_t = \frac{1}{(\sigma^d - 1)} + \epsilon_{mkp,t}.
$$

In the subsequent analysis we will simulate the effect of competition policies as negative shocks to the price markup via the markup shock component $(\epsilon_{mkp,t})$ in Equation 5.

Skill-specific labor demand can be obtained from the first order condition of the firm's cost minimization problem\(^{72}\) with respect to labor:

$$
P_t^j \frac{\partial Y^j_t}{L^j_t} \frac{1}{1 + \tau^j_t} = W^s_t, \ s \in \{L, H\},
$$

where the marginal product of labor and the markup will jointly determine the optimally chosen level of low-skilled and high-skilled employment level.

To sum up the transmission channel from the firms' (supply) side, the interventions of the competition authority resulting in an increase in competition and a decrease in markups will lead to lower prices (Equation 4). Because firms are forward-looking, their demand for labor and capital is based on the expected future stream of profits, taking into account the effect of markups both on prices and demand. They take into account the direct effect of markups on future profitability, which is negative due to lower markups, and at the same time they also take into account the increase in future demand for their products due to the lower prices. In order to satisfy the higher demand, firms require more labor and capital. However, the decline of firms’ future profitability partly mitigates the increase of demand for input factors as increased production costs and lower prices can result in shrinking profits accrued by the firms (Equation 3).

### C. Modeling the Distributional Effects

The model allows investigating the effects of EU merger control and cartel policy interventions not only on standard macroeconomic variables such as GDP and employment, but also on distributional outcomes and second-order effects through examining employment and the wage-distribution

\(^{72}\) Note that the term $\frac{1}{1 + \tau^j_t}$ represents the Lagrange multiplier, which in a cost minimisation problem can be interpreted as the effect on the objective (that is, costs) of relaxing the constraint by 1 unit (that is, producing one extra unit). This interpretation implies that the Lagrange multiplier equals real marginal cost $\frac{MC}{P^j_t} = \frac{1}{1 + \eta^j_t}$. 

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across households (1) with different socioeconomic characteristics—in particular skill levels, and (2) across different income sources (capital ownership, wage earners and benefit recipients).

We assume that there are two types of households characterized by a skill-income type combination: (1) high-skilled, non-liquidity-constrained (NLC) households whose income sources are wages, transfers, benefits and additionally income from capital ownership and the financial market; and (2) low-skilled, liquidity-constrained (LC) households whose income sources are only wages, transfers, and benefits. These households earn lower wages which is captured by their lower efficiency level in the labor aggregate (Equation 2). These households cannot rely on additional income from holding assets (for example, government bonds, physical capital) nor from the firms’ profits as opposed to the non-liquidity-constrained, high-skilled households who can benefit from accessing both financial and physical capital markets.

This setup allows assessing the effects of competition policy on employment and wages across skill-income levels and across income sources by comparing the effect on wages with the effect on profits.

Formally, the household sector consists of a continuum of households \( h \in [0, 1] \). A share \((1 - \theta)\) of these households is non-liquidity-constrained and high-skilled. They have access to financial markets where they can buy and sell domestic assets (government bonds) and they accumulate physical capital which they rent out to the final good sector. The remaining share \(\theta\) of households is liquidity-constrained and low-skilled. These households cannot trade in financial and physical assets and consume their disposable income each period. For each skill group we assume that households supply differentiated labor services to their trade unions which act as wage setters in monopolistically competitive labor markets for each skill-group separately. The unions pool wage income and distribute it in equal proportions among their members within each skill group. Nominal rigidity in wage setting is introduced by assuming that the households face adjustment costs for changing wages.

The utility function of households is additively separable in consumption \((C_{ht})\) and leisure \((1 - L_{ht})\). We assume log-utility for consumption and allow for habit persistence (as measured by the parameter \(habc\)).

\[
U(C_{ht}) = (1 - habc)\log(C_{ht} - habc\tilde{G}_{t-1})
\]  

(7)

Preferences for leisure are given by

\[
V(1 - L_{ht}) = \frac{\omega_s}{1 - \kappa}(1 - L_{ht})^{1-\kappa}, \text{ for } s \in \{L, H\}
\]  

(8)
Parameters $\kappa (\kappa > 0)$ and $\omega_s$ are used to calibrate the corresponding Frisch labor supply elasticities.\footnote{The Frisch labor supply elasticity is defined as the elasticity of hours worked to the wage rate. In other words, it measures the substitution effect of a change in the wage rate on the supply of labor.} We assume a skill specific weight ($\omega_s$) on leisure which is necessary in order to capture differences in labor supply elasticities across skill groups (higher for low-skilled and lower for high-skilled).

1. **Non-Liquidity-Constrained (High-Skilled) Households**

Non-liquidity-constrained households maximize an intertemporal utility function in consumption and leisure subject to a budget constraint. These households make decisions about consumption ($C_{h,t}$) and labor supply ($L_{h,t}$), the purchases of investment goods ($I_{h,t}$) and government bonds ($B_{h,t}$), the renting of physical capital stock ($K_{h,t}$), and receive wage income ($W_{H,t}$), unemployment benefits ($bW_{H,t}$), social transfer income from the government ($TR_{h,t}$), and interest income ($i_t, i_{K,t}$). Hence, non-liquidity-constrained households face the following Lagrangian:

$$\max_{\{C_{h,t}, L_{h,t}, B_{h,t}, I_{h,t}, K_{h,t}\}} \sum_{t=0}^{\infty} \beta^t (U(C_{h,t}) + V(1 - L_{h,t}))$$

$$-E_0 \sum_{t=0}^{\infty} \lambda_{h,t} \beta^t \left( (1 + t_{C,t}) P_{C,t} C_{h,t} + B_{h,t} + P_{I,t} I_{h,t} - (1 - i_{-1}) B_{h,t-1} 
- (1 - t_{W,H,t}) W_{H,t} L_{h,t} - b W_{H,t} (1 - NPART_{h,H,t} - L_{h,H,t}) - TR_{h,t} 
- (1 - t_{K,t})(i_{K,t-1} - rpK) P_{H,t-1} K_{h,t-1} - t_{K,t} \delta K P_{H,t-1} K_{h,t-1} - \sum_{j=1}^{J} PR_{j,h,t} \right)$$

$$-E_0 \sum_{t=0}^{\infty} \lambda_{h,t} \delta_{h,t} \beta^t (K_{h,t} - I_{h,t} - (1 - \delta_K) K_{h,t-1})$$

The budget constraints are written in real terms with the price for consumption, investment ($P_{C,t}, P_{I,t}$) and wages ($W_{H,t}$) divided by GDP deflator ($P_t$). All firms of the economy are owned by non-liquidity-constrained households who share the firms’ total profits, $\sum_{j=1}^{J} PR_{j,h,t}$, where $J$ denotes the number of firms. NPART denotes the non-participation rate and $b$ is the benefit replacement rate. As shown by the budget constraints, the households pay consumption taxes ($t_{C,t}$), wage income taxes ($t_{w,H,t}$), capital income taxes ($t_{K,t}$), and depreciation allowances ($t_{K,t} \delta K$) after their earnings on physical capital. When investing into tangible capital the household requires a premium $rpK$ in order to cover the increased risk on the return related to these.

\footnote{Note that $b$ is defined as the benefit replacement rate. Households only make a decision about the level of employment but there is no distinction on the part of households between unemployment and non-participation. It is assumed that the government makes a decision how to classify the non-working part of the population into unemployed and non-participants. The non-participation rate (NPART) must therefore be seen as a policy variable characterizing the generosity of the benefit system.}
assets. The final term in Equation 9 reflects the technological constraint with respect to the accumulation of capital over time.

2. Liquidity-Constrained (Low-Skill) Households

Liquidity-constrained households do not optimize but rather consume their current income at each date. The consumption of household $h$ is thus determined by the net wage income plus unemployment benefits and net social transfers:

$$
(1 + t_{C,t})P_{C,t}C_{h,t} = (1 - t_{W,L,t})W_{L,t}L_{h,L,t} + bW_{L,t}(1 - \text{NPART}_{h,L,t} - L_{h,L,t}) + \text{TR}_{h,t}
$$

(10)

3. Wage Setting

Within each skill group a variety of labor services are supplied which are imperfect substitutes to each other. Thus, trade unions can charge a wage markup ($\mu_{w,t}$) over the reservation wage. The reservation wage is given as the marginal utility of leisure divided by the corresponding marginal utility of consumption. The relevant net real wage to which the markup adjusted reservation wage is equated is the gross wage adjusted for labor taxes, consumption taxes and unemployment benefits, which act as a subsidy to leisure. Thus, the wage equation is given as

$$
\frac{U_{1-L_{h,L,t}}}{U_{C_{h,t},t}}(1 + \mu_{w,t}) = \frac{W_{s,t}(1 - t_{w,s,t} - b)}{P_{C,t}(1 + t_{C,t})} \quad \text{for} \quad s \in \{L, H\}
$$

(11)

Finally, to sum up the transmission channels from the households (demand) side, low-skilled, liquidity-constrained households, which consume their income every period, can increase their consumption thanks to declining prices and increasing wage income (as firms’ labor demand increases, as noted in the previous Part). High-skilled, non-liquidity-constrained households rely on additional income from holding assets (for example, government bonds and physical capital) and from the firms’ profits. Depending on the magnitude of the decline in firms’ profits resulting from the lower markups, these households may have experienced a smaller increase in their consumption relative to the liquidity-constrained households.

75 The wage markup depends on the intratemporal elasticity of substitution between differentiated labour services within each skill groups and fluctuations in the markup arise because of wage adjustment costs following Ratto, Roeger, and in’t Veld’s work. Ratto, Roeger & in’t Veld, supra note 5.
V. MODEL SIMULATIONS

A. Calculation of Markup Shocks

1. Method

A database, which was created to calculate customer savings estimates from important merger and cartel decisions by the European Commission, has been used to calibrate the markup shocks applied to the QUEST model. As explained in Part III.A, customer savings are obtained by multiplying the estimated reduction in prices resulting from competition policy enforcement decisions in the market concerned by the estimated duration of the price reduction and the size of the market.

The aggregate change in markup ($\Delta MUP_N$) due to a set $N$ of important competition policy enforcement decisions can be defined as follows:

$$
\varepsilon_{mpk} = \Delta MUP_N = \sum_{k \in \{K_N\}} \left[ \frac{\Delta P_k}{P_k} (1 + MUP_k) \right] \frac{GO_k}{GO}
$$

where $K_N$ is the set of sectors $k$ in which these decisions led to a change in customer prices, $\frac{\Delta P_k}{P_k}$.

Markups levels are calibrated for the available sectors on the basis of Thum-Thysen and Canton,77 which extends Werner Roeger’s markup calculation method78 by including the effects of product market reforms. Equation 12 illustrates that the aggregate markup shock moves in line with price shocks in the sectors affected by the European Commission’s decisions. However, they are weighted by the relative gross markup in the sector concerned, $1 + MUP_k$, and by the share of gross output of sector $k$ in the EU economy as a whole, $\frac{GO_k}{GO}$. In our simulations the sectors $k$ are defined at the ISIC3 2-digit level.

a. Direct Effects of Merger and Cartel Decisions

A distinction is made between markup shocks reflecting only the direct effects of merger and cartel decisions and shocks including the deterrent effects as well. In the former case, the price change in each sector $k$ is computed as a weighted average of the price changes in the set of markets affected by European Commission merger and cartel decisions $n$:

76 Note that from Equation 4, we can express the percentage price change in sector $k$ as $\Delta P_k/P_k = \Delta(1 + MUP_k) / (1 + MUP_k) + \Delta MC_k/MC_k$ where $MUP_k$ is the markup ($\tau_k^s$). Assuming that $\Delta MC_k/MC_k = 0$ and $\Delta(1 + MUP_k) \approx \Delta MUP_k$, we obtain that $\Delta MUP_k = \Delta P_k/P_k (1 + MUP_k)$. Equation 12 aggregates the relevant markup changes using the corresponding market-shares as weights.

77 Thum-Thysen & Canton, supra note 63.

13

\[
\frac{\Delta P_k}{P_k} = \sum_{n \in M_k} \frac{\Delta P_n}{P_n} MS_{nk} + \sum_{n \in C_k} \frac{\Delta P_n}{P_n} MS_{nk}
\]

where \( M_k \) and \( C_k \) are the sets of merger and cartel decisions respectively affecting sector \( k \). For each merger and cartel decision, the European Commission defines a relevant market directly concerned by the decision. In our simulations, the weights \( MS_{nk} \) used to calculate the price change at the sector level are defined as the share of the affected turnover in the relevant market of decision \( n \) in sector \( k \) \((mkt_{nk})\) over gross output in the sector at the 2-digit level \((GO_k)\):

\[
MS_{nk} = \frac{mkt_{nk}}{GO_k}
\]

As already mentioned in Part III.A, we adopt the default assumption that merger and cartel decisions entail price reductions of 3 percent and 10 percent, respectively, in comparison with the counterfactual of no intervention. Equation 13 can therefore be reformulated as:

\[
\frac{\Delta P_k}{P_k} = -0.03 \sum_{n \in M_k} MS_{nk} - 0.1 \sum_{n \in C_k} MS_{nk}
\]

Substituting back Equations 14 and 15 in Equation 12, the markup change associated with the direct effects of merger and cartel decisions can be calculated as follows:

\[
\Delta MUP_N = -\frac{1}{GO} \sum_{k \in \{K_N\}} \left[ 0.03 \sum_{n \in M_k} mkt_{nk} + 0.1 \sum_{n \in C_k} mkt_{nk} \right] (1 + MUP_k)
\]

b. Deterrent Effects of Merger and Cartel Decisions

As shown in Part III.B, the direct price effects of competition policy decisions ignore the deterrent effects of such decisions. To take into account these deterrent effects, we make the assumption that, for each important decision by the European Commission, the price reduction covers not only the relevant market directly affected by the decision (the direct effects described above) but also the whole subsector defined at the NACE rev2 4-digit level to which the relevant market belongs. For example, an important airline merger decision with competition concerns covering specific routes only is supposed to have deterrent effects on the whole air passenger transport sector, meaning that other airline companies will be induced to abandon likely anticompetitive mergers. This assumption rests on the idea that the deterrent effects of competition
policy interventions are more likely to have spillovers on the companies belonging to the same sector. The assumption has some empirical support. A survey by Deloitte suggests that mergers in the U.K. are more likely to be abandoned or modified if there has been a recent inquiry by the U.K. competition authority in the sector.\(^{79}\) Moreover, there is some evidence that cartel detection in a market decreases the rate of cartel formation in related markets.\(^{80}\)

In the calculation of the markup shocks including deterrent effects, we assume that the deterrent effects will spillover to the whole subsector defined at the NACE rev2 4-digit level to which the market concerned by the competition policy intervention belongs. When taking an important merger or cartel decision, the European Commission tends to indicate the NACE rev2 sectors concerned. In order to reflect the deterrent effects in our simulation, the weights \(MS_{nk}\) used to calculate the price change in sector \(k\) resulting from decisions \(n\) are defined as the share of output at the NACE rev2 4-digit level of sector \(k\) concerned by decisions \(n\) in total output of sector \(k\) (defined at NACE rev2 2-digit level). However, due to a lack of information on gross output at NACE rev2 4-digit level, we use the share of value added at the NACE rev2 4-digit level in total value added at the NACE rev2 2-digit level instead:

\[
MS_{nk} = \frac{VA_{4nk}}{VA_{2k}}
\]

(17)

In order to avoid implausible multiplication effects for specific small cases, we assume that this value cannot exceed the original value of the affected market by a certain threshold, \(T \in \{T_M, T_C\}\), which may differ between merger and cartel decisions:

\[
MS_{nk} = \begin{cases} 
\frac{VA_{4nk}}{VA_{2k}} 
& \text{if } VA_{4nk} \cdot GO_k < T_{mkt_{nk}} \\
\frac{T_{mkt_{nk}}}{GO_k} 
& \text{if } VA_{4nk} \cdot GO_k \geq T_{mkt_{nk}} 
\end{cases}
\]

(18)

where \(VA_{2k}\) denotes the value added of the 2-digit NACE rev2 sectors corresponding to the ISIC3 sectors used in the model simulations.\(^{81}\) The thresholds


$T_M$ for merger decisions and $T_C$ for cartel decisions have been set at 10 and 20, respectively, in order to be broadly in line with the literature.\footnote{See supra Part III.B.2.}

In practice, these thresholds have turned out to be often binding. We are therefore exploring alternative ways to simulate the sector diffusion of deterrent effects using a logistic function. Logistic functions are often employed in modeling the diffusion of knowledge and innovation. Their main advantage in this context is that they allow making different assumptions regarding the extent of the diffusion of the deterrent effects of competition policy interventions at the sector level.

The application of the weights ($MS_{nk}$) defined in Equation 18 permits the calculation of markup shock including deterrent effects:

$$\Delta MUP_N^{det} = -\frac{1}{GO} \sum_{k \in K_N} \left[(0.03 \sum_{n \in M_k} MS_{nk} GO_k + 0.1 \sum_{n \in C_k} MS_{nk} GO_k)(1 + MUP_k)\right]$$ (19)

However, as available measures of deterrence are not very precise, a robustness test has been carried out to assess the sensitivity of the simulation results to the assumptions made with respect to the calculation of the deterrent effects.

### 2. Magnitude and Duration of the Shock

The direct impact of the European Commission’s competition policies can be assessed by aggregating the changes in markup directly resulting for its merger and cartel decisions. Because the price effects following decisions by the European Commission may last more than a year, customers will benefit not only from the interventions in that same year, but also from interventions with a longer duration made in the previous years.

In the current exercise we look at decisions having had an impact in 2014—that is, all decisions taken in 2014 itself, as well as decisions taken in previous years still having an impact in 2014.\footnote{For example, as indicated in Table 1, some merger decisions can have an impact up to 5 years and some cartel decisions up to 6 years. However, very often, decisions are assumed to have an impact of 3 years. This means that the markup shock applied to the model is calculated on the basis of 2012 decisions having an impact during 3 years, 2013 decisions having an impact during 2 or 3 years and all 2014 decisions.}

The decrease in markup ($\Delta MUP_N$) associated with these decisions is computed using Equation 16 and then summed to arrive at a total effect in 2014 of 0.04 percentage points. This figure includes the direct effects of the European Commission’s merger and cartel decisions only.

However, the simulations presented in this article consider not only the direct but also the deterrent effects of merger and cartel decisions. Using Equation 19 the decrease in markup ($\Delta MUP_N^{det}$) resulting from the European Commission’s decisions still having an impact in 2014 can be
derived: the markup reduction equals 0.57 percentage points in 2014, which corresponds to a 4.49 percent reduction in the markup level. The magnitude of the shock and the simulation results presented below essentially come from deterrent effects of competition policy, not from direct effects.\footnote{Out of the 0.57 percentage-point reduction in markup achieved in 2014, 0.04 percentage points are due to direct effects of competition policy, whereas the rest comes from deterrent effects.}

The magnitude of this shock appears to be reasonable in comparison with the markup shocks reported by simulation studies aimed at assessing the impact of a wider set of competition-friendly structural reforms. For instance, in Janos Varga and Jan in’t Veld’s work, structural reforms aimed at narrowing the gap vis-à-vis the average of the three best EU performers in terms of market functioning correspond to an average markup decline across the EU of around 1.5 percentage points.\footnote{Janos Varga & Jan in’t Veld, \textit{The Potential Growth Impact of Structural Reforms in the EU: A Benchmarking Exercise} (Eur. Econ., Econ. Papers, Paper No. 541, 2014).}

It is also assumed that the European Commission will continue its competition policy interventions at the same pace into the foreseeable future. Such a “permanent” markup shock can then be applied to a baseline scenario under which the European Commission would take no merger or cartel decision. The assumption of a permanent shock reflects the idea that a single competition intervention by the Commission will have little or no enduring effects on company behavior. The deterrent effects of such interventions come from companies’ awareness of the existence of a competition authority and the expectation that the authority will continue to act if infringements of competition law occur.

### B. Simulations of Macroeconomic Effects

The simulations presented below are based on an aggregate negative markup shock of $\varepsilon_{mpk,t} = 0.57$ percentage points\footnote{See supra Equation 5.} to the QUEST model. The magnitude of the shock reflects both the direct and deterrent effects of the European Commission’s merger and cartel decisions. Table 3 shows the precise magnitude of the shock considered, both in absolute and relative terms. As motivated above, we take into account the cumulative “permanent” effects of Commission’s competition policy interventions.

Table 4 reports the percentage change of GDP and of selected macroeconomic variables of interest resulting from the above markup shock. The

### Table 3. Magnitude of the markup shock

<table>
<thead>
<tr>
<th>$\Delta \varepsilon_{mpk}$ (pp)</th>
<th>$mpk$ level (%)</th>
<th>$\Delta \varepsilon_{mpk}$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.57</td>
<td>12.7</td>
<td>-4.487</td>
</tr>
</tbody>
</table>
figures reported are in percentage difference from the unshocked values. Columns report different number of years after the shock.

Table 4 illustrates that competition policy interventions increase output and raise demand for the factors of productions (capital, labor). The combination of price decline and the higher wages associated with increased labor demand and higher labor productivity yields an increase in consumption. Investment is also increasing because the negative direct effect of markups on future profitability is dominated by the positive effect of increasing demand due to lower prices. In terms of GDP we can observe an increase of 0.27 percent after five years. In the long term, the effect on GDP almost doubles, increasing to 0.52 percent. This result is in line with Jarig van Sinderen and Ron Kemp’s work, who estimate that the policies of the Dutch competition authority from 1998 to 2007 had a positive GDP effect of 0.3 percent after five years and 0.4 percent after ten years.87 The fact that this latter study uses an altogether different methodology strengthens our confidence in the results obtained.

The magnitude of the effects on GDP of the European Commission’s merger and cartel decisions in 2012 can also be put into perspective by comparing the GDP effects with similar studies having looked at other procompetitive policies. Josefin Montaegudo, Alexander Rutkowski, and Dimitri Lorenzani estimate the economic impact of the implementation of the Services Directive across the EU Member States.88 It concludes that Member States may achieve around 0.7-percent higher GDP from the Directive if they continue their reform efforts after 10 years and a 0.8-percent GDP increase in the long-run at the EU level. These results are broadly of the same order of magnitude as the GDP effects reported here. The European Commission estimates that the European Union’s ambitious Single Market initiative should result in a 1.8-percent increase in EU GDP.89

<table>
<thead>
<tr>
<th>Δ (%) after n years</th>
<th>1 year</th>
<th>5 years</th>
<th>10 years</th>
<th>20 years</th>
<th>50 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>0.156</td>
<td>0.269</td>
<td>0.359</td>
<td>0.470</td>
<td>0.516</td>
</tr>
<tr>
<td>GDP deflator</td>
<td>-0.118</td>
<td>-0.154</td>
<td>-0.208</td>
<td>-0.296</td>
<td>-0.330</td>
</tr>
<tr>
<td>Employment</td>
<td>0.123</td>
<td>0.192</td>
<td>0.229</td>
<td>0.249</td>
<td>0.228</td>
</tr>
<tr>
<td>Consumption</td>
<td>0.161</td>
<td>0.239</td>
<td>0.327</td>
<td>0.431</td>
<td>0.473</td>
</tr>
<tr>
<td>Investment</td>
<td>0.252</td>
<td>0.522</td>
<td>0.638</td>
<td>0.773</td>
<td>0.835</td>
</tr>
<tr>
<td>Labor productivity</td>
<td>0.032</td>
<td>0.077</td>
<td>0.129</td>
<td>0.221</td>
<td>0.288</td>
</tr>
</tbody>
</table>

87 van Sinderen & Kemp, supra note 4.
Concerning labor market effects, our results indicate that employment goes up by around 0.2 percent in the mid- to long-term, which corresponds to a job creation of around 450,000. This increase is due to positive reinforcing effects from both the labor demand and the labor supply side. From the labor demand perspective, firms require more labor (and capital) in order to ensure that production keeps up with the increased demand for the now lower priced products. However, the higher production costs associated with increased wage levels mitigate the positive employment effect. In the longer term, increasing employment and wage income further stimulate consumption, which in turn reinforces the demand channel. From the labor supply side, households are willing to offer more labor services as declining prices lead to higher real wages.

This positive employment effect is supported by the theoretical literature. Using comparative statics, Olivier Blanchard and Francesco Giavazzi show that an increase in competition (modeled as product market deregulation) leads to lower markups, lower unemployment, and higher real wages in the short run. However, these favorable effects are maintained in the longer run only under the assumption of decreasing entry costs. The empirical literature, on the other hand, considers that the immediate employment effects of competition policy interventions may be negative rather than positive. The OECD, for example, points out that productivity gains caused by competition can result in firms laying off workers and thereby reduce employment in the short run. On this issue, it can be argued that if competition leads to the less productive firms exiting the market (rather than layoffs within existing firms), with flexible labor markets, the reallocation of workers to more productive firms can occur rapidly and thereby reduce the likelihood of increased unemployment in the short run. However, in less flexible labor markets this mechanism could lead to employment losses in the short run. In the medium to long-term, however, the employment effects of EU competition policy are unambiguously positive.

C. Robustness of the Macroeconomic Effects

This article is a first contribution to a more comprehensive analysis of the impact of competition policy, going beyond the direct effects and integrating deterrent effects and longer term effects. This objective is ambitious and the

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90 See supra Table 4.
simulations rely on a number of assumptions. Alternative simulations have been carried out to test the robustness of the macroeconomic results presented above. Table 5 illustrates the sensitivity of the results to different assumptions made regarding the magnitude of the overcharges and of the deterrent effects. The first row presents the five-year GDP effect of a markup shock under the baseline scenario.

The second and third rows describe the outcome of a lower bound and an upper bound overcharge scenario, respectively. The price increase avoided with merger control is fixed at 1 percent in the former and 5 percent in the latter, while the price overcharge of cartels varies between 10 and 20 percent. These figures are based on assumptions used by competition authorities to calculate the direct customer savings resulting from their interventions or from the results of the literature on the price effects of mergers and cartels. The upper bound scenario is still relatively cautious. For example, there are studies showing that mergers can lead to price increases of up to 7 percent and that cartel overcharges may reach 50 percent.

An interesting conclusion resulting from the comparison of simulation results in the lower bound and upper bound overcharge scenario is that competition authorities can multiply the positive effects of their interventions on GDP growth by two if they intervene in markets with more significant anticompetitive effects. The table shows that the GDP effect after five years increases from 0.23 percent to 0.52 percent if we move from the lower bound to the upper bound overcharge scenario. This would plead in favor of competition interventions in markets where the anticompetitive behavior of companies has the biggest impact in terms of overcharges (for example, highly concentrated markets).

However, the assumptions concerning deterrent effects have an even bigger impact on the simulations results. Two scenarios concerning the deterrent effects are defined in the final two rows of Table 5. In the lower bound deterrence scenario, it is assumed that the avoided price increase resulting

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Merger overcharge</th>
<th>Cartel overcharge</th>
<th>Sector spillover</th>
<th>Merger deterrence threshold</th>
<th>Cartel deterrence threshold</th>
<th>GDP effect after five years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>3%</td>
<td>10%</td>
<td>Yes</td>
<td>10x</td>
<td>20x</td>
<td>+0.27%</td>
</tr>
<tr>
<td>Lower bound overcharge</td>
<td>1%</td>
<td>10%</td>
<td>Yes</td>
<td>10x</td>
<td>20x</td>
<td>+0.23%</td>
</tr>
<tr>
<td>Upper bound overcharge</td>
<td>5%</td>
<td>20%</td>
<td>Yes</td>
<td>10x</td>
<td>20x</td>
<td>+0.52%</td>
</tr>
<tr>
<td>Lower bound deterrence</td>
<td>3%</td>
<td>10%</td>
<td>Yes</td>
<td>5x</td>
<td>10x</td>
<td>+0.13%</td>
</tr>
<tr>
<td>threshold</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper bound deterrence</td>
<td>3%</td>
<td>10%</td>
<td>Yes</td>
<td>15x</td>
<td>30x</td>
<td>+0.40%</td>
</tr>
<tr>
<td>threshold</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
from a competition decision covers the whole subsector to which the relevant market of the decision belongs, with thresholds \( TM = 5 \) for merger decisions and \( TC = 10 \) for cartel decisions and in the upper bound deterrence scenario, the thresholds are fixed at 15 for mergers and 30 for cartels.

A comparison of the results under the different deterrence scenarios shows a greater sensitivity of the results to the different assumptions concerning the deterrent effects than to those concerning the price overcharges. The GDP effects after five years vary by a factor of three between the lower bound and upper bound deterrence scenarios, reaching 0.13 percent for the lower bound and 0.40 percent for the upper bound scenario. More precise estimates of the deterrent effects of competition policy interventions, in particular with respect to the size of the sector spillover effects, could help to narrow the range of the estimated GDP effect. Nevertheless, it would be a mistake for competition authorities to define priorities only on the basis of the estimated direct effects of their interventions. Pursuing cases with limited anticompetitive effects but with significant deterrent effects is worthwhile.

D. Simulations of Distributional Effects

In this Part, we focus on the distributional effects of the European Commission’s merger and cartel decisions. As explained in Part IV.C, we make a distinction between different types of households. Non-liquidity-constrained, high-skilled households work, receive wages, transfers and benefits, consume and save, own capital and invest in financial markets. Liquidity-constrained, low-skilled households, whose only sources of income are wages, transfers and benefits, consume all their resources in each period. Making a distinction between these two types of household permits analyzing the distributional effects of interventions by competition authorities such as the European Commission.

Table 6 reports the percentage change of the main macroeconomic variables describing the relative performance of non-liquidity-constrained, high-skilled households (NLC) and liquidity-constrained, low-skilled households (LC). Variables which refer to a specific household type are expressed in per-household terms. It appears that the markup shock leads to an increased demand for both non-liquidity-constrained and liquidity-constrained labor. Consequently, the wage increase for both types of households is comparable as well, but slightly higher for non-liquidity-constrained households.

We also observe a substantial deterioration in profits due to lower markups (a peak deterioration of 5.5 percent after five years), and a decrease in income from financial assets due to lower interest rates on bonds, driven by an accommodating monetary policy responding to decreasing prices.\(^93\) The

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\(^93\) In line with standard assumptions in similar DSGE models, the monetary authority is assumed to follow a Taylor-type interest-rate rule, where the policy rate is set as a function of the lagged policy rate, the inflation rate and the output gap. Roeger, Varga & in’t Veld, *supra* note 61.
latter two negative effects are only borne by the non-liquidity-constrained households, who however, can benefit of an increase in capital income due to a higher demand for production factors.

Following the increase in disposable incomes, households increase consumption by 0.24 percent after five years. The increase in consumption of liquidity-constrained households (0.62 percent after five years) is particularly prominent due to the fact that in the QUEST model liquidity-constrained households consume all the available income sources and do not save or invest. In the long run, non-liquidity-constrained households slowly recuperate their consumption relative to the liquidity-constrained households as their losses from profits and interests on bonds are decreasing.

Unemployment benefits paid to non-liquidity-constrained households is decreasing because they experience a proportionally larger decline in their unemployment rate.\(^{94}\) As transfer incomes are not linked to unemployment or wages, they increase proportionally at the same rate for both households.

Overall, we can observe that procompetitive policies have important redistributive effects because, although they boost the demand for all types of workers, they significantly reduce rents that are destined to non-liquidity-constrained households.

The distributional consequences of competition friendly interventions and product market reforms are not addressed in the previously mentioned studies

\(^{94}\) Although the employment effect is the same for each skill group—as the firms require a similar increase of labour input from both of them—the same increase in employment means a much larger decrease in the unemployment of high-skilled because their unemployment is much smaller initially.
of Monteagudo, Rutkowski, and Lorenzani, the European Commission, and Varga and in’t Veld. Structural reforms, in particular tax, labor market and welfare reforms have been more frequently analyzed in terms of their distributional effects. Matthias Burgert and Werner Roeger, for instance, simulate the macroeconomic impact of tax shifts in the European Commission’s QUEST model and show that a tax shift from labor income to consumption redistributes disposable income from capital owners to wage earners. They find that the tax shift is regressive in the short run, but progressive in the long run, if it is enacted by reducing employers’ social security contributions, and is progressive already in the short run if it is enacted by reducing personal income taxes. In contrast, our results show that competition friendly measures can favor poorer households already in the short run.

Rudiger Ahrend, Jens Arnold, and Charlotte Moeser present model-based evidence about how the short-term impact of selected macroeconomic shocks is shared across different groups of agents. Unsurprisingly, the authors find that individuals with low incomes, and especially young people, seem in general to lose most from adverse macroeconomic shocks (fiscal consolidation reforms). Stricter product market regulation (for example, stronger entry barriers, less competition, and friendly environment) is found to amplify the negative effects of certain shocks for youths and the poorer segments of society. Additionally, more rigid market regulations also had negative income effects on the poor following devaluations and commodity price decreases, and adversely affected poverty in the aftermath of financial crises. This evidence is very much in line with the results presented in this article, which illustrates how procompetitive policy actions and reforms benefit the poorer segments of society.

VI. CONCLUSION

This article proposes a methodological approach to strengthen the microfoundations of the macroeconomic assessment of EU competition policy by making the link between important competition policy decisions and markup shocks applied to a macro-model. This approach includes three further novelties: first, it exploits a unique database containing case-specific information on merger and cartel decisions; second, it allows taking into account not only the direct effects of competition policy interventions but also their deterrent effects; and third, it sheds light on the distributional impact of competition policy.

95 Monteagudo, Rutkowski & Lorenzani, supra note 88.
96 EUROPEAN COMMISSION, 20 YEARS OF THE EUROPEAN SINGLE MARKET, supra note 89.
97 Varga & in’t Veld, supra note 85.
98 Burgert & Roeger, supra note 61.
The macroeconomic effects of competition policy interventions are assessed by deriving and applying markup shocks to a DSGE model, the QUEST III model. The markup shocks are calibrated on the basis of the microeconomic data used to calculate the customer savings from cartel and merger decisions of the European Commission in 2014, as well as decisions from earlier years still having an impact in 2014. These shocks reflect both direct and deterrent effects of competition policy interventions. This article models the deterrent effects as sector spillovers. It assumes that the price effects of the Commission’s decisions affect not only the relevant market cited in the decision but also the whole subsector to which this market belongs (subject to thresholds defined in line with the literature on the size of deterrent effects of merger and cartel decisions, respectively). In the QUEST model simulations the markup shock brings about a reduction in prices, which in turn results in higher demand, employment, and GDP growth. Profits are negatively affected.

The results of the simulations show that the total effects (including the deterrent effects) of competition policy interventions on GDP are sizeable: a 0.27-percent increase after five years and a 0.52-percent increase in the long term. This result is very similar to the one obtained in the one other study on the macroeconomic impact of competition policy that we are aware of. van Sinderen and Kemp report increases of 0.3 percent and 0.4 percent in GDP after five and ten years, respectively.\(^\text{100}\) The competition policy effects are slightly lower than the estimated impact of the implementation of the EU Services Directive.

The model simulations presented here are reliant on a number of assumptions including on the level of overcharges, their duration and scope, the importance of the deterrent effects, and the specification and calibration of the general equilibrium model. Robustness tests have been carried out to assess the sensitivity of the results to the different assumptions made. However, the positive impact of competition policy on growth and jobs is robust to these different assumptions.

The QUEST III model also allows assessing the distributional effects of the EU competition policy interventions across households, differentiating between non-liquidity-constrained households (savers and high-skilled) and liquidity-constrained households (low-skilled and consuming all their resources in each period). The simulations show that competition policy has important redistributive effects, with liquidity-constrained households increasing proportionally more their consumption than non-liquidity-constrained households: the liquidity-constrained households increase their consumption four times more than the non-liquidity-constrained households after 5 years (by 0.62 and 0.16 percent, respectively). This supports the view that competition policy

\(^{100}\) van Sinderen & Kemp, supra note 4.
interventions, by lowering prices, may be particularly beneficial to the poorest in the society.

This article provides more comprehensive analysis of the gains from competition policy enforcement than the customer savings approach. However, it still gives an incomplete picture of the impact of competition policy. It does not include an assessment of the macroeconomic effects of competition policy interventions in the areas of abuse of dominance and State aid control. Moreover, it models the impact of competition policy interventions as a decrease in markups, while there are other transmission channels through which the impact of competition policy may be felt, such as increased business dynamism or improved incentives for innovation. Finally, it would be worthwhile to exploit the available information on the sector distribution of Commission and merger decisions by tracking the interlinkages between sectors and analyzing the differential effects of competition decisions affecting different sectors of the economy, which would require the use of a macroeconomic model that is disaggregated by sector. All these issues could be areas for further research.