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Legal Standards and Economic Analysis in Antitrust Enforcement: An Empirical Investigation for the Case of Greece

Kelly Benetatou and Yannis Katsoulacos

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

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Kelly Benetatou[*] and Yannis Katsoulacos[†]

ABSTRACT

The purpose of this paper is to explain the choice of legal standards of the Hellenic Competition Authority (HCC) concerning antitrust enforcement and the impact of this on the judicial review of the decisions reached. This paper is based on the methodology presented in a paper by Katsoulacos Y., S. Avdasheva, and S. Golovaneva (2019), which measures empirically the extent of economic analysis used and the legal standards (LSs) adopted by Competition Authorities (CAs). The methodology is applied to the appealed investigations of the HCC. In contrast to the theoretical analyses, systematic empirical assessments of LSs have been very limited. There are case studies based on particular decisions or meta-analysis of a group of decisions, but there is no statistical representation of the legal standards applied by competition authorities. The absence of empirical measurement and statistics on legal standards limits our ability to answer important questions. Thus, it makes any international comparisons of LSs applied in different jurisdictions and judgments on the role of economic analysis speculative. Further, it impedes the analysis of the evolution of LSs over time and explaining the factors that drive this evolution. Both issues are important for the identification of the deviation of legal standards actually applied in competition cases from their optimal level. For the purposes of this paper we collected and analysed a dataset of antitrust infringement decisions reached by the HCC, between 1997-2017, which were appealed to Courts for annulment. Our main objectives have been to use this dataset to examine to what extent economic analysis and evidence is used in the decisions of the HCC and how it evolves over time. Also, we examine how changes in the extent of economic analysis or variations in LSs, for any given conduct, is related to (how it affects) the probability that decisions on that conduct are annulled in appellate courts, as well as the effect of movements in LSs – from *per se* toward effects-based – on litigation costs and the duration of litigation. We show that on average, economic analysis still plays a very modest role in the investigations, as HCC applies close to *per se* legal standards even when assessing conducts for which effects-based LSs would be more suitable. There is no discernible evolution toward a more effect-based approach during the period 1995-2017. Further, the choice of LSs for specific conducts can create considerable legal uncertainty for firms about how these conducts will be assessed by the HCC. Overall, our empirical findings indicate low quality of enforcement. Our results are consistent with recent arguments, according to which, the higher disputability of decisions as a result of increasing the extent of economic analysis under effects-based LSs, increases the annulment rates of decisions under appeal.

Keywords: Competition policy, legal standards, Greece

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1. Introduction: factors that influence the choice of LSs – a brief review

In recent years, the debate on competition policy has focused on the role played by economics in improving the analysis of antitrust enforcement and merger cases. The discussion has raised issues concerning the legal standards (LSs) that should be adopted and remains still very controversial[3].

Katsoulacos and Ulph in a series of papers (2009, 2011, 2015 and 2016) have attempted, by using a maximization-of-welfare framework, to provide answers on how a number of fundamental factors – such as decision errors and deterrence effects – affect the choice of the (optimal) legal standard[4] and hence, indirectly, the appropriate role and extent of economic analysis in Competition Law (CL) enforcement. Their analyses point quite strongly to the view that for a range of conducts – which now are understood not to be strongly presumptively illegal and for which the developments in economic theory and modeling in the last 20 or so years significantly improved the discriminating quality of the assessment – moving to assessment with effects-based standards will improve welfare. This is due to a reduction in the costs of decision errors and an improvement in deterrence effects. But, as is widely recognized, the legal standards actually adopted in many countries – most importantly in the EU and its member states – remain close to *per se* (and the extent of economic analysis applied by the vast majority of CAs today remains low) for cases in which effects-based LSs would be considered more appropriate from the point of view of welfare maximisation. This is particularly so for abuse of dominance cases.

This implies that the arguments concerning decision errors, deterrence effects, as well as legal uncertainty and administrative costs, are not the only – or even the most important – in considering the choice of legal standards. In practice, other factors must be important. In some more recent papers, these are at the center of the analysis (Katsoulacos, 2019a, b and Katsoulacos, Avdasheva and Golovanova, 2019). One is related to the objectives of CAs, specifically the reputational concerns of those deciding the enforcement procedures that are affected by the judicial review of the CA's decisions. As a result of these concerns, CAs will make their choice, taking into account what they anticipate the Courts' choice of legal standard will be. Given this, it must also be recognized that the choice of legal standard is dependent on the *substantive standard* ("SS") adopted by Courts. While in academic discussions this is usually assumed to be welfarist (liability requiring a showing of adverse effects on welfare[5]), in practice this is often not the case. For example, the substantive standard may be just to "protect the economic freedom of market participants", or the pursuit of a "system of undistorted competition" (Wils, 2014) without obligation to show adverse effects on consumer welfare or

[3] For discussions and empirical information concerning the use and usefulness of economics in competition law enforcement see Baker (2003), Gavil (2008), Neven (2006), Schinkel (2008) and Lianos (2012).

[4] Extensive references and reviews of the literature related to these issues are contained in these papers. See also J Padilla (2011), page 435.

[5] Consumer or total welfare – see also below.

efficiency (Rey and Venit, 2015). This would imply that any conduct that puts one or more competitors at a disadvantage would be considered unlawful[6], irrespective of the ultimate consequences of the conduct for welfare[7]. The link between substantive standards and the choice of legal standards has been discussed recently and it has been demonstrated (Katsoulacos, 2019a) that adopting non-welfarist substantive standards increases the likelihood that *per se* legal standards are applied and a limited amount of economic analysis and evidence is utilized in investigations of specific conducts.

In contrast to the theoretical analyses, systematic empirical assessments of LSs have been very limited. There are case studies based on particular decisions or meta-analysis of a group of decisions, but there is no *statistical representation* of the legal standards applied by competition authorities. The absence of empirical measurement and statistics on legal standards limits our ability to answer important questions. Thus, it makes any international comparisons of LSs, applied in different jurisdictions and judgments on the role of economic analysis, speculative. Further, it impedes the analysis of the evolution of LSs over time and explaining the factors that drive this evolution. Both issues are important for the identification of the deviation of legal standards actually applied in competition cases from their optimal level.

For the purposes of this paper we collected and analysed a dataset of 77 antitrust infringement decisions reached by the Hellenic CA – the Hellenic Competition Commission (HCC) between 1997-2017[8], which were appealed before administrative courts for annulment. Our main objectives have been to use this dataset to examine the following:

1. Measure to what extent economic analysis and evidence is used in the decisions of the HCC and how it evolves over time. This can be compared to the "optimal" level of economic analysis for any given conduct that would be applied if the appropriate[9] ("optimal") Legal Standard (LS) for that conduct was adopted. We develop a number of indices[10]. First, we measure the Weighted Average Legal Standard (WALS) adopted for each potentially anticompetitive conduct-type (the weights being the share of each legal standard used in assessing each conduct-type) and the degree of concentration (CONC) for the WALS of each conduct-type. The higher the CONC, the greater the concentration on specific LSs when

[6] The meaning of "preserving undistorted competition" was actually made clear by the EU General Court which, upholding in its entirety the Commission's Decision on *Intel*, argued that making it more difficult for a rival to compete "in itself suffices for a finding of infringement".

[7] Rey and Venit (2015) note that the effects-based standard *starts* with a showing of a distortion of the competitive process but, in order to assess this distortion and find liability, one "should (also) look at the actual or likely *effects of the conduct*", on consumer welfare or efficiency (p. 17, italics ours). Note that here we will not try to examine the pros and cons of using "consumer welfare" or "total welfare / efficiency" as the right substantive standard. There is currently quite an intense debate on this issue, with some economists arguing for a total welfare standard, e.g. D. Carlton (2007). For a recent contribution also containing a review of the recent debate see Katsoulacos, Metsiou and Ulph (2016). Also, CAs often take into account the presence of "public interest concerns" as additional liability criteria.

[8] Decisions issued up to 12/2017.

[9] As inferred by the recent relevant literature.

[10] Indices presented in the paper of Avdasheva S., Golovaneva S. and Katsoulacos Y. (2019).

assessing specific conducts and hence the greater the certainty with which it can be anticipated that a specific LS will be used in the future to assess a conduct. The standard deviation of WALS is another *measure of the uncertainty* that surrounds the anticipated LS for a conduct. Finally, we develop *indices for quality of enforcement,* measuring the deviation of WALS from its optimal level[11].

2. Examine how changes in the extent of economic analysis or variations in LSs, for any given conduct, is related to (how it affects) the probability that decisions on that conduct are annulled in appellate courts. That is, examine empirically the probability of annulment as a function of the LS adopted[12].
3. Examine the effect of movements in LSs from *per se* towards effects-based on litigation costs and the duration of litigation[13].

Our main results are as follows. First, we find that on average the HCC applies a moderate degree of economic analysis, closer to the amount under *per se* (TEB) legal standards. Additionally, the legal standards are not applied in a consistent way. In investigations of similar conducts, the legal standards applied vary quite substantially, creating high levels of legal uncertainty for firms that we measure empirically and compare across different conduct groups. Overall, with the exception of price fixing and market sharing conducts, the quality of enforcement (measured by the deviation of the LSs adopted from the theoretical optimum) has been – and remains throughout the period investigated – very low.

Next, our results indicate that when legal standards adopted by the HCC are low (Strict *per se* – as defined below) higher legal standards may decrease the likelihood of decisions being annulled: consistent with the hypothesis that adopting very low legal standards is considered "wrong" by the courts. Simultaneously, we provide evidence that significantly increasing the extent of economic analysis leads to an increase in the annulment rate of decisions[14]. Our results are thus (at least in most cases) consistent with the existence of a U-shaped relationship between LSs and the probability of annulment: higher legal standards decrease and then increase the likelihood of decisions being annulled. This can be supported theoretically as showing that, for example, the HCC adopts the "wrong" (lower) LSs in many cases when courts' standards are close to what we term 'Truncated Effects-Based' (TEB), but follow the courts

[11] The indices are given in Tables

Table **5** -

Table **9**.

[12] Results on this are contained in

Table **10**.

[13] Results on this are contained in

Table **12**.

[14] It is important to notice here that we count in annulled decisions *only* decisions annulled for substantive reasons (not procedural reasons).

when the LS is higher than TEB. When LSs are higher than TEB (and closer to full effects-based), the increase in the disputability of decisions increases the probability of annulment[15].

Finally, we show that an increase in legal standards leads to additional costs of enforcement for competition authorities. Specifically, in terms of the time necessary for litigation to be completed, decisions in which HCC applies analysis close to a TEB LS take longer than decisions based on MPS legal standards.

Overall, our results are consistent with recent theoretical predictions concerning the choices made by a reputation maximizing authority, whose reputation (and, hence, utility) is decreasing in accordance with the annulment rate of its decisions under appeal and which is operating under increasing enforcement costs as LSs move closer to effects-based (Katsoulacos, 2019a).

The remainder of this paper is organized as follows. In section 0, we provide a brief overview of the methodology used to construct our database and measure the extent of economic analysis (LSs). Then, we briefly describe HCC's Enforcement Rules; this review helps us interpret the findings of qualitative and quantitative analysis on effects-based indicators and the factors affecting legal standards. Also, section 0, contains the empirical analysis undertaken and a detailed discussion of the results obtained related to objectives 1-3 described above. Section 0 concludes.

2. Identifying the extent of economic analysis and legal standards in competition law enforcement: a methodology

2.1 Types of economic analysis applied in competition law enforcement

The methodology, referred in the paper of Katsoulacos Y., Avdasheva S. and Golovaneva S. (2019), begins with the assumption that there are variations between pure *per se* (or pure object-based) and full *effects-based* (or full Rule of Reason) decision rules. According to their opinion, it is probably best to think of legal standards as forming a continuum at the extremes of which are the strict *per se* (or object based) and the ("full") *effects-based* (or full rule of reason) standards (these variants are discussed in more detail below).

In order to capture the differentiation and complexity of decision rules, the authors propose a set of indicators aligned with the case law tests broadly used in competition textbooks. They identify the important components of economic analysis that are necessary to substantiate in a specific investigation, how the relevant market has been defined, how market power raising or exclusionary effects have been shown, how efficiency effects have been proven and what is ultimately the welfare impact of the conduct. Then, they analyze the documents on particular decisions made by a CA and identify whether a component (or one or more of its sub-components) of economic analysis has been undertaken or not. They suggest that all of the

[15] See discussion below on the argument that increasing LSs close to full effects-bases increases the disputability of decisions and thus leads to an increase in annulment rates [Neven (2006), Katsoulacos, Makri and Metsiou (2018) and Katsoulacos (2019a)].

information could be extracted from texts of appealed decisions and they assign a value – "Yes=1 (in case the analysis has been undertaken)" or "No=0 (otherwise)" – to the variable corresponding to a component of economic analysis.

The methodology identifies four broad components or categories of economic analysis (A, B, C and D in

Table 1) that must be performed for the investigation to constitute an effect-based (or rule-of-reason) analysis. One or more variables (sub-components) make up every one of these main categories of economic analysis (e.g. sub-components B.1, B.2, C.1 etc; see

Table 1). Taking into account the fact that non-exploitative and exploitative conducts require different blocks of economic analysis, different analysis variables are used in each of these two conduct categories. They abstract variables that could be included in the assessment of each specific conduct type, among the many of the non-exploitative conducts category, from differences in the analysis – assuming that these are about the same.

The statements – in which the authors assign (0/1) – under consideration are:

Table 1: Types of economic analysis taken into account in the construction of the indicators of the extent of economic analysis [or of the Effects-Based (EB) indicators][16]

		Restrictions of competition other than Exploitative conducts	**Exploitative conducts**	
Statement Category	**Statement Description**			**Score**
A	**Discussion of the nature and characteristics of the conduct**	**Comment:** Since in all cases there must be some discussion of the nature and characteristics of the conduct, we should not get a score of "0" here – in this sense perhaps this category is not needed. It is included for purely formal reasons, to remind ourselves that an overall score of "1" is a strict *per se* approach to the assessment and that this means that the CA only considered the nature and characteristics of the conduct.		0/1
B	**Market Analysis**			

[16] For details see Katsoulacos et.al. (2019).

		Restrictions of competition other than Exploitative conducts	Exploitative conducts	
Statement Category	**Statement Description**			**Score**
B.1	Basic analysis of market characteristics based on available market statistics	**Comment:** Economic theory is even necessary in order for a CA to "frame" a case. This typically involves information about the structure of the industry, the firms, the structure of demand and the technology, determination of market shares (without formal analysis of market definition). It is the first step in an economic analysis in the context of a competition case.		0/1
or B.2.	Formal market delineation and market share Determination, based on Hypothetical Monopolist methodology[17]	**Comment:** Market definition decisions based not on qualitative assertions but on more sophisticated economic tests (e.g. SSNIP test, Price correlation and Critical loss analysis)		
C	**Evidence on restrictions of competition/ harm imposed**			
C.1.	Analysis undertaken in order to identify whether conduct has market power enhancing (e.g. through agreements) or exclusionary effects (e.g. in monopolization practices)	**Comment:** This need not include the construction of a formal model (e.g. examination of incentive compatibility constraints in a concerted practice case, or examination of how exclusive contracts could lead to exclusion or prevent entry in the specific context, or "equally efficient competitor test"). But must indicate a serious effort to demonstrate the presence of such effects.	**Comment:** Analysis undertaken to compare price with cost	0/1

[17] Note that in decisions where formal market definition B.2 is provided, then B.1 must also be given a score 1. The authors emphasise that B.1=0, when CA's decisions only mention briefly what is considered to be the product and geographic market (e.g. on decisions on price fixing conducts, concerted practices).

		Restrictions of competition other than Exploitative conducts	Exploitative conducts	
Statement Category	**Statement Description**			**Score**
C.2.	Articulation of theory of harm to consumer welfare (without taking into account of efficiencies)	**Comment:** When "scoring" CAs decisions this need not be a full-blown formal analysis, but one could also score some effort towards determining where the case stands on the basis of assessing crucial aspects of the situation e.g. assessing the size of non-contestable demand of a dominant firm, negative impact on consumers.	**Comment:** Comparison of the prices of the dominant supplier with the prices in other markets	0/1
C.3.	Analysis of potential efficiency defense	**Comment:** Analysis should be based on efficiencies that are expected to result from conduct that will create benefits to consumers (again, this need not be very sophisticated but must indicate a serious effort to take efficiencies into account). Analysis of potential Efficiency Defense relating to factors that tend to prevent a price rise or other harm to consumers. Counterfactual analysis[18] may be undertaken under any of the C components – though this is not strictly necessary	**Comment:** Comparison of the prices of the dominant supplier with the price of competitors	0/1

[18] I.e. Analysis proposing that theory of harm does not stand and demonstrating the absence of foreclosure effects and consumer harm of an exclusionary conduct.

		Restrictions of competition other than Exploitative conducts	Exploitative conducts	
Statement Category	**Statement Description**			**Score**
		for considering the effect as established.		
C.4.			**Comment:** Excess profitability analysis	0/1
D	**More effects-based analysis to support robustness of C**			
D	Balancing of potential anticompetitive effects of conduct with the efficiencies and determination of the final impact of consumers (or on total welfare)	**Comment:** This is any analysis "over and above" the analysis that may have been included under "efficiencies" above (taking into account efficiencies that need not impact consumers, especially in the short-term) . By "balancing" here we mean any formal economic analysis that attempts to measure the net effect of the conduct, that may not be related to efficiencies - e.g. balancing the short-term and long-term implications of refusal to license (or of compulsory licensing) an innovative activity.	**Comment:** Analysis of welfare effects of exploitative conduct.	0/1
Total Score		**6**	**7**	

Source: Katsoulacos et.al (2019)

Note that the value (1 or 0) of an analysis variable (e.g. of B.2 or C.2 etc.) is based on a judgment whether the relevant analysis has been undertaken or not and it says nothing about the correctness or "quality" of the analysis or of the data used. In other words, the value of an analysis variable indicates *whether the competition authority, in the particular case, has tried to address the specific question associated with that analysis variable*.

2.2 Effect-based scores and types of legal standards

Following the above methodology, Avdasheva, Golovaneva and Katsoulacos (2019) suggest to construct the *effects based scores* (hereinafter EBS) using the 6 statements above (for non-exploitative practices). EBS are calculated as the sum of the analysis variables presented in

Table 1 – with a minimum of 1[19] and a maximum of 6. The question is: *Is it reasonable for undertaking empirical analysis to use data that aggregate scores over many different conducts (e.g. all the non-exploitative conducts)?*

The answer is that a straight aggregation of scores across different conduct types will not provide indicators which can be used to undertake meaningful empirical analysis of the extent of economic analysis and type of LSs adopted. Such aggregate indicators cannot meaningfully be used to measure whether economic analysis is used "optimally", since optimal LSs can only be defined at the level of each conduct. Furthermore, such aggregate indicators cannot be used to make comparisons between different countries. The level of the aggregate indicator will depend on the composition of conduct types, which will be different for different countries, and will change over time. For example, an EBS indicator score of 2.91 for both Greece and France certainly does NOT mean that the extent of economic analysis relative to some optimal level is the same in Greece and France given that the composition of conduct types may well be completely different between the two countries[20]. Moreover, such aggregate indicators cannot be used to examine how changes in the economic analysis – if measured by changes in the value of the aggregate indicator – affect the annulment rate, since the latter is expected to be influenced by what "type" of economic analysis[21] is utilized and how this changes. Additionally, a given value of the aggregate indicator cannot reflect what "types" of analysis are utilized and – when the value of the indicator changes – what "type" of economic analysis is responsible for the change in the indicator's value.

Empirical researchers can respond in two ways to the above difficulties for undertaking empirical analysis. One way is to increase the available data for each conduct type, e.g. by putting together different countries, and constructing indicators for each conduct type[22] – using a table (that may be very similar to

[19] There must always be some discussion at least of the nature and the characteristics of the conduct.

[20] E.g. in France there may be proportionally many more decisions on conduct types for which the appropriate LS is Per Se or close to Per Se.

[21] For example, different types of economic analysis can lead to a score 3 and different ways of increasing economic analysis can increase the score from 3 to 4 but the implications of each case for the rate of annulment may not be the same.

[22] The amount of data for each conduct type, e.g. bundling, among those in the non-exploitative conducts category, is quite small for any one country for undertaking empirical analysis.

Table 1) which identifies the analysis variables for the specific conduct type. This is not an approach without difficulties; one of which is the collection of enough data from different countries[23].

A second way[24] that we report in this section, is to concentrate on the data of one country (Greece). Then, rather than just using the EBS described above, using EB scores that result from aggregation across conduct types, but when aggregating we make sure that we assign the same score to different decisions only when the same amount and the same "type" of economic analysis is undertaken. We follow this procedure below for all non-exploitative conducts in a bundle (these include horizontal and vertical agreements and exclusionary conduct[25]).

According to this procedure, we use the analysis variables that describe the different steps of economic analysis that are utilized in antitrust investigations, ordered – as in

Table 1 above – in a sequence that represents what most economists would recognize as successively increased application of economic analysis. That is, as we move from strict *per se* to *full effects-based LS*.

Table 1 describes additional blocks of analysis applied. This is very useful when we come to map the extent of economic analysis applied in a specific case to the legal standard adopted in that case. However – while we consider the order of statements above to reflect a common (or "natural") order in which economic analysis is applied as we move from "low" (*per se*) to "high" (effects-based) legal standards – this order cannot be considered as unique for the assessment of all conducts in practice. Indeed, the statements described in

Table 1 distinguish between what is a reasonably good set for all conducts other than exploitative and another set of statements, given for exploitative conducts[26].

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[23] At this point we are collecting data on antitrust decisions in 2 countries and we hope that in the future we will be able to aggregate data from more (different) countries and thus extend our sample and to follow up on this approach.

[24] Which is, indeed, complementary to also using data from different countries together.

[25] There are significant common elements in the assessment of these conducts to justify using a unified methodology for constructing EB-indicators. Of course we could distinguish (additionally) between two sub-categories of anticompetitive agreements and exclusionary conduct (and, can disaggregate even further) and construct EB-indicators for each of these more disaggregated conduct categories. As already noted, the main disadvantage of disaggregating further is that disaggregation leads to smaller samples with which to undertake statistical work.

[26] However, note that this does not necessarily imply, when in the text of a decision we find some analysis of a higher level (in the sequence), that lower level analyses *have been* included and has also been explicitly described in the decision text. This is particularly important with regard to the statements B relating to the Contextual Analysis of the Market and the Firms. We believe that an analysis putting forward a theory of harm even if it is not preceded by an *explicit* description of the market in the decision text, will be based on developing some understanding of market characteristics and conditions.

Given these points, the aggregate EB indicator that will be used below is obtained by constructing the following Sets of EB analysis (SEB) which, hereafter, we will also term Legal Standard Indicators (LSI), using the statements in

Table 1:

S1: this contains all the infringement decisions in the sample in which we find "1"scores just for the A statement (for all other statements score is "0").

S2: this contains all the decisions in which we find "1"scores for the A statement and for the B statement (for all other statements score is "0").

S3: this contains all the decisions in which we find "1" scores for the A statement and for the B statement and for the C1 statement (for all other statements score is "0").

S4: this contains all the decisions in which we find "1" scores for the A statement and for the B statement and for the C1 statement and for the C2 statement (for all other statements score is "0").

S5: this contains all the decisions in which we find "1" scores for the A statement and for the B statement and for the C1 statement and for the C2 statement and for the C3 statement (for all other statements score is "0").

S6: this contains all the decisions in which we find "1" scores for the A statement and for the B statement and for the C1 statement and for the C2 statement and for the C3 statement and for the D statement (for all other statements score is "0").

Thus, by construction, our (new) aggregate EB-indicator with a value of 1 is represented by the set of decisions S1: that is, 1 is the value of the indicator when, in decisions, only block of analysis A is undertaken. Our aggregate EB-indicator with a value of 2 is represented by the set of decisions S2: that is, 2 is the value of the indicator when, in decisions, only block of analysis A and B is undertaken. Our aggregate EB-indicator with a value of 3 is represented by the set of decisions S3: that is, 3 is the value of the indicator when, in decisions, only block of analysis A, B and C1 is undertaken, etc.

In particular, the authors identify the following sets of decisions S_i,i=1,……6, as described above and the corresponding value of the aggregate EB-indicator for each set are:

S1: {A} – aggregate LSI - of value 1.

S2: {A, B} - aggregate LSI - of value 2.

S3: {A, B, C1} – aggregate LSI - of value 3.

S4: {A, B, C1, C2} – aggregate LSI - of value 4.

S5: {A, B, C1, C2, C3} – aggregate LSI - of value 5.

S6: {A, B, C1, C2, C3, D} – aggregate LSI - of value 6.

Now, by comparing the different sets of decisions, S_i,i=1,……6 we can identify the effects of additional economic analysis. For example, by comparing decisions in S2 with decisions in S3,

we can identify the effect of adding the block of analysis C1; by comparing decisions in S3 with decisions in S4, we can identify the effect of adding the block of analysis C2. We are also able to identify the frequency with which the CA applies the analysis associated with each one of the sets in assessing different conduct types and hence infer the extent to which the CA favors a certain legal standard for the different conduct types (see below).

Katsoulacos et al. (2019) distinguish between four main distinct legal standards that are intermediate between them, corresponding to the above mentioned (sets) scores of economic analysis (see

Table **2** below). A brief description of the LSs follows.

Under the *Strict Per Se (SPS)* LS the CA makes decisions on the basis only of the purely formal characteristics of the conduct under investigation, relying on strong presumptions about the implications of the general class of conducts to which the specific conduct belongs for welfare. Alternatively, one can say that under SPS LS the CA makes inferences about effects (on welfare) from the formal characteristics of the conduct and some basic analysis of the market.

The *Modified Per Se (MPS)* LS can be considered as a *per se* rule, subject *to* a Significant Market Power requirement or, more generally, as supplementing *per se* by undertaking analysis of market characteristics. For example, when assessing conducts under abuse of dominance or in an information exchange agreement or in a concerted practice for which there is no strong hard evidence of collusion. Alternatively, one can say that under MPS LS the CA makes inferences about effects (on welfare) from the formal characteristics of the conduct, detailed analysis of market characteristics and – depending on the type of conduct – the implications of these on incentives for achieving sustainable collusion and/or on the assessment of market power.

Truncated Effects Based (TEB) is a higher LS, under which decisions about whether or not there is liability in the case of a specific conduct are reached by establishing that the characteristics of the specific conduct and of the market in which it is undertaken are such that it belongs to a class of conducts that distort the competitive process by disadvantaging rivals (i.e. through exclusionary effects, widely defined) or by enhancing market power (as in a concerted practice case) and – assuming a welfarist substantive standard – by establishing that the conditions present are such that a strong presumption can be made of adverse welfare effects. Alternatively, one can say that under a TEB LS, the CA decides that there is liability by inferring adverse welfare effects from the potential of the conduct to distort the competitive process by disadvantaging rivals (i.e. through exclusionary effects, widely defined) or by enhancing market power (as in a concerted practice case).

Finally, *Full Effects Based (FEB)* represents the LS under which a finding of liability relies on all potential anticompetitive (exclusionary or market power enhancing), all potential pro-competitive effects of the specific conduct being assessed and compared[27] as well as a showing of adverse effects on *welfare* (consumer or total) of this specific conduct to be established.

[27] In summary and simplifying somewhat, under (strict) Per Se only conduct characteristics are examined and assessed, under MPS these are examined as well as market characteristics, under TEB additional analysis establishing exclusionary or market power enhancing effects is undertaken and under FEB the above are

Table 2: Mapping EBS to legal standards

	Presumed components of economic analysis applied in assessment	SEB (or LSI)	Legal Standards
1	**A**	**S1**	**Strict Per Se (**SPS**):**
2	**A, B**	**S2**	**Modified Per Se (**MPS**):**
3	**A, B, C.1**	**S3**	**Truncated Effects Based (**TEB**):**
4	**A, B, C1, C2**	**S4**	LSI = 4, Intermediate between Truncated and Full Effects Based (FEB) LS **(ITFEB)**
	A, B, C1, C2, C3	**S5**	LSI = 5, **FEB** LS under Consumer Welfare SS
	A, B, C1, C2, C3, D	**S6**[28]	LSI = 6, **FEB** LS under Total Welfare SS

Source: Katsoulacos et.al (2019)

3. Empirical investigation of the Greek Competition Authority

3.1 The Greek context of competition law enforcement

The Hellenic Competition Commission ("HCC") is the authority responsible for the enforcement of Greek Law 3959/2011[29], "Protection of Free Competition" (hereinafter "Competition Act"), previously Law 703/1977, as well as of Articles 101 and 102 of the Treaty for the Functioning of the European Union (TFEU). According to the Explanatory Note by the Ministry accompanying Law 703/1977, its purpose was twofold. First, it aimed to protect free competition in the marketplace for the benefit of the economy in general and of consumers in particular[30]. Second, it intended to harmonize the Greek law with the EU (then EEC) legislation in this field, in view of Greece's then prospective accession to the Common Market.

supplemented by additional analysis and evidence to establish the net effect of the specific conduct on some measure of welfare taking into account potential efficiencies.

[28] For practices other than exploitative.

[29] Year 2011 marked the abolition of Law 703/1977 (with consecutive amendments).

[30] There are no exclusions or exemptions from the general competition law (Law 3959/2011 which replaced Law 703/1977). The only existing sectoral exclusion concerns the telecoms sector. EETT (Hellenic Telecommunications and Post Commission) is entrusted with the competences to act as the Competition Authority in the electronic communications market (fixed and mobile telephony, wireless communications and Internet access providers) and the postal services market (postal and courier service providers).

Pursuant to Law 2296/1995, the HCC is an Independent Administrative Authority with procedural and decision-making autonomy. Pursuant to Law 2837/2000, the HCC also enjoys financial autonomy. Furthermore, the Authority has a dualist structure, essentially comprising two bodies: the Directorate General for Competition ("Directorate-General"), which is conducting the investigations and the HCC Board, which is the decision-making arm of the Authority[31].

The HCC co-operates closely with the European Commission and the national competition authorities of EU Member States in order to enforce the EU competition rules, primarily in the context of the Regulation (EC) 1/2003. The HCC performs all of the enforcement actions of a designated National Competition Authority to apply national and EU competition rules, in accordance with Regulation (EC) 1/2003 (see Art. 5). It also has consultative powers in the area of identifying and removing regulatory barriers to competition. In particular, the HCC has broad enforcement powers in the area of collusive practices/cartels, abuses of dominance and merger control. In this context, the HCC may: make decisions upon finding an infringement of Article 1 of the Competition Act and Article 101 TFEU and/or of Article 2 of the Competition Act and Article 102 TFEU and impose administrative fines; take interim measures in case of a suspected infringement of the above said articles; review prior notifications of envisaged mergers and acquisitions (merger control of concentrations); launch investigations and conduct dawn raids for the enforcement of antitrust and merger control rules; deliver opinions on competition issues, and conduct sector inquiries.

In 2011, as a means of rationalizing the handling of complaints, the law finally permitted the prioritization of cases which meet certain criteria specified by the authority[32], particularly taking into account "*the public interest, the likely effect on competition, consumer protection, the newly introduced prescription period and the impact expected from the authority's intervention*".

The HCC is considered as a medium CA in terms of size. According to the latest data (2017), 57 out of 84 members of its staff focus on competition enforcement, including 18 lawyers, 34 economists and five having different backgrounds.

Cases are dealt with by the two Economics Directorates (A and B) and the Legal Services Directorate, which report to the Director General. The Advocacy Unit is a separate unit, also reporting to the Director General. The legal and economic Directorates are organized by sectors, while there are no units dealing exclusively with specific types of cases (e.g. there is no merger-specific unit or directorate). As a result, all staff works on all areas of competition enforcement and on advocacy matters if necessary. Case teams are normally multi-disciplinary, including both lawyers and economists. In relation to the latter, the organization of the HCC's

[31] As a result, the Greek institutional arrangements preserved their basic quasi-judicial characteristics (including the exchange of rounds of written pleadings and a fully-fledged oral hearing before a separate decision-making body, with rights to examine witnesses, cross-examine etc.).

[32] See HCC Decision 525/VI/2011 on the Criteria for the Prioritization of Cases, issued on 7/7/2011 available at: http://www.epant.gr and press release of 18.05.2011, available at www.epant.gr/en/. As well as decision quantifying the criteria of 525/2011, i.e. HCC Decision 616/2015, available at www.epant.gr/Pages/DecisionDetail?ID=1647, and press release of 10.03.2016, available at www.epant.gr/en.

DG is quite unique in the EU: its Directorates are organized by the qualification of competition experts (lawyers – economist) and sectors and thus, instead of having a Chief Economist position, it has two Economists Directors.

within a period of sixty days from notification, the decisions of the HCC may be challenged before the Athens Administrative Court of Appeals, which conducts a full review – judicial control of both substance and procedure – of the decisions of the HCC. In these cases, the Administrative Court of Appeal acts as a first instance court. The judgments of the Administrative Court of Appeals may be brought for judicial review (control of legality[33]) before the Council of State (Supreme Administrative Court – Conseil d'Etat). In this case the Council of State acts as a second (and last) instance court. There is no third instance for decisions issued by the HCC. The courts can exercise their powers and either uphold or annul the decision. The Athens Administrative Court of Appeals examines the case on the merits and may reduce the fine imposed by the HCC[34].

The HCC has been criticized for following a rather standard formalistic assessment of the conducts under investigation on the basis of (per se) legal rules in its decisions; the evaluation of potential anti-competitive practices does not rely on the examination of the effects or the impact of the specific practices on welfare (i.e. on effects-based legal standards). In 2018, the Organization for Economic Co-operation and Development (OECD) reviewed the development of competition law and policy in Greece and recommended that the HCC should (especially in abuse of dominance cases) conduct more economic analysis in assessing the effects of a given practice – in addition to the analysis conducted when defining markets[35] – to improve the narrative of the case and the overall persuasiveness of the theory of harm. The empirical analysis of this paper supports the conclusion of the OECD review.

The scarcity of use of sophisticated economic analysis (especially with regard to efficiency and effects analysis, such as the as efficient competitor test, counterfactual analysis, etc.) in infringement decisions could be attributed to several reasons, apart from the limited resources in personnel and time constraints. Before discussing the impact of economic evidence on the outcomes of appeals, one should also bear in mind that another factor effecting the degree of economic analysis undertaken is the fact that the HCC mainly follows the EU current and past cases and jurisprudence.

Table 13, Table 14 and Table 15 (in Appendix 1) show the evolution of the different types of decisions adopted by the HCC over time[36]. Out of the total of the HCC's decisions[37] (on Articles 1 & 2 of the Competition Act 3959/2011), horizontal agreements represent about 40.3%, while

[33] I.e. wrong application of the law, assuming as correct the factual basis.

[34] The new Competition Act (Law 3959/2011) provided that specialised competition chambers can be established at the Athens Administrative Court of Appeals, the aim being to further enhance the effectiveness of judicial review (not yet implemented; nonetheless, in practice, competition cases are adjudicated by specific chambers of the Court).

[35] OECD Peer Reviews of Competition Law and Policy, 2018, Greece, p. 171 (available at: http://www.oecd.org/competition/oecd-peer-reviews-of-competition-law-and-policy-greece-2018.htm).

[36] Cases from 1995-2017. Note that, in year 1995 no antitrust decision was examined; while in1996 no antitrust decision was concluded with infringement.

[37] Table 15.

vertical agreements represent 32.5%, and abuse of dominance cases 27.3% for the entire period.

3.2 Specific features of the Greek dataset on competition enforcement[38]

The information needed for the construction of our dataset was extracted from texts of HCC's infringement decisions issued from 1997 to 2017 and recorded through "Yes = 1" or "No = 0" responses to the statements as described in the previous Section 0. As mentioned above, the HCC's enforcement records focus on investigations pertaining to vertical agreements, abuses of dominance, horizontal collusion practices, as well as mergers of strategic nature which warranted more complex remedial action[39].

Table 14, in Appendix, presents the main infringement decision types. Out of a total of Article 101 and Article 102 cases[40], around 58% represents decisions finding an infringement (the total prohibition decisions). The commitment decisions[41] account for a very small percentage of the total cases: about 7%.

As we have already stated, concerning the structure of the sample according to the type of infringement, the HCC investigates overall more vertical and horizontal agreements (about 73%[42]) than abuse of dominance cases. For the HCC the average duration of an investigation, in terms of the resources spent, is about 5-6 years (see

Table 4 below, it is within the average for cases examined in the European Commission)[43] from the submission of the complaint or the initiation of the ex officio investigation to the HCC's final decision. Regarding appealed, challenged and annulled decisions, around 90% of the infringement decisions were appealed, while 30% of the appeals succeeded.

Table 3: HCC's decisions: total decisions *v.* decisions with infringements

[38] Decisions issued up to 12/2017. Note that the full document of Court Decisions on HCC's cases is available in its website, for Court cases issued from 2011 to date.

[39] Henceforth, for simplification reasons, instead of referring to national articles of competition law of Greece, we will refer to them as articles 101 & 102 of TFEU.

[40] i.e. 137, both infringement and acquittals decisions.

[41] HCC introduced the Settlement procedure for horizontal infringements of competition law in 2016 (see Decisions 628/2016).

[42] Tables 13 and 15.Error! Reference source not found.

[43] In specific: horizontal agreements: 4 years, abuse of dominance cases: 5-6 years and vertical agreements 5 years. Based on comparative information from Global Competition Review for the period 2012 – 2016, the average duration of the HCC's cartel investigations and abuse of dominance cases is longer than for some of the other authorities of comparable size or smaller (i.e. Belgium, Lithuania, Portugal and Switzerland). The average duration of cartel investigations and of abuse of dominance cases in these countries are 28 months and 29 months, respectively. However, this is a rough measure and does not take account of other factors that can affect duration, such as the number and complexity of cases each authority investigates simultaneously, procedural differences and time private parties require to provide fully responsive submissions.

Year	Number of total antitrust decisions (art, 1 & 2)	Number of infringement decisions (art, 1 & 2)	Number of the claims to annul decisions (Court of Appeals / Council of State)	%	Number of finally annulled decisions (Court of Appeals / Council of State) [44]	%
1996[45]	11					
1997	2	1	1	100%	1	100%
1998	4					
1999	0					
2000	3	2	2	100%	2	100%
2001	3					
2002	0	3	3	100%	2	67%
2003	7	5	5	100%	2	40%
2004	4	2	2	100%	1	50%
2005	4	3	3	100%	1	33%
2006	7	4	4	100%	2	50%
2007	13	9	7	78%	3	43%
2008	13	6	5	83%	1	20%
2009	17	8	8	100%	3	38%
2010	14	5	4	80%		0%
2011	9	6	6	100%	2	33%
2012	8	4	4	100%		0%
2013	7	7	7	100%		0%
2014	3	3	3	100%		0%
2015	9	4	4	100%	1	25%

[44] There are cases still pending before Greek Courts for the final decision, especially for years 2014-2017. In particular, Court decisions on 13 cases are still pending (8 in Court of Appeals and 5 in Supreme Court).

[45] Note that in 1996 and 1998, no antitrust decision was concluded with infringement, while in 1999 no antitrust decision was issued (see also Table 15 in Appendix).

Year	Number of total antitrust decisions (art, 1 & 2)	Number of infringement decisions (art, 1 & 2)	Number of the claims to annul decisions (Court of Appeals / Council of State)	%	Number of finally annulled decisions (Court of Appeals / Council of State) [44]	%
2016	1					
2017	9	7	3	43%		0%
Total	**148**	**79**	**71**	**90%**	**21**	**30%**

Source: Calculated by authors using dataset

To describe and explain the essential features of the standards of proof of competition investigations, we combine qualitative and quantitative analyses. We use decisions of the HCC and the corresponding decisions by the Appellate Court and Supreme Administrative Court and attribute quantitative characteristics to these observations, including the following:

- type of alleged infringement (abuse of dominance or agreements and concerted practice, Articles 101 and 102 of TFEU, respectively);
- decisions that are considered as violating competition law both as "agreements" and as "unilateral exclusionary conduct", i.e. those that fall under both Articles 101 and 102 TFEU (we include them in both categories).
- indicators of the court decisions (whether the court of first instance upholds or rejects the appeal, whether the parties appeal to a higher court, whether the higher court reverses the outcome of the decision of the first instance)[46];
- duration of the anti-competitive investigation[47];
- qualitative features of the alleged investigation.

One drawback is the small sample of cases for which decisions have been issued by the CA [HCC: 148 decisions on cases, of which 79 (including decisions on exploitative practices) were concluded with an infringement decision. Out of these, 71 decisions were challenged before

[46] Also note that in the published text of decisions we may not observe the total economic analysis undertaken by the CAs (in the meaning that usually decisions are much shorter and condensed than Statement of Objections, we are not public documents, however).

[47] Duration of investigation = date of the complaint / or initiation of an ex officio investigation to date of HCC decision.

courts] used to assess the quality and coherence of economic evidence used by the CA. The HCC's decisions that are (finally) upheld by courts, rate to about 70%[48].

In the analysis below, we classify conducts by conduct groups. As mentioned above, we concentrate on non-exploitative practices. Thus, the conduct groups that we consider are:

- conduct group G1: consists of violations of article 101, which have strong market power-enhancing effects. They include price fixing, bid rigging, boycotts, market sharing and exclusive territories;
- conduct group G2: includes concerted practices and coordination;
- conduct group G3: are vertical restraints that, according to conventional wisdom, can have both competition restriction and welfare-enhancing effects; such as resale price maintenance (rpm min, rpm max), vertical exclusionary agreements, exclusive territories.
- conduct group G4: consists of exclusive contracts, tying and non-price discrimination, but by dominant companies.

The total number of observations for the above conducts (i.e. excluding exploitative abuses) in our dataset is 77. However, for constructing our aggregate EB indicators (EBS, or LSI) following the methodology described in previous Section 0, a number of decisions (in which "gaps" in economic analysis are present) could not be taken into account. As a result, the number of observations in our dataset drops to 69.

In the analysis of legal standards in Greek antitrust enforcement, we also use groups of variables that reflect the following[49]:

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[48] I.e. 21 out of 71 HCC's infringement decisions that claim to annul them are filed so far (we did not count for cases whose final decision is still pending in court). This rate concerns the substantive correctness of the HCC's decisions, not the amount of the fine, which is usually partially amended (lowered) by court. The courts frequently lower the quantum of the fine. This is thought to happen partly when the courts are not fully persuaded of the robustness of the case and, partly, because the courts apply "proportionality" considerations to reflect concerns about the economic crisis and the undertakings' difficulty to pay. Out of the total decisions upheld by the courts of first instance, the proportion of cases in which the courts reduce the fine varies significantly over the relevant period, ranging from 30% of cases in 2012 – 2013 to 70% in 2016 (due to financial crisis).

[49] Further from the above made assumptions analyzed when describing the indicators that we will use, we also made the following hypothesis:

When assessing the values of the indicators we took into consideration also the above mentioned CA's competition enforcement rules.

We used both the texts of CA and court decisions. However in the "scorecard" we count only the evidence that each CA undertook. For example, if some additional analysis is submitted by company (defendants/complainant), we do not count it in the score.

Parallel claims (e.g. in case of more than one defendants) to annul the same infringement decisions (which imply double-counting) are excluded from consideration (also cases that were concerned as partially annulled in substance, we considered them as annulled.).

Most of the CA cases, in their first stage of investigation usually concerned mixed cases, i.e. cases with alleged infringements of both articles 101 (case of vertical agreements) and 102 (cases of abuse of dominance) TFEU (and/or the corresponding articles of each national competition law). In these cases we count, as mentioned above,

- Characteristics of violators (size) - this is captured by a dummy variable that depends on whether the company (or companies collectively, in cartel cases) possess market share above 50% of the Greek market (SIZE);
- Whether or not monetary penalties (fines) are imposed on violators (MONPEN);
- Whether or not infringement decisions are appealed by the involved parties (APPEALED);
- Outcomes of judicial review, as an important type of independent external assessment of the analysis undertaken by HCC. We consider both annulments of infringement decisions in the courts of first instance and final annulments (ordered by higher courts)[50]. We note that the means of the two variables do not coincide (
- Table 4); the mean of final annulments is almost double, in our sample, since every 8th decision upheld by the court of first instance is annulled by the higher court (ANNUF, FANNUL, respectively);
- Duration of the anti-competitive investigation (in days) as the indicators of the resources spent by HCC considering the case (DUR).

The Table below summarizes the descriptive statistics of the variables we use, for all of our datasets:

Table 4: Characteristics of infringement decisions in the dataset of HCC (other than Exploitative conduct)

Variables	Description	Total Number of observations	Share[51]	St. Dev.	Min	Max
Conduct group variables						
G1	Price fixing, bid rigging, boycotts, market sharing and exclusive	69	0.174		0	1

only the article / type of behaviour that the infringement was ascertained. In cases where the infringement is ascertained for both articles / types of behaviour, we count both infringements (see also above).
We haven't included in our database the interim and referrals decisions of the CA.
We haven't included the acquittal or commitments decisions.

[50] Final Annulment that might be the Court of any instance (either Court of Appeals or Supreme Administrative Court). Also, Final Decisions, decisions that have been annulled or upheld, or that no claims for annulment have been filed (i.e. in 8 cases).

[51] The share can be calculated using the numbers in Table 6 and
Table **7** below. For example, for Conduct group variables, e.g. G1, we calculate: N cases of G1 (=12)/ Total N cases (=69). For Legal standards applied, e.g. LSI =2, we calculate: N cases of LSI (=16)/ Total N cases (=69).

Variables	Description	Total Number of observations	Share[51]	St. Dev.	Min	Max
	territories					
G2	Concerted practices and coordination	69	0.159		0	1
G3	RPM min, RPM max, vertical exclusionary agreements, exclusive territories	69	0.362		0	1
G4	Exclusive contracts, tying and non-price discrimination	69	0.304		0	1
Legal standards applied						
LSI = 2	S2: {A, B}	69	0.232		0	1
LSI = 3	S3: {A, B, C1}	69	0.493		0	1
LSI = 4	S4: {A, B, C1, C2}	69	0.246		0	1
LSI = 5	S5: {A, B, C1, C2, C3}	69	0.029		0	1
Outcomes of judicial review						
APPEALED	=1 if the infringement decision is appealed, =0 otherwise	69	0.870		0	1
ANNULF (Annulment in the first instance)	=1 if the infringement decision is annulled by the court of first instance, =0 otherwise	69	0.145		0	1
FANNUL [final (court) annulment][52]	=1 if the infringement decision is finally annulled after all instances, =0 otherwise	69	0.290		0	1

[52] Cannot be / have not been further appealed.

Variables	Description	Total Number of observations	Share[51]	St. Dev.	Min	Max
Costs of litigation						
DUR	Duration of CA's investigation (in days / years)	69	2110.25	1214	175	5933
Violator-specific characteristics						
SIZE	=1 if market share is >50%, = 0 if otherwise (Market share of investigated parties)	69	0.696		0	1
MONPEN	=1 if monetary payments are imposed, = 0 if otherwise (Sanction)	69	0.855		0	1

Source: Calculated by authors using dataset

3.3 Legal standards in Greek competition enforcement: empirical analysis

3.3.1 EBS scores and LSI scores over time

This section provides statistical analysis for the *EBS* and the *LSI* measured using the approach described above. The objective of this description is threefold. We want first, to assess the time trends in the application of economic analysis in Greek competition enforcement; second, to analyze the degree of standardization (consistency) of the approach that the Greek authority adopts regarding different allegedly illegal types of conduct; and third, to compare the empirical estimate of LSs (the LSI) to the LSs suggested by modern economic theory.

Table **5** summarizes descriptive statistics of legal standards in the investigation of particular conduct groups. As we notice, in all of its cases, the HCC undertakes a basic analysis of the market characteristics of the investigated cases (even in cartel cases). This could be attributed to the need a.) to measure the implicated parties market shares (product and the geographic

market) in order to apply or not also Article 101 TFEU[53] (along with GCA) and b.) the size of the implicated parties and the impact of the infringement is usually taken (as an aggravating factor) into account for the calculation of the antitrust fines. However, the hypothetical monopolist – although referred to by the European Commission's guidelines on market definition[54] – has only been used in two instances[55] since its use requires information on price elasticities, which is often unavailable. What we also notice is that HCC has made effort to establish harm to competition (C2) in some cartel cases (around 40% of cartel cases) during the examined period. These cases mainly concerned price fixing cartels to producers (i.e. buyers' cartels); the HCC tried to prove statistically, as well as economically, the effects of the infringement in order to show that the cartel had an impact on the market (due to factors, such as buyer power). Finally, efficiencies defences were examined only in two decisions.

Table 5: Blocks of analysis per conduct group, HCC

	A = 1	***B1 = 1***	***B2 = 1***	**B = 1**	**C1 = 1**	**C2 = 1**	**C3 = 1**	**D = 1**
Group 1 (N=18)	18	*18*	*0*	18	2	8	1	0
Group 2 (N=13)	13	*13*	*0*	13	8	5	0	0
Group 3 (N=25)	25	*25*	*1*	25	22	5	0	0
Group 4 (N=21)	21	*21*	*1*	21	21	9	1	0
Total (N=77)	77	*77*	*2*	77	53	27	2	0
	100.0%	*100.0%*	*2.6%*	100.0%	68.8%	35.1%	2.6%	0.0%

Source: Calculated by authors using dataset

[53] Guidelines on the effect on trade concept contained in Articles 81 and 82 of the Treaty (Text with EEA relevance), *OJ C 101, 27.4.2004, p. 81–96,* https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52004XC0427%2806%29. "*The Commission holds the view that in principle agreements are not capable of appreciably affecting trade between Member States when the following cumulative conditions are met: (a) The aggregate market share of the parties on any relevant market within the Community affected by the agreement does not exceed 5 %, and (b) In the case of horizontal agreements, the aggregate annual Community turnover of the undertakings concerned in the products covered by the agreement does not exceed 40 million euro. In the case of agreements concerning the joint buying of products the relevant turnover shall be the parties' combined purchases of the products covered by the agreement*".

[54] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A31997Y1209%2801%29.

[55] Note that from the database, B2=1 actually concerns the same decision; but since (as we mentioned in ftn 49) mixed cases, i.e. cases with alleged infringements of both articles 101 (case of vertical agreements) and 102 (cases of abuse of dominance) TFEU (and/or the corresponding articles of each national competition law), where the infringement is ascertained for both articles / types of behaviour, we count them for both infringements.

Table 6 below summarizes intertemporal descriptive statistics of legal standards in the investigation of particular types of conduct groups, as well as the outcomes of judicial review. The data should be interpreted with caution, since the number of the observations is small and the structure of the database change over time. The data differ for different time periods and different conduct groups.

However, we can reach a number of interesting/important observations. First, the extent of economic analysis, measured either by the EBS or LSI is average (close to 3 when the maximum value is 6) – indicating that average (close to TEB) legal standards are adopted. Also, even though absolute decisions numbers over time change, they demonstrate an increasing trend, mainly G1 and G2; while the trend for G3 and G4 is rather stable. Regarding, the average LS score, overall, we observe an increasing trend; which also stands for all conduct groups, but for G4. This could be considered as an indication that HCC when it applies Article 102 in its decisions, maintains a "conservative" approach, relying essentially on the formalistic type of these. This conclusion of increasing trend is also true for decision annulment, even though the number of our observations is quite small. The share of finally annulled decisions was stable and started to decrease since 2006; but it increased in 2009 and 2011. However, for each of the groups of (type of) conduct the trends, regarding the share of finally annulled decisions, are not obvious.

Table 6: EBS and LSI for different types of conducts and conduct groups (HCC, 1997[56] – 2017)

HCC, All non-exploitative conduct		1997	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2017	Av. For period
EBS	MEAN	2.00	2.00	2.67	3.25	3.50	3.00	3.33	3.11	3.33	3.63	3.20	3.00	2.75	3.14	3.00	3.25	2.43	3.06
	N	1	2	3	4	2	3	3	9	6	8	5	6	4	7	3	4	7	77
LSI (Set)	MEAN	2.00	2.00	2.50	3.25	3.50	3.00	3.33	3.11	3.33	3.63	3.20	3.00	2.67	3.33	3.00	3.25	2.43	3.07
	N	1	2	2	4	2	3	3	9	6	8	5	5	3	3	2	4	7	69
Share of appealed cases		1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.78	0.83	1.00	0.80	1.00	1.00	1.00	1.00	1.00	0.43	0.88
Share of finally annulled cases		1.00	1.00	0.50	0.50	0.50	0.33	0.67	0.33	0.17	0.38	0.00	0.40	0.00	0.00	0.00	0.25	0.00	0.29
BY CONDUCT TYPE																			
Group G1																			
EBS	MEAN							2.00	3.00	2.00		3.50	2.50	2.50	3.00	3.00		2.00	2.61[57]
	N							1	2	1		2	2	2	3	1		4	18
LSI (Set)	MEAN							2.00	3.00	2.00		3.50	2.00	2.00				2.00	2.42
	N							1	2	1		2	1	1				4	12

[56] In 1996 no antitrust decision was concluded with infringement.

[57] High scores for years 2007, 2010, 2011, 2013 and 2014, relate to supply cartel cases, where extra economic analysis was undertaken.

HCC, All non-exploitative conduct		1997	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2017	Av. For period
Share of appealed cases		0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	0.00	0.00	0.50	0.83
Share of finally annulled cases		0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.50	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Group G2																			
EBS	MEAN			2.50	2.50	4.00	3.00		3.50						3.00			3.00	3.00
	N			2	2	1	2		2						1			3	13
LSI (Set)	MEAN			2.00	2.50	4.00	3.00		3.50									3.00	3.00
	N			1	2	1	2		2									3	11
Share of appealed cases		0.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.82
Share of finally annulled cases		0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18
Group G3																			
EBS	MEAN	2.00	2.00		4.00	3.00	3.00		3.00	3.50	3.40	3.00	3.00	3.00	3.00	3.00	3.50		3.08
	N	1	2		1	1	1		4	2	5	1	1	1	2	1	2		25
LSI (Set)	MEAN	2.00	2.00		4.00	3.00	3.00		3.00	3.50	3.40	3.00	3.00	3.00	3.00	3.00	3.50		3.08
	N	1	2		1	1	1		4	2	5	1	1	1	2	1	2		25

HCC, All non-exploitative conduct		1997	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2017	Av. For period
Share of appealed cases		1.00	1.00	0.00	1.00	1.00	1.00	0.00	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.96
Share of finally annulled cases		1.00	1.00	0.00	1.00	1.00	1.00	0.00	0.25	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40
Group G4																			
EBS	MEAN			3.00	4.00			4.00	3.00	3.67	4.00	3.00	3.33	3.00	4.00	3.00	3.00		3.48
	N			1	1			2	1	3	3	2	3	1	1	1	2		21
LSI (Set)	MEAN			3.00	4.00			4.00	3.00	3.67	4.00	3.00	3.33	3.00	4.00	3.00	3.00		3.48
	N			1	1			2	1	3	3	2	3	1	1	1	2		21
Share of appealed cases		0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.67	1.00	0.50	1.00	1.00	1.00	1.00	1.00	0.00	0.86
Share of finally annulled cases		0.00	0.00	0.00	1.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.67	0.00	0.00	0.00	0.50	0.00	0.24

Source: Calculated by authors using dataset, N = number of observations

3.2.2 Weighted Average Legal Standards (WALS) and indicators of legal uncertainty and of the quality of enforcement

Table **7** provides information about the share of the value (between 1 and 6) of the EBS and LSI indicators for our four main conduct groups. We observe that variations in both the EBS and LSI are very large, demonstrating absence of consistency in the use of legal standards in assessing any given group of conduct. For example, in Group 2, in 45% of the cases LSI is 3 (i.e. the TEB LS is applied), while in another 27% of the cases LSI is 2 and in another 27% LSI is 4. This implies that, from the point of view of firms, there is a high degree of legal uncertainty in the enforcement of competition law that we also measure empirically and show in

Table **8** together with a number of other indices. The same conclusion stands also for Groups 3 and 4; while in Group G1, in 83% of the cases LSI is 2 (i.e. the MPS LS is applied) and in another 8% of the cases LSI is 5 (i.e. a FEB LS is applied).

Table **8** deepens the statistical analysis by presenting measures of the weighted average legal standard (WALS) adopted and of both the quality of enforcement and legal uncertainty. We consider several indicators of the deviation of legal standards from what is considered best practice in international antitrust enforcement: deviation from the WALS, from the legal standard with the highest share and from the two neighboring legal standards with the highest cumulative share in the sample.

WALS is calculated using

Table **7** and is the sum of the values of LSI, each value weighted by its respective share[58]. The higher the WALS the closer is the LS to effects-based (with full effects-based requiring a value of 6). The first observation is that, for the conduct group (G1) that is traditionally illegal *per se* (price fixing and market sharing), the weighted average legal standard is, as expected, close (though not as close as it should) to 1 (the optimal value of the LS in this case). The second observation is that in all other cases (conduct groups G2, G3 and G4) the WALS is rather in the middle from its theoretical optimum (which we assume to be full effects-based): in all cases, the HCC is choosing LSs that are much closer to TEB than to effects-based.

Two indicators in

Table **8** measure legal (un)certainty. The first is the index of the concentration of legal standards (the HHI concentration index calculated as the sum of the squared shares multiplied by 100) and the second is the standard deviation of LSI. The concentration of LSI is rather low (with highest attained for conduct group G1) indicating that HCC's approach to assessment is not predictable. This fact indicates that HCC oscillates between TEB and ITFEB, with the exception of G1, for which decisions are made using standards that are on average closer to per se rules.

Two indicators measure the quality (Q) of enforcement. The first expresses the distance of WALS from the theoretically "optimal" legal standard. The second, measures the distance of most typical legal standards used by HCC from the optimal. As the value of Q increases, the

[58] For example, the value of WALS for G1 in

Table **8** is 2.41. This is obtained, using

Table **7** as: 0.833*2+0.083*2+0.083*5 = 2.42.

quality of enforcement increases. We notice that the quality of enforcement is extremely low for all conduct groups except G1 (price fixing and market sharing) for which a Per Se approach is the appropriate one. We can also observe from

Table **8** that Concerted Practices (G2) and Exclusionary Conducts (G4) have the lowest legal quality of decisions.

Another indicator that we will use in the analysis that follows is the Weighted Average Annulment Rate (WAAR) for each of the LSI across the conduct groups, that is the average annulment rate throughout the different conduct groups. WAAR is calculated as follows:

Let:

$N_{i,j}$ = number of decisions in conduct groups = j, j=1,2,3,4 for each LSI=I, i=1,2,…,6.

T_i = total number of decisions for which LSI=I, in all conduct groups.

$AR_{i,j}$ = annulment rate of decisions in conduct groups = j, j=1,2,3,4, for which LSI=I,

i=1,2,…,6. Then:

$$WAAR_i = \sum_{j=1}^{4} \frac{N_{i,j} AR_{i,j}}{T_i}$$

So (from Table 9), we notice that the annulment rate decreases when HCC uses an average LS (that is either TEB or ITFEB) and then increases when HCC uses a more effects-based approach. We will elaborate further on the interpretation of the evolution of AR when we discuss the empirical analysis of the effects of the LS adopted by the HCC on the probability of annulment by appeal courts.

Table 7: Values of EBS and LSI for the different conduct groups, HCC

		Value of the EBS and LSI indicators						
		1	2	3	4	5	6	N
Group G1								
EBS	Share		**0.56**	0.33	0.06	0.06		
	N		10	6	1	1		18
LSI (Set)	Share		**0.83**	0.00	0.08	0.08		
	N		10		1	1		12
Appealed rate (for each LSI)	Rate		0.80		1.00	1.00		0.83
	N		8		1	1		10
Annulment rate (AR, for each LSI)	Rate		0.30					0.25
	N		3					3
Share of missed observations =		**0.33**						

		Value of the EBS and LSI indicators						
		1	2	3	4	5	6	N
Group G2								
EBS	Share		0.23	**0.54**	0.23			
	N		3	7	3			13
LSI (Set)	Share		0.27	**0.45**	0.27			
	N		3	5	3			11
Appealed rate (for each LSI)	Rate		1.00	0.60	1.00			0.82
	N		3	3	3			9
Annulment rate (AR, for each LSI)	Rate		0.33		0.33			0.18
	N		1		1			2
Share of missed observations =		**0.15**						
Group G3								
EBS	Share		0.12	**0.68**	0.20			
	N		3	17	5			25
LSI (Set)	Share		0.12	**0.68**	0.20			
	N		3	17	5			25
Appealed rate (for each LSI)	Rate		1.00	0.94	1.00			0.96
	N		3	16	5			24
Annulment rate (AR, for each LSI)	Rate		1.00	0.35	0.20			0.40
	N		3	6	1			10
Share of missed observations =		**0.00**						
Group G4								
EBS	Share			**0.57**	0.38	0.05		
	N			12	8	1		21
LSI (Set)	Share			**0.57**	0.38	0.05		
	N			12	8	1		21
Appealed rate (for each LSI)	Rate			0.75	1.00	1.00		0.86
	N			9	8	1		18

		Value of the EBS and LSI indicators						
		1	2	3	4	5	6	N
Annulment rate (AR, for each LSI)	Rate			0.17	0.25	1.00		0.24
	N			2	2	1		5
Share of missed observations =		**0.00**						
Total number of EBS:			16	42	17	2		77
Total number of LSI:			16	34	17	2		69
Total number of Appealed Decisions:			14	28	17	2		61
Total number of (Finally) Annulled Decisions:			7	8	4	1		20

Source: Calculated by authors using dataset, N = number of observations

Table 8: Indicators of quality of inforcement and legal (un)certainty for particular conducts and conduct groups, HCC

	(Horizontal) Price Fixing	**(Horizontal) Concerted Practices**	**Vertical Agreements**	**Exclusionary Conduct**
HCC	(Number of observations 12)	(Number of observations 11)	(Number of observations 25)	(Number of observations 21)
	[optimal: 1]	[optimal: 6]	[optimal: 6]	[optimal: 6]
WALS (1 to 6)	2.42	3.00	3.08	3.48
LS with highest share (s)	2 [0.83]	3 [0.45]	3 [0.68]	3 [0.57]
Two LSs with highest sum of two neighboring shares	2-(-)[59] [0.83]	3-4 [0.73]	3-4 [0.79]	3-4 [0.95]
Index of Concentrations of LSs [I_{CON} (Indirect index of uncertainty)]	71	36	52	47
Index of Uncertainty [I_U]	0.39	0.19	0.30	0.27
Quality of Enforcement: $I_{Q,1}$, $0 \leq I_{Q,1} \leq 5$	3.58	2.00	2.08	2.48
	Weighted Average Quality of Enforcement: 2.45			
Quality of Enforcement: $I_{Q,2}$, $0 \leq I_{Q,2} \leq 5$	4	2	2	2

[59] Neighboring LSs, i.e. 1 & 3 are zero.

NOTES: "Optimal": according to what economic theory suggests

WALS= Weighted Average Legal Standard

$$I_{CON} = 100 * \sum_{1}^{8} s_i^2 , 16.66 \leq I_{CON} \leq 100$$

I_U= standard deviation of shares, $0 \leq I_U \leq 1$

$I_{Q,1}=5-D_1$, $D_{1=}$ Deviation of WALS from optimal, $0 \leq D_1 \leq 5$

$I_{Q,2}=5-D_2$, $D_{2=}$ Deviation of max share from optimal, $0 \leq D_2 \leq 5$

Table 9: The value of WAAR for each value of the LSI, HCC

WAAR (LSI = 1)	WAAR (LSI = 2)	WAAR (LSI = 3)	WAAR (LSI = 4)	WARR (LSI = 5)
-	44%	24%	24%	50%
				(112.5% increase)

Source: Calculated by authors using dataset

4. Econometric analysis of the effect of legal standards on the probability of annulment and on the costs of enforcement

4.1 Legal standard as a predictor of the outcome of judicial review

This sub-section aims to assess the impact of legal standards on the probability of annulment of the HCC decisions (that is, on the outcome of the judicial review). As dependent variables, we use both the binary variable of the annulment of the HCC decision by the court of first instance and the binary variable of final annulment. It makes sense to look both at the decision of the court of first instance and at the final decision, given that, because of the easy and inexpensive access to litigation, in Greece decisions of first instance courts are often appealed to Supreme court.

What factors are expected to influence and hence are responsible for the annulment rate of appealed infringement decisions that we observe in practice? One important factor is that the more extensive the economic analysis is, the higher the LSs adopted by competition authorities, the more opportunities exist for the alleged violators to criticize this analysis, attempting to show ambiguities, omissions or errors and, hence, to show the opposite effect to that shown by a CA. In other words, disputability of economic analysis increases with the legal standards applied[60], thus increasing the probability of annulment. This is why we expect

[60] Neven (2006), looks at all the appeals against EC decisions in the period 1994 – 2006, and computes the proportion of cases in which the Commission prevailed (so decisions were not annulled). He finds a success rate of art.82 (abuse of dominance) decisions of 98% which, as he comments, "is striking" (for mergers and art.81

that if CAs are well informed and always choose the LSs optimal for courts, there will be an increasing relationship between probability of annulment and LSs adopted.

However, there is another factor at work that may lead to the observed probability of annulment to *decline* with LSs. This is the following. While CAs will not have incentives to choose LSs that are higher than those anticipated to be chosen by courts[61], they might find it optimal to apply legal standards lower than those they expect courts to adopt. In doing so, they know that the probability of annulment will be higher than if the "correct" LS was chosen[62] – the probability of annulment at the level of evidence associated with the lower LS will be higher than if the level of evidence associated with the "correct" LS was chosen – but this increase in the probability of annulment due to using the "wrong" (lower) standard is outweighed by the reduction in cost as a result of using the lower standard. This implies that we can observe that a lower legal standard (applied by the CA) is associated with a higher probability of annulment, when the LS is lower than that considered appropriate by the Courts.

A U-shaped relation between LSs and probability of annulment can then be observed in cases where, when the LSs considered optimal and adopted by courts are relatively low (say, MPS or TEB), the CA adopts even lower LSs (so the second effect above is present), while when the LSs adopted by courts are higher (higher than MPS or TEB), the CA follows the courts and also adopts the higher LSs (so then the first effect above applies)[63].

This discussion suggests that it is not possible to predict theoretically what the empirical relationship between the LSs adopted and the probability of annulment will be, as this depends on whether the CA anticipates correctly the LSs adopted by Courts and on whether it adopts lower LSs than those adopted by the Courts. Our empirical results, described below, are consistent with a U-shaped relationship in which the increase in LSs reduces the probability of annulment up to some threshold beyond which the probability of annulment increases.

In deriving our empirical results, we also include decision-specific binary variables for monetary penalties and violator-specific (market share of the company) control variables. Our expectations are that monetary penalties induce companies to exert greater efforts to provide more evidence for achieving annulments. Finally, we expect that larger companies (i.e. companies with larger market shares) can devote more resources to invest in the annulment of infringement decisions.

The baseline regression model for testing how annulment at the first instance court is influenced by the legal standard adopted has the following probit regression specification:

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cases the fraction is much lower – 75%). To explain this, he notes that "Article 82 has remained focused on form, whereas the merger regulation and increasingly Article 81 (at least with respect to vertical agreements) are focusing on effects, which involves the development of economic theories and evidence. *Such differences in success rates are consistent with the view that the scope for disagreement (and decision annulment) is greater when economic theory and evidence are important*. This is probably the most important insight from (our findings)….." (authors' emphasis). The evidence presented by Neven is confirmed with a larger dataset (that considers EC decisions until 2016) by Katsoulacos, Makri and Metsiou (2018). See also Katsoulacos (2018a) for an extensive discussion.

[61] Given that both litigation costs increase as LSs increase (move closer to effects-based from Per Se) and the probability of annulment also increases when CAs and courts move to higher LSs – by the argument just given above.

[62] I.e. the LS considered correct by the courts.

[63] See Chapter 1, for a model in Katsoulacos (2019a) of a reputation maximising CA whose utility declines with the probability of annulment derives these results.

$$P(annulf = 1|appeal, LSI_i, x) = \Phi\left(\alpha_0 + \sum_{i=2}^{4} \alpha_i LSI_i + \sum_{M} \alpha_M{}' X_M{}'\right)$$

where $annulf = 1|appeal, LSI_i, x$ indicates the probability that an infringement decision is annulled under judicial review in the first instance. The regression model for final annulment is similar. Using a similar model, we also check the impact of LSs on the probability of an appeal.

LSI_i denotes the LSI adopted by the HCC and X_M denotes the set of explanatory variables mentioned above.

Since the dependent variable - ANNUL (either in first instance or final annulment or appealed decision) - is binary we use the Probit model for binary response. Further, since what we want to see for interpretation are effects on the probability of ANNUL, we will use margins[64] for different levels of LSI and for differences in levels (marginal effects). The marginal effect of an individual explanatory variable is a function that reads to the change in the mean value of the dependent variable in response to a one-unit increase in the value of the explanatory variable, holding constant the effects of all other explanatory variables in the model.

Table **10** and

Table **11** present the results for regressions in respect to LSI control variable and for all control variables respectively, for all observations and by group. In

Table **10**, the mean for the final decisions on the rate of annulment (though the effects for LSI5 are not statistically significant) is confirmed as calculated in WAAR Table above (

Table **9**). The hypothesis of a U-shaped relationship between LSs and probability of annulment seems to be confirmed. The increase in (marginal effect of) the legal standard (from MPS) up to TEB and then up to ITFEB (*LSI = 3* and *LSI = 4,* respectively) on the probability of annulment on average is 20% less; while for a further increase in legal standard to LSI = 5, the probability of annulment on average is 6% more relative to its value when LSI=2; however this effect is not statistically significant (due to the small number of observations). Regarding MONPEN (

Table **11**), the m*ain result is the absence of positive impacts* on the annulment rate (even though not statistically significant in the case of final annulments); while for the probability on filing an appeal, we found a statistically significant positive impact for MONPEN, as expected. The negative impact could partly be attributed to the fact that out of the 20 finally annulled cases, 3 of them (15%) concerned decisions where no monetary fine was imposed (either due to the limited time of the infringement, or for prescription reasons); and thus the sample is quite small. Finally, for SIZE, we found a statistically significant *negative impact* of

[64] Margins are statistics calculated from predictions of a previously fit model at fixed values of some covariates and averaging or otherwise integrating over the remaining covariates. (from "margins" help):
•"conditional margin" – response at fixed values for all covariates
•"predictive margin" – response when at least one covariate is left to vary.
With the "margins" command you can compute predicted levels for different covariate values or differences in levels (often called marginal effects), or even differences in differences.

the size of the implicated parties on the probability of annulment. This could also be partly attributed to the fact that out of the 20 finally annulled cases, 11 (55%) concerned decisions against parties that possessed a market share below 50% of the relevant market; this fact in conjunction with

Table 4, leads to the conclusion that while most (approx. 70%, i.e. 48 decisions and of them 40 concerned G2-G4) of the HCC's infringement decisions concern undertaking with significant market shares, only (approx.) 19% of them were annulled.

Table 10: Annulment and Appealed rate of infringement decision by the first instance court, and final annulment respectively (marginal effects are reported), HCC – *control variable LSI*

	Final decision	First instance court	Appealed Decision
A. Average margins of responses			
LSI = 2	0.44*** (0.12)	0.19* (0.1)	0.88* (0.08)
LSI = 3	0.24 ** (0.073)	0.15** (0.06)	0.82* (0.06)
LSI = 4	0.234 ** (0.10)	0.06 (0.06)	-
LSI = 5	0.50 (0.35)	0.5 (0.35)	-
Number of observations	69	69	50
Prob chi2	0.4359	0.4090	0.6372
Pseudo R2	0.0328	0.0506	0.0051
B. Marginal effects			
LSI = 2 *(base level)*			
LSI = 3	-0.20 (0.14)	-0.04 (0.11)	-0.051 (0.11)
LSI = 4	-0.20 (0.16)	-0.13 (0.11)	*not estimable*
LSI = 5	0.06 (0.38)	0.31 (0.37)	*not estimable*
C. Average margins of responses by Group			
C.1. Group 1			
LSI = 2	0.27** (0.14)	0.08 (0.084)	0.8* (0.13)

	Final decision	First instance court	Appealed Decision
LSI = 4	0.02 (0.03)	0.00 (0.00)	-
LSI = 5	0.23 (0.34)	0.19 (0.33)	-
C.1. Group 2			
LSI = 2	0.54** (0.24)	-	0.99* (0.00)
LSI = 3	0.05 (0.06)		0.6** (0.22)
LSI = 4	0.08 (0.09)		-
C.1. Group 3			
LSI = 2	0.89* (0.12)	0.73** (0.24)	1* (0.00)
LSI = 3	0.32** (0.10)	0.2** (0.09)	0.94* (0.06)
LSI = 4	0.39** (0.16)	0.1 (0.09)	-
C.1. Group 4			
LSI = 3	0.19*** (0.1)	0.09 (0.09)	0.75* (0.12)
LSI = 4	0.25** (0.13)	0.06 (0.07)	-
LSI = 5	0.77** (0.34)	0.81 (0.33)	-

St. errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Annulment and Appealed rate of infringement decision by the first instance court, and final annulment respectively (marginal effects are reported), HCC – *all control variables*[65]

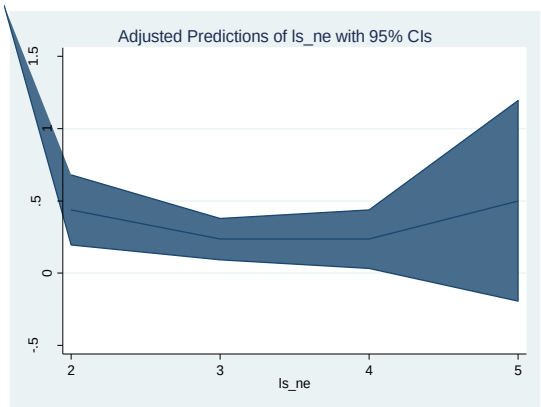
[65] For average responses by group, see Appendix 2.

	Final decision	First instance court	Appealed Decision
A. Average margins of responses			
MONPEN	-0.67 (0.47)	-0.92* (0.54)	1.51** (0.55)
SIZE	-1.18** (0.39)	-1.08** (0.45)	-0.47 (0.55)
LSI = 2	0.43*** (0.11)	0.19** (0.09)	0.84* (0.08)
LSI = 3	0.19** (0.06)	0.12** (0.05)	0.85* (0.05)
LSI = 4	0.32** (0.11)	0.09 (0.08)	-
LSI = 5	0.53 (0.33)	0.5 (0.34)	-
Number of observations	69	69	50
Prob chi2	0.0198	0.0612	0.0352
Pseudo R2	0.1615	0.1847	0.1955
B. Marginal effects			
LSI = 2 *(base level)*			
LSI = 3	-0.23 (0.13)	-0.08 (0.10)	0.00 (0.1)
LSI = 4	-0.11 (0.16)	-0.11 (0.12)	*not estimable*
LSI = 5	0.11* (0.35)	0.30 (0.36)	*not estimable*

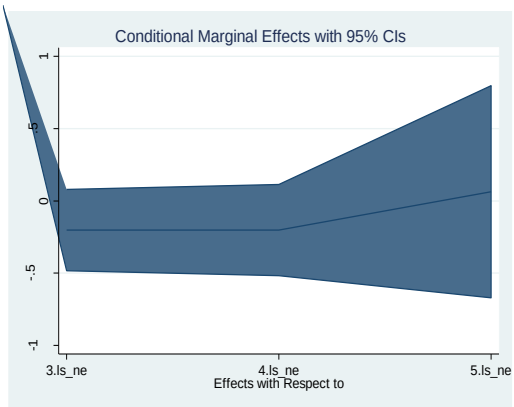
St. errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Graphs presented below visualize the estimated marginal effects on final annulment for all groups and by groups of conducts illustrating in most cases results that are consistent with a U-shaped relationship.

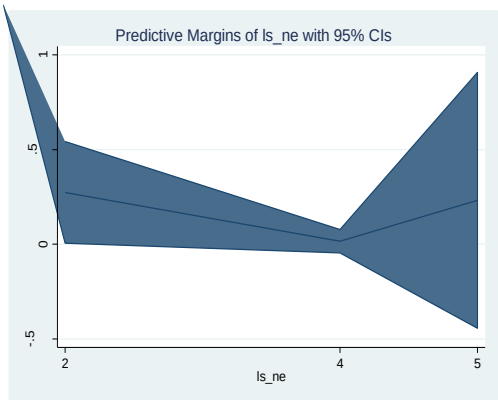
Graph 1: **Average margin response and Marginal effects of LSI on probabilities of, HCC**



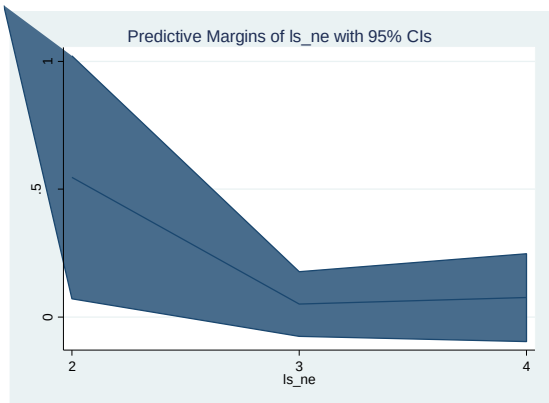
Average margin response (all observations)



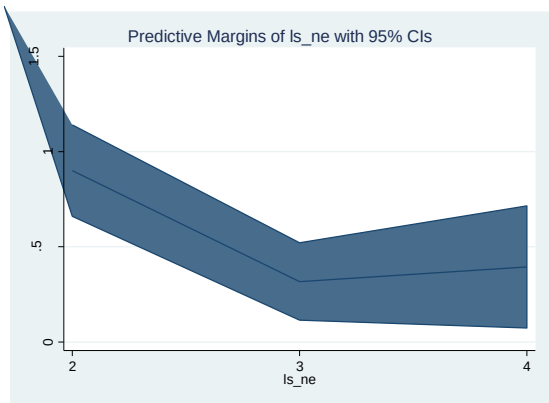
Marginal effects (all observations)



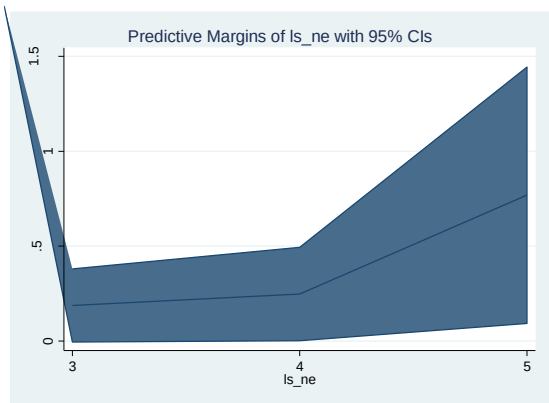
Average margin response - Group G1



Average margin response - Group G2



Average margin response - Group G3



Average margin response - Group G4

4.2 Legal standards as a predictor of the costs of decisions

We use time – measured by days from the submission of a complaint to HCC (or the initiation date of an ex officio investigation) to the final (HCC) decision – as an indicator of the cost of litigation. This approach makes sense since longer litigation is expected to imply higher costs in person-days, expert fees and management time, for all litigation parties, as well as for society. CAs and undertakings bear the costs of litigation, in terms of additional resources used.

The main hypothesis that we test is that litigation costs increase monotonically with legal standards. This is expected as a result of higher LSs requiring a greater amount and more

sophisticated economic analysis – something that follows from the very definition of effect-based procedures.

We apply OLS regression to test the hypothesis.

$$E(duration|claim, x) = F(\beta_0 + \beta_1 LSI_i + \beta_2 X_1 + \beta_3 X_2)$$

The results presented in

Table **12** confirm partly our hypothesis. The sample shows that, on average for all legal standards the (probability of increase) duration of the litigation cost corresponds to similar percentages. One result worth mentioning is that under the low value MPS cases, a shift to TEB analysis (LSI3) provides a statistically significant increase in the number of days, that is it increases the duration of the litigation by 38%. This result is entirely consistent with our interpretation of the HCC adopting a lower than TEB LS when it anticipates that the Courts will use a TEB LS.

Table 12: Determinants of the duration of litigation (OLS regression), HCC marginal effects

	All claims
Average margins of responses	
MONPEN	-0.11 (0.26)
SIZE	0.05 (0.20)
Constant	7.18* (0.34)
Prob F-stat	0.2544
Adj R-squared	0.0252
LSI = 2	7.12* (0.19)
LSI = 3	7.5* (0.13)
LSI = 4	7.04* (0.18)
LSI = 5	6.75* (0.53)
Marginal effects	
Set (LSI = 2 is the base level)	
LSI = 2	*base level*
LSI = 3	0.38***

	All claims
	(0.22)
LSI = 4	-0.07 (0.26)
LSI = 5	-0.37 (0.57)

St. errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

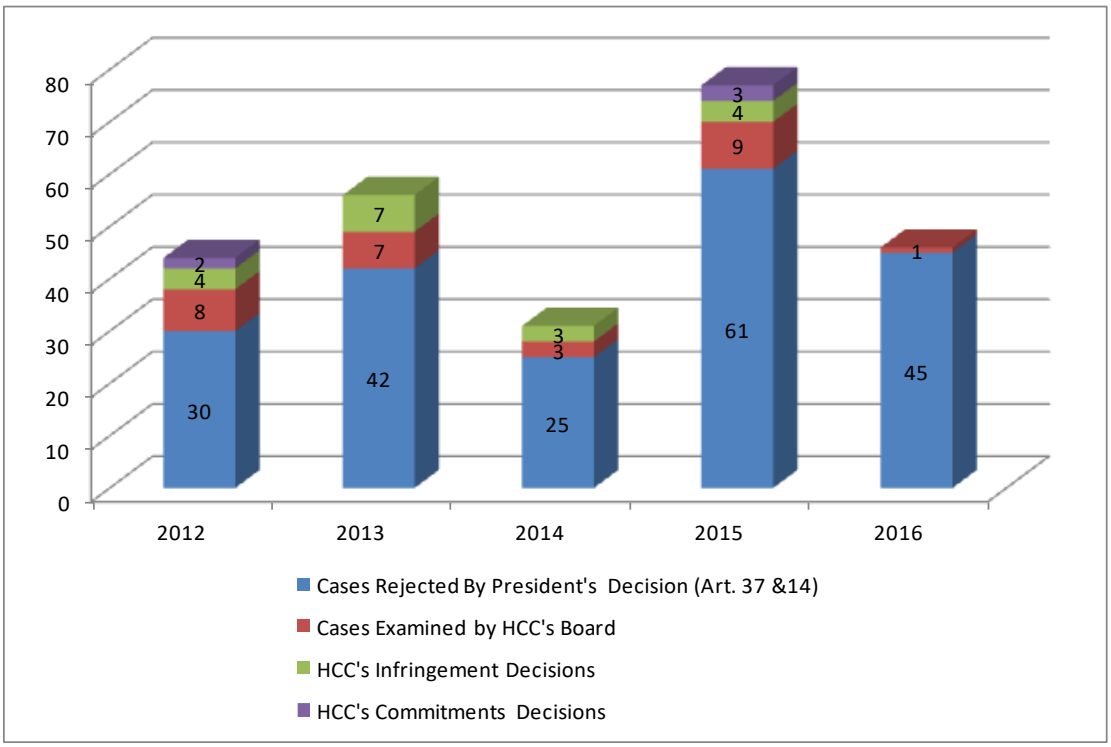
5. Conclusions

For the purposes of this paper we collected and analyzed a dataset of 77 antitrust infringement decisions reached by the Greek competition authority between 1996 – 2017, which were appealed to Courts for annulment. Our analysis contributes to the development of tools for the empirical measurement of the extent of economic analysis and legal standards in competition law enforcement. Our second contribution consists, in a detailed empirical description, of the role of economic analysis in Greek competition enforcement. Our approach allows us to precisely assess the role of economic analysis in comparison to judgments based on anecdotal evidence. We find both a moderate degree of economic analysis, closer to *per se* (TEB) legal standards, as well as a tendency to non-consistent application. In investigations of similar conducts, the legal standards applied vary quite substantially, creating high levels of legal uncertainty for firms that we also measure empirically and compare across different conduct groups, with the exception of Group G1. Overall, with the exception of price fixing and market sharing conducts, the quality of enforcement (measured by the deviation of the LSs adopted from the theoretical optimum) has been and remains throughout the period investigated very low.

Next, our results are (quite) consistent with the existence of a U-shaped relationship between LSs and the probability of annulment. This can be supported theoretically as showing that the HCC adopts the wrong (lower) LSs when courts' standards are intermediate (MPS or TEB LSs) but follows the courts when the LS is higher than TEB. Finally, we show that an increase in legal standards leads to significant additional costs, but only when moving from MPS to TEB analysis (that is from S2 to S3 LSI). Specifically, in terms of the time necessary for litigation to be completed, decisions in which the HCC applies a "more" *effect-based approach* (i.e. TEB) take longer than decisions based on more "*per se*" (i.e. MPS) standards.

Appendix 1

Figure 1: Number of HCC decisions by year and by decision type



Source: Calculated by authors using dataset

Table 13: Evolution of HCC's decisions[66]

Year	Horizontal Agreements	Vertical Agreements[67]	Abuse of Dominance	Mergers	Interim Measures	Opinions
1995				4	2	1
1996	2	5	4	11	4	0
1997		2		36	4	1
1998		4		40	6	0
1999				51	6	0
2000		3		48	9	1
2001				27	2	3
2002	2		1	11	4	1
2003	3	1	2	13	8	1
2004	1	3		11	3	0
2005	2	2		14	3	0
2006	1	3	3	13	1	1

[66] Data from www.epant.gr (for decisions published up to 31.12.2017).
[67] Including also decisions on cases of prohibition of the abuse of a relationship of economic dependence, which, since 2009, is no longer applied by the HCC and is now incorporated into another body of civil legislation.

Year	Horizontal Agreements	Vertical Agreements[67]	Abuse of Dominance	Mergers	Interim Measures	Opinions
2007	3	4	5	31	1	1
2008	3	6	3	29		
2009	1	10	6	21	1	
2010	5	4	5	11	1	
2011	2	1	5	3		2
2012	2	1	5	12	1	17
2013	3	1	1	16		3
2014	1		1	9		1
2015	2	4	1	9	1	
2016			1	8		1
2017	5	2		4	1	2
Total	**38**	**56**	**43**	**432**	**58**	**36**

Source: Calculated by authors using dataset

Table 14: Evolution of HCC's decisions by type of decision

CA:	Infringement Decisions (1)				Commitment Decisions (2)	Total (1+2)
	with fine	Settlement	w/o fine	Total		
HCC	**66**	**4**	**9**	**79**	**10**	**89**
%	*74%*	*4%*	*10%*	*89%*	*11%*	*100%*
1997	1			1		1
2000	2			2		2
2002	3			3		3
2003	5			5		5
2004	2			2		2
2005	2		1	3		3
2006	2		2	4	1	5
2007	7		2	9	1	10
2008	5		1	6	1	7
2009	7		1	8		8
2010	5			5	1	6
2011	5		1	6		6
2012	4			4	2	6
2013	7			7		7
2014	3			3		3
2015	3		1	4	3	7

CA:	Infringement Decisions (1)				Commitment Decisions (2)	Total (1+2)
	with fine	Settlement	w/o fine	Total		
2017	3	4		7	1	8

Source: Calculated by authors using dataset

Table 15: Share of HCC's decisions by year and conduct type

Year	Horizontal Agreements (All Other)	Horizontal Agreements (Concerted Practices)	Vertical Agreements	Abuse of Dominance
1997	0.0%	0.0%	100.0%	0.0%
2000	0.0%	0.0%	100.0%	0.0%
2002	0.0%	66.7%	0.0%	33.3%
2003	0.0%	50.0%	25.0%	25.0%
2004	0.0%	50.0%	50.0%	0.0%
2005	0.0%	66.7%	33.3%	0.0%
2006	33.3%	0.0%	0.0%	66.7%
2007	22.2%	22.2%	44.4%	11.1%
2008	16.7%	0.0%	33.3%	50.0%
2009	0.0%	0.0%	62.5%	37.5%
2010	40.0%	0.0%	20.0%	40.0%
2011	33.3%	0.0%	16.7%	50.0%
2012	50.0%	0.0%	25.0%	25.0%
2013	42.9%	14.3%	28.6%	14.3%
2014	33.3%	0.0%	33.3%	33.3%
2015	0.0%	0.0%	50.0%	50.0%
2017	57.1%	42.9%	0.0%	0.0%
Total	**23.4%**	**16.9%**	**32.5%**	**27.3%**

Source: Calculated by authors using dataset

Appendix 2

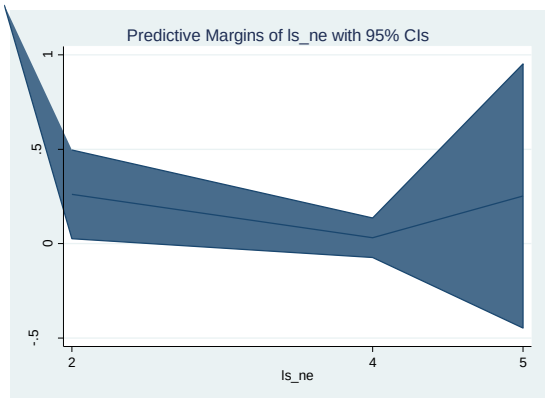
Annulment rate of infringement decision (final court decisions), *HCC – **all** control variables*

	Final decision
Average margins of responses	
MONPEN	-0.67 (0.47)
SIZE	-1.18** (0.39)
LSI = 2	0.43*** (0.11)
LSI = 3	0.19** (0.06)
LSI = 4	0.32** (0.11)
LSI = 5	0.53 (0.33)
Number of observations	69
Prob chi2	0.0198
Pseudo R2	0.1615
Marginal effects	
LSI = 2 *(base level)*	
LSI = 3	-0.23 (0.13)
LSI = 4	-0.11 (0.16)
LSI = 5	0.11* (0.35)
Average margins of responses by Group	
C.1. Group 1	
LSI = 2	0.26** (0.12)
LSI = 4	0.03 (0.05)
LSI = 5	0.25 (0.36)
C.1. Group 2	
LSI = 2	0.52**

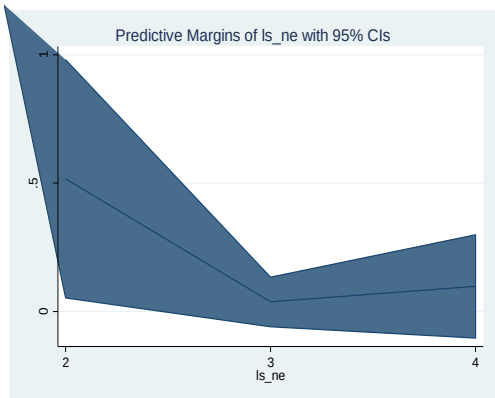
	Final decision
	(0.24)
LSI = 3	0.04 (0.05)
LSI = 4	0.09 (0.10)
C.1. Group 3	
LSI = 2	0.87* (0.13)
LSI = 3	0.3** (0.09)
LSI = 4	0.5** (0.15)
C.1. Group 4	
LSI = 3	0.15*** (0.08)
LSI = 4	0.30** (0.13)
LSI = 5	0.79** (0.37)

St. errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

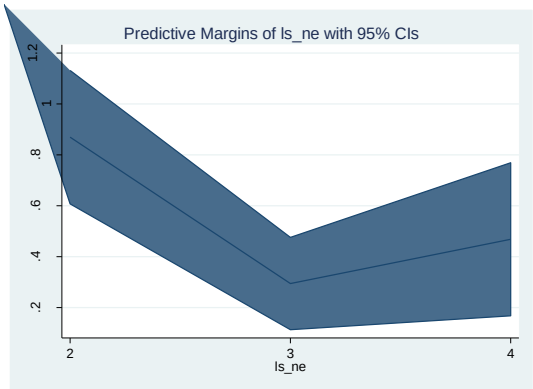
Average margin response and Marginal effects of LSI on probabilities of, HCC –***all*** *control variables*



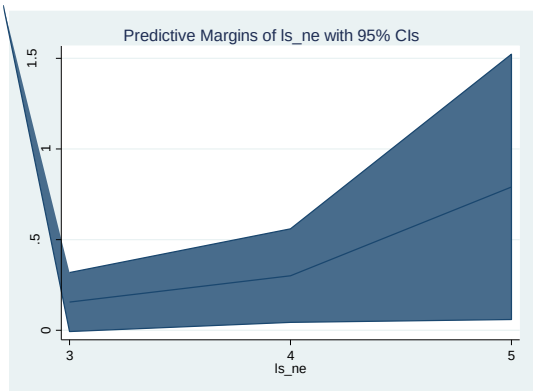
Average margin response - Group G1



Average margin response - Group G2



Average margin response - Group G3



Average margin response - Group G4

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