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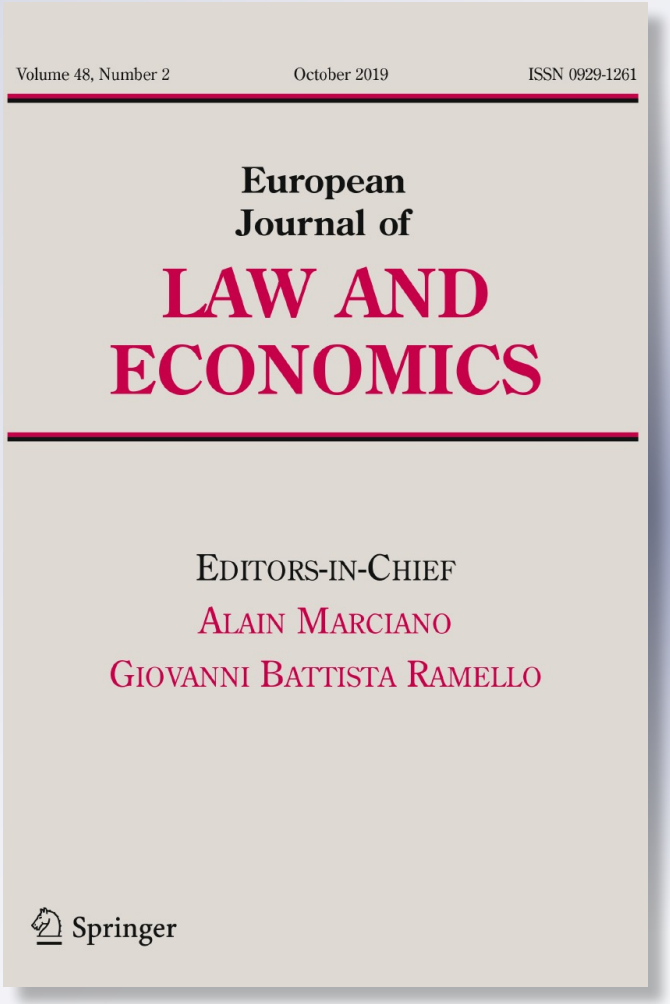

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On the choice of legal standards: a positive theory for comparative analysis

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Abstract
In contrast to existing economic theory on the choice of legal standards in the enforcement of Competition Law, we develop a modelling framework that accounts explicitly for (a) Courts' choices, given the substantive standard adopted and (b) Competition Authorities (CAs) setting legal standards anticipating Courts' choices, recognizing that CAs place at least some weight on the implications of their choices for the outcome of the judicial review process and, hence, for their reputation. We then show why CAs may favor Per Se type standards (even when an error-minimising or welfare maximization approach would suggest the choice of an effects-based standard), with sub-optimal utilization of economic analysis, how this choice is affected by the Courts' substantive standards, why the legal standards for any given conduct may differ between countries, why there may be a U-shaped empirical relationship between legal standards and the probability that the CA's decisions are annuled and how the choice of standards affects other aspects of enforcement, such as the number of investigations undertaken.

Keywords Antitrust enforcement · Effects-based · Per Se · Economic analysis · Judicial review

JEL Classification K21 · K41 · L40

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1 Motivation, objectives and literature review

1.1 Motivation, objectives and main results

The issue of the choice of legal standards and of the appropriate role of economic analysis in the enforcement of Competition Law (CL)[1] has always been and remains very controversial. Thus, while not without dissenting voices that even become dominant at certain periods over the last hundred or so years, the North America point of view has tended to give economic analysis and evidence a much more important role to that which the dominant point of view has assigned to it in (continental) Europe.[2] This divergence, that has remained particularly strong in abuse of dominance cases, has become more noticeable and more difficult to explain, by a growing body of economic theory on the choice of legal standards, using a welfare-based approach,[3] that points to the superiority in many circumstances of an economics-based approach with effects-based legal standards. In the EU, despite the extensive reforms stretching over 25 years,[4] as many commentators recognize, the movement towards effects-based never seriously took off, especially for art. 102 cases.[5] Evidence suggests that the divergence in the standards adopted and tendency towards Per Se is also reflected in the enforcement record of other countries from the developed and developing world (Avdasheva et al. 2015, 2019).

[1] For discussions and empirical information concerning the use and usefulness of economics in CL enforcement see Baker (2003), Gavil (2008), Neven (2006), Schinkel (2008) and Lianos (2012). Also, Gual and Mas (2011) for the use of concepts and tools from modern Industrial Organization theory and Fisher (1989) for an early skeptical view.

[2] At the level of the EC and that of Member States. For an overview of the application of economics in a century of enforcement in US see Kovacic and Shapiro (2000). As Gavil et al. (2008) note, after the *Sylvania* decision "the Court systematically went about the task of dismantling many of the per se rules it had created in the prior fifty years, and increasingly turned to modern economic theory to inform its interpretation and application of the Sherman Act". Neven (2006) contains a review of the situation in EU, identifying the low levels of economic analysis, especially in abuse of dominance cases. For an exchange, encapsulating the controversy in Europe, see Wils (2014) and Rey and Venit (2015) on the EU *Intel* decision. Also, Geradin and Petit (2010), Marsden (2010), Papandropoulos (2010), Gifford and Kudrle (2015), Peepercorn (2015) and Ibanez Colomo (2016). The latter's review of the *European Courts choice of legal standard* in abuse of dominance cases shows that for a large number of practices the standard is one of Per Se Illegality while for the rest it is what we will identify as Truncated Effects Based (which falls short of full effects-based or rule of reason).

[3] See literature review below.

[4] That culminated in EC's Guidance Paper (2009); see review in Katsoulacos et al. (2018).

[5] The 2009 EC Decision on Intel (T-286/09) and the 2014 General Court (GC) Judgement on this case, exemplifies this. Though the recent decision on *Intel* by the ECJ seems to provide some basis for rejuvenating the effects-based approach in EU, a close reading does not leave much ground for optimism. Rather than proposing an effects-based approach the ECJ argues that the GC did not apply properly the (lower) Truncated Effects Based standard (see also below) that is needed to demonstrate exclusion (ECJ EU Press Release No 90/17, 6th September 2017 "Judgment in Case C-4 13/14 P Intel v.Commission). See for further discussion Rey and Venit (2015) and Katsoulacos et al. (2018).

This paper, rather than associate the choice of legal standards[6] and subsequent role of economic analysis *in abstracto* with error-cost minimization or welfare maximization, proposes a positive framework that is based on (a) an explicit examination of the choice of legal standards by the CAs *in the light of the standards set by the Courts* (which examine appealed decisions of CAs); (b) the fact that the choice of legal standards by Courts depends on the Substantive Standard (SS) adopted, that is, on the criterion for establishing liability and (c) the fact that by their nature *CAs are best thought of as utility maximizing organizations* in which, those responsible for deciding enforcement procedures, place at least some weight on the implications of their choices for their reputation or public image. Thus, in our proposed framework, CAs maximize utility, which depends both on what they perceive to be the objectives of their principals and Courts, that we take to be to maximize the expected benefits that enforcement choices bring to competition or to consumers or to society more generally, but also on their *public image or reputation* (see Kovacic et al. 2011 and discussion below). This is consistent with the widely recognized fact that, in many cases, CAs operate under various *performance criteria* some of which at least are *not* related to the effects of enforcement on welfare (see, for example, Avdasheva et al. 2018). Within this framework we are able to identify the fundamental role of the judicial review process[7] in understanding the choice of legal standards and the extent of economic analysis and evidence used by CAs.

More specifically, in our framework the CA's public image and reputation is determined by an indicator of *reputation-related* (or, for short, *reputational) enforcement success* which is affected negatively when the number of infringement decisions by the CA falls and when the reversals of its infringement decisions in Courts of Appeal during the judicial review process are increased. The CA's utility is also affected positively by the impact of the CA's enforcement choices on the *quality of its enforcement,* measured by the expected benefits that these choices bring to competition or to consumers or to society more generally. Of course, different CAs will place different weights on these factors that influence utility, depending on the specific characteristics of the jurisdiction in which they operate (such as its maturity, the degree of autonomy of the CA and the objectives of its principals).

[6] By "legal standard" we will always mean the "decision rule" used in order to undertake the assessment of *any given* conduct that potentially violates CL. The decision rule prescribes *how* assessment should be made, in terms of the presumptions on which it will rely and the series of tests and economic argumentation that will take into account in making the assessment. It can differ for different conducts: sometimes, relying on general presumptions and proving certain behavior has taken place will be all that is required (Per Se); in other cases detailed market investigation and proving likely or actual effects of the *specific* conduct will be required. Below we will treat "effects-based" as more or less synonymous to "economics-based" (a term that has become very popular in Europe). Sometimes, legal scholars draw a distinction between "rules" (like Per Se) and "standards" (like "rule of reason")—see, for example, Blair and Sokol (2012a). Below we neglect this distinction. The notions of "substantive (or liability) standard" and of "legal standard" are clearly distinct. The substantive or liability standard is the *criterion used (e.g. impact on consumer welfare) in order to decide whether or not a conduct violates the law*.

[7] For other attributes of this process see Katsoulacos and Ulph (2011), Geradin and Petit (2010) and Shavell (1995).

Using this framework, we analyze the CA's utility maximising choice of legal standard (and, hence, application of economic analysis) and its choice regarding the number of investigations undertaken and decisions reached. Our main results, established in six empirically testable propositions, are as follows.

A reputation sensitive CA may well adopt, in assessing potentially anticompetitive conducts, a lower, closer to Per Se legal standard, utilizing a sub-optimal amount of economic analysis and evidence, and will never adopt a higher legal standard (Proposition 1), than the optimal legal standard that would be adopted by Courts. We find that adopting a lower legal standard is more likely (Propositions 2 and 3):

(i) When the CA's utility depends just on reputational concerns, so it does not take into account the implications of its choice of standards on the quality of enforcement, in terms of error avoidance and adverse deterrence effects.
(ii) When the CA is uncertain, in relation to what legal standard will be chosen by Courts for any given conduct. This is particularly likely to occur in *young jurisdictions*, in which CAs do not know with certainty what legal standard will be considered by the Courts as the right standard for any given conduct, due to the lack of a long enough tradition in the application of CL, and, in which, average investigation costs are likely to rise steeply as more sophisticated analyses and techniques are applied with higher legal standards.
(iii) When the average investigation costs are sufficiently convex, with respect to the amount of economic analysis used, *relative* to the increase in the probability of decision annulment when a (wrong) lower standard is used.

Importantly, the model can explain empirical evidence indicating a U-shaped relation between the probability of annulment of the CA's decisions and the economic analysis applied in assessment (i.e. the legal standard adopted) (Proposition 4).

Other important results, emerging from our analysis are:

The legal standards adopted by CAs will be lower (closer to Per Se), when Courts adopt non-welfarist substantive standards (Proposition 5), as is common in Europe[8] but also in the developing jurisdictions. This may be an important factor explaining differences in the legal standards adopted in EU relative to those in other mature jurisdictions such as US or Canada. Also, the closer the standard to effects-based the *smaller*, ceteris paribus, the optimal number of investigations (decisions reached) for this conduct by the CA (Proposition 6). Finally, jurisdictions in which Courts adopt non-welfarist substantive standards will tend, *ceteris paribus*, to be associated with more enforcement in terms of decisions reached (Proposition 6; Corollary (ii)). A number of corollaries, in the form of empirically testable predictions, are also established for most Propositions.

[8] Blair and Sokol 2012b; Gifford and Kudrle 2015; Coniglio 2017; Katsoulacos 2019; also Sect. 1.2 below.

The structure of the paper is as follows. After a brief literature review in the next sub-section, Sect. 2 sets out the various elements that make up our proposed modeling framework. In Sect. 3 we apply this framework and derive our main results concerning the optimal choice of legal standards and the number of investigations undertaken. Section 4 provides concluding remarks, offers some recommendations and discusses opportunities for future research.

1.2 Brief literature review on legal and substantive standards

Broadly speaking, there are two types of legal standards that can be used, those (to use the terminology common in the EU) that are *effects-based* and those that are *object-based*, which in US are referred to as rule of reason and Per Se rules, respectively, though the terms are not, strictly speaking, exactly equivalent.[9] Of course, there are variations in these rules and for some purposes it is probably best to think of legal standards as forming a *continuum* at the extremes of which are the Per Se (or object-based) and the ("full") rule of reason (or full effects-based) standards.[10]

We can think of the difference between the two broad types of legal standard as follows. While for certain conducts a sufficiently high standard of proof[11] of anti-competitive harm can be reached by applying an object-based legal standard, that

[9] Further, while in US a Per Se offence concerns conduct that is necessarily and irretrievably unlawful, this is not the case in EU where the object-based standard may refer to a "rebuttable Per Se" rule and an effects-based standard is usually thought of as falling short of the full-blown rule of reason in terms of how discretionary is the Authority's case-by-case decision making approach—see Katsoulacos and Ulph (2009). Also, Gavil (2008), ab.cit. p. 141. In EU, agreements under Art.101 are rebuttable. There are however cases in EU CL which *are* strictly Per Se prohibited: RPM, Parallel Trade restrictions and restrictions on cross-sales in vertical contracts.

[10] Alexander Italianer, ab.cit. p. 2, referring to Justice Stevens who was probably the first to point out that one should think of legal standards (for dealing with restraints under US Sect. 1) as forming a *continuum* with Per Se and Rule of Reason being at the opposite ends of this *continuum*. As Italianer notes, the US Supreme Court has explicitly recognized that "the categories of analysis cannot pigeonholed into terms like "per se" or …."rule of reason". No categorical line can be drawn between them. Instead, what is required is a situational analysis moving along what the Court referred to as a "sliding scale"". The term *continuum* is not used here in a mathematical sense but juest to indicate that one can identify some distinct legal standards between Per Se and Full Effects-Based.

[11] We should stress that we will be using the term «standard of proof» rather loosely. Formally, by «standard of proof" is meant the degree of evidence required in order to establish *proof,* or for the CA to discharge its ultimate contention (that welfare will be adversely affected). Or, it is the threshold, in terms of the probability that must be met, for the CA or Court to discharge its burden of proof. Common standards (associated with a progressively higher probability) include: "substantial evidence", "Preponderance of the evidence" (or "balance of probabilities"—it is demonstrated, with at least 51% probability, that contention is true—mostly applied in civil cases), "clear and convincing evidence" and "beyond reasonable doubt" (mostly applied in criminal cases). While, however, these concepts are well understood and widely applied in common law systems, "in other jurisdictions, particularly in (EU) continental legal systems, *such "probabilistic" standards of proof generally do not exist*. The amount of evidence required is rather a question of the personal conviction of the judge (*intime conviction*). That is to say, a *party who bears the burden of proof must satisfy the judge to the point of persuading him of the existence of a pertinent fact*." (see Hellstrom 2009; p. 2; our emphasis). We should stress that our use of the term "standard of proof" in this article *does not* necessarily rely on a "probabilistic" interpretation; we may interpret it as "sufficiency in the evidence required to convince a judge".

is, purely on the basis of identifying the exact nature of the conduct, for many other conducts this will not be the case. In these latter circumstances, where the standard of proof reached by adopting object-based is too low, effects-based legal standards, relying on extensive investigation of firm and market characteristics and the application of economic analysis and evidence, are needed in order for the enforcer to be able to identify whether it can reach its threshold for discharging its burden of proof and establishing its ultimate contention that the conduct will violate CL. The exact variant of object-based or effects-based rule that is required will depend on the conduct under consideration. This implies that the extent and sophistication of the economic analysis utilized under effects-based rule is greater than under object-based, but how much greater depends on the exact variant that is used.

Existing literature has examined the question of what is the optimal choice of legal standards along the *continuum,* and hence of the role of economics in CL enforcement, assuming an welfarist substantive standard (i.e. a liability criterion of consumer or total welfare) and using a *minimization-of-costs of decisions errors* framework and, more recently, a more general *maximization-of-welfare* framework (that incorporates the former). The main factors that then need to be taken into account can be summarized as follows:

- the cost of decision errors (of Type I and II) under the alternative legal standards;
- the deterrence or indirect (or incentive) effects of the standards;
- whether the standard generates legal uncertainty;
- other enforcement costs (such as administrative costs of enforcement and costs to firms of self-assessing their actions or of reducing legal uncertainty).

In a series of papers, Katsoulacos and Ulph (2009, 2011, 2015, 2016) have attempted, by using a maximization-of-welfare framework to provide answers on how the factors above affect the choice of the (optimal) legal standard[12] and hence, indirectly, about the appropriate role and extent of economic analysis in 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[13] and for which the developments in economic theory and modeling in the last 20 or so years improved significantly the discriminating quality of the assessment,[14] moving to assessment with effects-based standards is likely to improve welfare due to a reduction in the costs of decision errors and an improvement in deterrence effects.[15]

[12] See also Padilla (2011).

[13] I.e. which cannot be presumed to be on average harmful to welfare, but which, up to the 1990 s, were widely considered as strongly presumptively illegal. See for more details Katsoulacos et al. (2017a).

[14] That is, the ability of the assessment to discriminate accurately between harmful and benign conducts.

[15] Which are likely to more than compensate for higher administrative costs and legal uncertainty. The evolution of enforcement in US is consistent with this. As Jones and Kovacic (2017, p. 7) note «many jurisdictions apply a rule of per se illegality, or virtual per se illegality, against some horizontal agreements such a price fixing. The extent to which such a rule should be expanded beyond this……is (now) much more controversial and contested». As they indicate (p. 16) nowdays in US, vertical restraints,

But, as noted in the previous sub-section, the legal standards actually adopted in many countries and most notably in the EU, for many practices, remain closer to Per Se (and the extent of economic analysis applied by the majority of CAs today remains low).[16] As Geradin and Petit (2010, p. 31) note, in relation to the assessment of abuse of dominance cases in the EU, this has relied on «old, formalistic legal appraisal standards, and (has shown) a reluctance to endorse a modern economic approach» (also, for a similar appraisal, Neven 2006; Ibanez Colomo 2016).[17]

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, influences in choosing legal standards. In practice, other factors must be important and must be recognized in an alternative positive modelling framework. These, as noted in the previous sub-section, are at the center of the analysis of this paper. The most important one is related to the objectives of CAs, specifically their reputational concerns, 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 to be the Courts' choice of legal standard.

Another important factor that must be recognized, influencing the choice of legal standards of Courts and, hence, of the CAs, is the *substantive standard* adopted. While in academic discussions this is usually assumed to be welfarist (liability requiring a showing of adverse effects on consumer or total welfare), 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 efficiency (Rey and Venit 2015)—which would imply that any conduct that puts one or more competitors at a disadvantage would be considered unlawful,[18] irrespective of the ultimate consequences of the conduct for welfare.[19]

Footnote 15 (continued)
mergers *and* single-firm exclusionary behavior are *not* assessed by per se. Also Blair and Sokol (2012a, b) and Hovenkamp (2017), especially onwards from p. 43.

[16] The statement does reflect accurately the reality in the vast majority of jurisdictions—other than US, Canada, UK and a few more jurisdictions. The statement does *not* concern hard-core horizontal collusion, for which all arguments do favor a Per Se Ilegality standard, and mergers, for which there is a very wide applicability of effects-based. Thus, the type of practices that we have in mind in making this statement, are the other business conduct for which there is no universally accepted choice of legal standards i.e. unilateral conduct by dominant firms, vertical restraints and concerted practices.

[17] See also the references in footnote 4 above. The importance of effects-based standards and relying on the predictions of sound economic analysis has also been stressed by OECD, not just in the context of developed countries but equally and perhaps more importantly in developing ones. For example, in its recent report evaluating the Russian CA, that has in the last few years become the largest CA in the world, the OECD (2011) makes as its top recommendation that the authority must "improve the quality of economic analysis and its application to competition enforcement and in support of improved judicial decisions".

[18] As was made clear by the EU GC which, upholding in its entirety the EC's on *Intel*, argued that making it more difficult for a rival to compete "in itself suffices for a finding of infringement".

[19] If the substantive standard was welfarist then, as Rey and Venit (2015) note the effects-based legal standard should *start* with a showing of a distortion of the competitive process but, in order to assess this distortion and find liability, it "should (also) look at the actual or likely *effects of the conduct"*, on consumer welfare or efficiency.

The link between substantive standards and the choice of legal standards by Courts has been examined recently and it has been demonstrated (Katsoulacos 2019) that adopting non-welfarist substantive standards increases the likelihood that Per Se legal standards are applied in investigations of specific conducts.[20]

2 A modelling framework for determining the choice of legal standards by CAs and courts

Formulating our proposed modelling framework requires that we start by considering in detail each of its distinct elements. Specifically, the following four sub-sections examine the following:

(i) Since, central to the CAs' choice of legal standard is what they anticipate will be the legal standard adopted by Appeal Courts, in the first sub-section below, we turn to the factors influencing Court's behavior and choices.
(ii) Next, we discuss the differing objectives of CAs and Courts and the issue of information possessed by CAs about Court choices.
(iii) We then turn to an examination of the CAs' utility function.
(iv) Finally, we turn to the CAs' cost constraint.

2.1 Choice of legal standards by the appeal courts

We will consider Courts as deciding which legal standards are appropriate for assessing specific conducts or conduct categories (e.g. specific abuse of dominance practices) taking into account the following factors:

(i) What they consider to be the legal standard that is most appropriate, in terms of the wider social benefits generated by its adoption, given that, for any conduct, legal standards adopted will have different implications/impact on decision errors and deterrence effects. To select the legal standards that are best in terms of error avoidance and deterrence (Katsoulacos and Ulph 2009) it is important to consider what the evolving body of economic theory and evidence suggests in relation to the potential anticompetitive and efficiency effects of different conducts, that affect the *strength of the presumptions* that can be made about the effect on average of these conducts. Also, the *discriminatory quality* of the available underlying economic models that can be used in the assessment must be considered—in terms of their ability to distinguish harmful from benign cases in specific investigations.[21] If the presumptions

[20] Concerning the results established in this paper, we note that while Proposition 5 is a direct consequence of Lemma 2, which is based on the results in Katsoulacos (2019), all other Propositions in this paper (i.e. Propositions 1, 2, 3, 4 and 6) are completely independent of Katsoulacos (2019).

[21] As Blair and Sokol (2012a) describe "In the US, it was the law-and-economics academy that first transformed the analysis of antitrust, starting in the 1950 s. The Courts followed, responding to the emerging scholarship. *Courts began to shift antitrust doctrine from per se to rule of reason (and greater*

are very strong[22] and the discriminatory quality of economic models is low, Per Se or close to Per Se standards should be selected. If the presumptions are relatively weak and the discriminatory quality high then effects-based legal standards should be preferred.

(ii) What they consider should be the appropriate objective(s) of CL enforcement and, hence, the substantive (or liability) standards (SS) that they adopt. The SS adopted will influence the choice of legal standard[23]. Substantive standards differ substantially between countries as in different jurisdictions there are different views as to what should be the objectives of competition policy. More specifically, while in some cases welfarist objectives are incorporated among the criteria of assessment, in order to define under what circumstances there will be a liability finding, there are significant variations between jurisdictions in practice as evidenced by case-law, in relation to:

(a) Whether the welfarist objectives cover just consumer welfare (as would seem to be the case in UK and US), or extend to wider welfare notions of economic efficiency or total welfare (as, for example, in Canada[24]).

(b) Whether welfarist objectives are replaced by other competition-related objectives such as "putting competitors at a disadvantage" or "protecting the competitive process" (adopted, as noted above, in Europe) that can be considered as part of a set of criteria for assessing impact on welfare but, on their own, do *not* constitute a complete assessment.[25] What is important in this respect in our context is that, non-welfarist SSs will imply that Courts will favor lower legal standards—see Lemma 2 below.

(c) Whether other "public interest" objectives become an important part of the assessment procedures.[26]

(iii) The country specific institutional context and legal traditions. Young jurisdictions will take into account international best practice. Also, such jurisdictions and jurisdictions, in which there is no tradition in the application of economic analysis and evidence in legal proceedings and, specifically, in competition law enforcement, especially when the latter surpasses a certain amount of

Footnote 21 (continued)
economic analysis) starting in the late 1970s, while at the same time transforming procedural standards. These changes next influenced the antitrust agencies, which in turn further strengthened the changes within the courts" (our italics).

[22] So the assessment in specific investigations can rely on general presumptions about general conduct categories.

[23] See below Lemma 2 and, for details, Katsoulacos (2019). Here we assume that the choice of SS is exogenous.

[24] See recent decision on Commissioner of Competition v. Tervita Corp.

[25] For a discussion of the multi-objective concerns characterizing EU CL enforcement see also Blair and Sokol (2012b, pp. 2510–2513). See also the discussion of the Intel case in the Introduction—based on the contributions by Wils, Rey& Venit and Peepercorn. The Non-Disadvantaging Rivals objective can also be thought of as one of protecting Consumer Choice—see below and Coniglio (2017). See also Korah (2010) and Marsden (2010) on the European ordoliberal tradition influencing the choice of non-welfarist SS in EU and Gifford and Kudrle (2015).

[26] See, for example, Katsoulacos et al. (2017a) and Katsoulacos (2019).

sophistication and complexity or in which judges lack any formal training in economics and the necessary relevant experience in assessing economic arguments (as when the appeal courts are not specialized in competition law) will tend to rely less on what evolving economic theory and evidence suggests about the potential effects of different conducts[27] and will tend to rely on low legal standards.

The above considerations determine the choice of legal standards by the Courts and hence what they would consider as appropriate levels of economic analysis and evidence in the assessment of specific conducts.[28] So, let $LS_k^{C,j}$ be the Legal Standard adopted by Courts (C) in country/jurisdiction j for conduct type k. From the discussion above:

$$LS_k^{C,j} = f(E_k(SS^{C,j}), SS^{C,j}, I^j) \tag{1}$$

where E_k measures what the economic, theoretical and empirical, literature suggest is the appropriate legal standard for any given SS adopted by Courts for conduct k (specifically, it measures the strength of the presumption of illegality and the discriminatory quality of the economic models that can be used in the assessment of potentially welfare reducing conducts[29]), $SS^{C,j}$ is the SS adopted by Courts in jurisdiction j and I^j captures the institutional and cultural/historical context in jurisdiction j.

Let us start by assuming that the *SS is that of consumer or total welfare (i.e. the SS is welfarist)*, an assumption to which we will return below. Also, consider some specific jurisdiction, which allows us to drop for the moment superscript j. Finally, assume that the optimal choice of LS that Courts can adopt is among one of four potential legal standards, specifically, Strict Per Se (SPS), Modified Per Se (MPS), Truncated Effects-based (TEB) or Full Effects-based (FEB), that is:

[27] These will certainly tend to hold in the relatively newer jurisdictions of, for example, the BRICS and other developing countries. But, they may well hold too, at least to some extent, in some mature jurisdictions (e.g. of the EU) in which the legal tradition is not one that is receptive to economic arguments in substantive evaluations of CL cases (see for a good discussion, Blair and Sokol 2012b, pp. 2513–2516). It is worth stressing that there is significant variation even between countries within each of these two categories. Thus, in the jurisdictions in which enforcement of competition law is quite new the above argument is likely to hold less in a country like South Africa where the legal institutions and traditions have long been under Anglo-Saxon influence and, among mature jurisdictions, it is more likely to hold in European continental countries than in the UK.

[28] As Geradin and Petit (2010) note (p. 20) "the EU Courts have developed legal standards both with respect to the procedural and substantive aspects of competition law….. (with regard to the latter) the EU Courts have developed in their case law a variety of legal standards that should be relied upon to determine the compatibility with EU CL of a wide range of commercial practices susceptible of creating anticompetitive effects, including horizontal agreements, vertical agreements, exclusive dealing, rebates, predatory pricing, selective price cuts, tying and bundling, refusal to supply, margin squeeze….. An important observation with respect to these legal tests is that they are intensely "economic" in nature….".

[29] See Katsoulacos and Ulph (2009) for a formal analysis deriving indicators of the "strength of the presumption of illegality" and of "discriminatory quality" and using them to provide an welfare comparison of legal standards.

$$\widehat{LS}_k^C = \{SPS, MPS, TEB, FEB\} \quad (2)$$

$\widehat{LS}_k^C$ will be the *LS that minimizes decision errors and adverse deterrence effects* in assessments of conduct k. So, a Court, chooses the optimal $\widehat{LS}_k^C$, under any given substantive standard, and, with this, the optimal economic analysis, $\widehat{e}_{k,LS_k}^C$, associated with that optimal legal standard. While in the text we use the simplifying but realistic assumption that the CA has to choose between a discrete set of legal standards in the "Appendix" we prove the main results also for the case that the economic analysis and corresponding legal standard can increase continuously.

Under the SPS standard decisions are made on the basis only of the purely formal characteristics of the conduct, relying on strong presumptions about the implications of the general class of conducts to which the specific conduct belongs for welfare. The MPS standard can be considered as a Per Se rule subject to a SMP requirement or, more generally, as supplementing Per Se by undertaking analysis of market characteristics as, for example, in 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. Depending on the results of this additional analysis we then decide whether or not we can presume adverse welfare effects. Truncated Effects Based (TEB) is an intermediate standard, in which assessment additionally requires showing, following a specific investigation of the conduct and market characteristics, whether it belongs to a class (of conducts and market characteristics) 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, as a result, *can be presumed* to adversely affect welfare. Finally, FEB represents the case under which all potential anticompetitive *and* procompetitive effects of the *specific* conduct must be assessed and compared.[30] Different countries and the same countries over different time periods have been adopting one or another of these alternative legal standards for assessing vertical restraints, concerted practices or conducts under abuse of dominance.

For any LS_k^C we assume that it is possible to determine the optimal extent of economic analysis and evidence associated with it in investigations of conduct k. Let:

$\widehat{e}_{k,LS_k}^C(SS^C)$ = amount of economic analysis and evidence that Courts will consider as optimal under LS_k^C for any given SS adopted by Courts. Since now we assume an welfarist SS we use the symbol "w" as superscript to indicate this, so:

$\widehat{e}_{k,LS_k}^{C,w}$ = the amount of economic analysis and evidence that Courts will consider as optimal under $LS_k^{C,w}$ when the SS is welfarist. If a non-welfarist SS is adopted, the optimal amount of economic analysis will be, *ceteris paribus*, lower (see also Lemma 2 below).

[30] 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 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.

Thus, we have:

$$\begin{aligned} \hat{e}_k^{C,w} = \{\hat{e}_{k,SPS}^{C,w}, \hat{e}_{k,MPS}^{C,w}, \hat{e}_{k,TEB}^{C,w}, \hat{e}_{k,FEB}^{C,w}\} with \\ \hat{e}_{k,SPS}^{C,w} < \hat{e}_{k,MPS}^{C,w} < \hat{e}_{k,TEB}^{C,w} < \hat{e}_{k,FEB}^{C,w} \end{aligned} \tag{3}$$

According to (3) if a Court adopts FEB as the appropriate LS for a conduct k then it will consider that the optimal economic analysis and evidence associated with this is greater than it would be if TEB was considered the appropriate LS, with the optimal economic analysis and evidence associated with TEB being greater than it would be if

MPS was considered the appropriate LS. Note that it may be that, for any two conducts k and k' the optimal amount of economic evidence that is required by Courts under any given LS may differ. That is:

$$\hat{e}_{k,i}^{C,w} \neq \hat{e}_{k',i}^{C,w}, \; k \neq k', i = SPS, MPS, TEB, FEB \tag{4}$$

given that, for example, the range of market characteristics that must be examined, market modeling undertaken and evidence required to show anticompetitive effects or efficiencies, can differ from conduct to conduct.

Since, when shifting from a lower to a higher legal standard, e.g. from a SPS[31] to MPS or from MPS to TEB, the CA will have to undertake a series of additional distinct steps or "blocks" of economic analysis and economic tests, that require potentially additional evidence,[32] each of which is necessary in order to achieve the higher optimal e associated with the higher standard, we can illustrate this increase in the value of e, associated with a higher legal standard (LS), as in Fig. 1 below. In the Figure we have assumed, for reasons of tractability, that the function relating e to LS is a continuous step function. In the "Appendix" we also prove the main results for the case where economic analysis and the associated legal standard can increase continuously rather than in a step-wise fashion.

2.2 Assumptions about information

If one were to assume that:

(i) The Courts and CAs had exactly the same objectives when choosing legal standards;

[31] For which we can take the amount of economic evidence to be negligible or zero as assessment relies on just the form of the conduct. Without loss of generality we assume in Fig. 1 that $\hat{e}_{k,SPS}^{C} > 0$—none of our results would be affected if we assumed this is zero.

[32] We can think of such blocks as those associated with, for example, market definition, identifying market power, identifying whether market conditions are conducive to horizontal collusion, modeling oligopolistic interaction and identifying whether a conduct has exclusionary effects, developing a theory of harm, identifying efficiencies and their effects, examining a counterfactual etc. See for details and a methodology of how such blocks can be used to construct effects-based (EB-) indicators, Katsoulacos et al. (2017b).

(ii) There are well defined blueprints about exactly how different standards should be applied and Courts and CAs are equally well aware of these and use them in exactly the same way to reach the same conclusions;
(iii) The CA has perfect information about the legal standards that Courts consider appropriate for each conduct,

then, of course, annulment rates of CAs decisions by Courts would be zero—indeed under such circumstances it is difficult to find motivation for costly appeals by those whose conduct has been found to violate CL.

However, in practice we observe high rates of appeal and also quite high rate of annulment of infringement decisions[33] so these assumptions do not hold.

Concerning assumption (i), while Courts may be assumed to decide which legal standards are appropriate in order to maximize the wider social benefits from enforcement, related to the competitive process, consumer choice, consumer welfare or efficiency, as already explained, CAs will *also* be concerned with their reputation and public image and indeed they will often be judged by performance criteria that relate to the number of decisions reached and the extent to which these were upheld in Courts of Appeal.[34]

Concerning assumption (ii), there are not perfect generally applied blueprints (especially for high legal standards), Courts and CAs may not apply the same legal standard (indeed one of our objectives is to explain this) and, when they do, they may not do so in the same way—because beliefs and perceptions about the exact models and about the tests and data that should be utilized and applied will be different for CAs and Courts and results/predictions will be open to different interpretations in terms of their validity and/or weight (importance).

Finally, CAs may not have good information about what Courts will choose as legal standard. This will be so because:

(a) CAs operate in young jurisdictions with no tradition in the enforcement of CL;
(b) Courts' views about what is the appropriate standard for assessing a specific conduct are changing over time with evolving developments in economic science. However this consideration will influence Courts views very slowly over time so we can take CAs in mature jurisdictions (such as those of US and EU) as knowing with very high probability the legal standard applied by Courts.

The above implies that the analysis applied is likely to be different for mature and for young jurisdictions. In young ones, the natural assumption is that CAs do not know with certainty what legal standards are adopted by Courts. In mature ones, the natural assumption is that CAs do know. Our analysis below covers both of these cases.

[33] See empirical evidence mentioned below in discussion after Eq. (9).

[34] See Avdasheva et al. (2018) for a comparison of performance criteria used by CAs in various countries.

2.3 The CA's utility function

Our model of the determination of legal standards adopted by CAs, in assessing potentially anticompetitive conduct,[35] is based on two fundamental premises which form the basis for formulating the CA's utility function. The first premise is that, as already noted, the CA has to make choices in the light of the legal standards set and the substantive standard adopted by the Appeal Courts, which examine those of its decisions that are appealed. The second premise is that the CA is a government agency[36] and as such it will typically enjoy a certain degree of freedom to choose among different possible courses of action. Given this, its objectives (or, the objectives of the CA Head and Commissioners) may be concerned with the overall objectives of its principals and Courts for the agency's enforcement activities (reflected in the substantive standard adopted by Courts), but also with the organization's (and hence their) public image or reputation.[37]

Thus, while the CA Commissioners are concerned with the wider social benefits of the CA's activities, as reflected in consumer welfare or the preservation of a competitive environment, the impact on which depends on the CA making the right choice of legal standards *in terms of avoidance of decision errors and of adverse deterrence (or incentive) effects*, that is on the *Quality of Enforcement*, they are also attaching value to how the CA's enforcement activities impact on their reputation and public image, or what we term the Reputation-related (or, for short, the *Reputational*) *Success of Enforcement*.

Good reputation, which is essential for the furtherance of career concerns, is often dependent on what the public and the market for professionals perceive as "success", as measured in terms of certain easily identifiable and objectively measured criteria. Indeed, these are often reflected in formal "performance criteria" which provide the basis for identifying the extent of success of the CA in performing its enforcement duties, and which are used in order to appraise the head and the commissioners on the basis of their "case record".[38] These formal performance criteria certainly include the investigations undertaken and decisions reached and also the extent to which Courts of Appeal uphold these (Avdasheva et al. 2018).

[35] The discussion below covers potentially *all* conducts examined by CAs. It should be understood, however, that the practical implications of the analysis and its relevance for undertaking empirical research are strongest for antitrust conduct involving abouse of dominance practices, vertical constrains or concerted practices. Assessment in the cases of horizontal price fixing agreements and mergers is more or less universally agreed to be Strict Per Se and Full Effects-Based, respectively.

[36] With a degree of independence that varies quite a lot between countries.

[37] See for a discussion of these assumptions and of empirical evidence, as well as for a review of related theoretical work, Schinkel et al. (2014). They construct a model to examine the behavior of government agencies by assuming the same overall objective as we advocate here. As they note, in governmental agencies like Competition Authorities, the measurement of "output", in terms of the welfare impact of activities is difficult and this allows other performance criteria and hence incentives than just impact on social welfare to hold. For example, as Leaver (2009) stresses, agency officials may try to minimize their "mistakes" for fear of been publicly marked as incompetent rather than try to maximize social welfare.

[38] As Kovacic et al. (2011) note "….CA heads have concerns other than social welfare, including "being busy" with an eye to the media and political superiors".

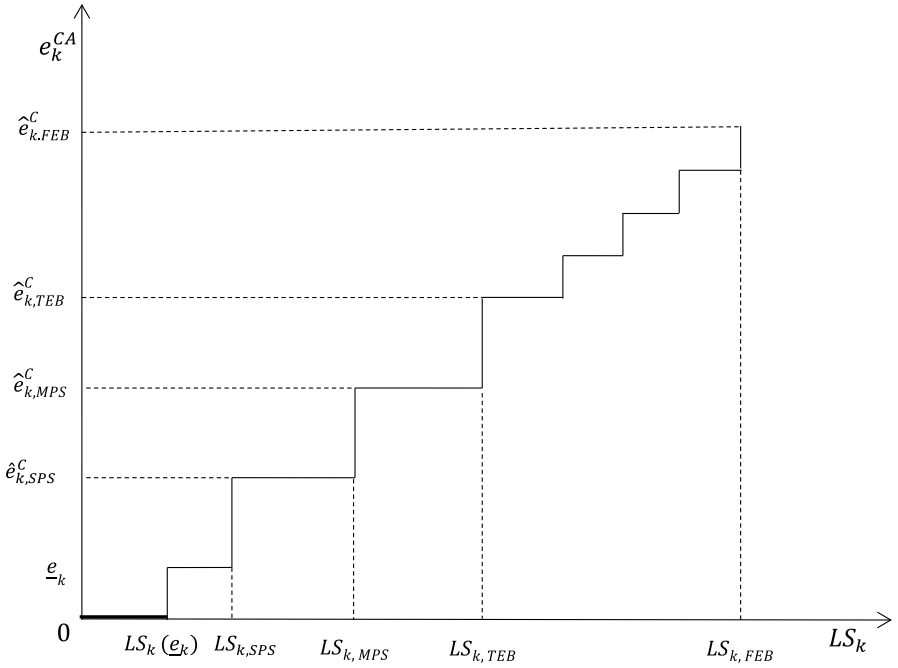

Fig. 1 The relation between economic analysis and legal stsndard

Given these remarks we can formalize the CA's objective function through a utility function (U) that depends on the reputation (R) and the quality (Q[39]) of its enforcement activities, where R and S depend on the LS adopted and R also depends on the decisions (D) reached.

Reputation is determined by the *Reputational Success of Enforcement* (S) of the CA. Assuming that the CA's enforcement efforts are directed to K potentially anti-competitive business conduct types, S is a function of enforcement success in investigations of these different conducts:

$$S = S(S_1, S_{2,} \ldots, S_K) \tag{5}$$

and reputation is given by:

$$R = R(S),\ R'_{S_k}(S) > 0, R''_{S_k}(S) < 0 \tag{6}$$

[39] Since we will assume that the CA makes choices taking into account what it expects to be the choices of the Appeal Courts, a question that emerges is whether we could avoid incorporating directly Q (and, hence, indirectly the wider social benefits from enforcement) also in the utility function of the CA. While our analysis could be undertaken and its main results would not be affected with a utility function in which Q is not an argument, the fact that in some important cases the CA's performance criteria incorporate explicitly the benefits that enforcement generates for consumers explains why we have chosen to leave Q as affecting directly the utility of the CA (e.g. UK's CMA, where the benefit to consumers must exceed by a factor of 10 the cost of enforcement; see, for a brief review of performance criteria, Avdasheva et al. 2018).

That is, reputation increases (at a diminishing rate) as S_k increases.[40]

Generally, the CA's utility from enforcement related to conduct k = 1, …, K can be expressed as[41]:

$$U_k = U_k(R_k(S_k(D_k, e_k(LS_k))), Q_k(LS_k)), \frac{\partial U_k}{\partial R_k}, \frac{\partial U_k}{\partial Q_k} > 0, k = 1, \ldots K \tag{7}$$

We will take S_k to be determined by:

$$S_k(D_k, e_k(LS_k)) = D_k(1 - \Phi_k(e_k(LS_k))), k = 1, \ldots K \tag{8}$$

where

D_k = *infringement* decisions reached on conduct k;

e_k = a measure of the extent to which economic analysis and evidence is utilized on average in the assessment of *specific* investigations relating to conduct of type k, which depends on the legal standard (LS_k).

Below we will also use the following notation:

$e^{CA}_{k,i}$ = indicator of the (average) extent of economic analysis and evidence used by the CA in investigations of a conduct of type k, given the legal standard $LS^{CA}_{k,i}, i = SPS, MPS, TEB, FEB$, is used[42] .

$\Phi_k(e_k(LS_k))$ = probability that an *infringement* decision is reversed by Courts of Appeal given the legal standard (LS_k). Reversed decisions harm the reputation of the CA and its public image. This has the implication that, *ceteris paribus*, the CA will prefer to adopt legal standards that lower the risk of having its infringement decisions reversed.

$Q_k(LS_k)$ = a measure of the quality of enforcement in investigations of conduct k, given the LS_k adopted (and, hence, given e_k), in terms of the welfare benefits of lowering costs of decision errors and adverse deterrence effects.

Since the expected reversals of infringement decisions reached on conduct k given the Legal Standard (LS_k) adopted, depend on the probability that a conviction will be appealed against and the probability that an appealed decision will be reversed by an appeal court[43] we have:

$$\Phi_k(e_k(LS_k)) = \varphi^r_k(e_k(LS_k)).\varphi^A_k(e_k(LS_k)), \; k = 1, \ldots K \tag{9}$$

where:

[40] For the simple cases where there is no danger of confusion, we will use subscripts to indicate derivatives, otherwise we will write them explicitly. Note that, in principle, the increase in reputation will depend on k (the type of conduct) given that investigations regarding different conduct types may affect differently the CA's *public image*—e.g. because investigations of conduct k are more likely to involve *high-profile cases*.

[41] The assumption in (7) that the number of infringement decisions D_k is independent of e_k is discussed further below. According to (7), $U_k = U_k(D_k, e_k)$ rather than $U_k = U_k(D_k(e_k), e_k)$.

[42] For an approach to constructing these indicators of economic analysis and evidence for undertaking empirical work, see Katsoulacos et al. (2017b). Clearly, if the CA decided to use, for example, a strict Per Se legal standard when faced with a price-fixing conduct the amount of economic analysis that it will apply (e) in its investigation of any *specific* case and reaching a decision will be very small (if there is hard-evidence that price-fixing did occur).

[43] The Φ function is discussed in detail in the next section.

$\varphi_k^r(e_k(LS_k))$=probability that an infringement decision on conduct k investigated under LS_k, *that is appealed,* is finally reversed in Courts of Appeal.

$\varphi_k^A(e_k(LS_k))$=probability that an infringement decision of conduct k given LS_k, leads to an appeal.

Empirical evidence, including evidence from the EC and some European countries and developing countries, suggest that on average 75% of infringement decisions are appealed, while a fraction between 30 and 50% of these appeals result in a reversal of the CA's decisions.[44] In relation to reversals, however, the significant variation across different conduct categories should be noted—evidence (below, end of Sect. 3.1.1) shows that the rate of reversals is very low in abuse of dominance cases.

The objective of the CA is to undertake investigations (and reach decisions, D) and adopt legal standards (LS) and apply economic analysis (e), that maximize its utility taking into account the cost constraint and the constraints imposed by the anticipated choices of legal standards by Courts of Appeal. Before we proceed further, below we provide some comments on the relation of economic analysis to legal standards and to justify our focus on the infringement decisions of the CA.

Discussion of the utility function and the variable D_k (infringement decisions)

The rationale of functions (7) and (8) is that increased economic analysis and evidence are associated with "higher" (i.e. closer to effects-based) legal standards (LS_k), for assessing some conduct-type k and will influence the CA's utility by affecting the probability of decision reversals (Φ) in Courts of Appeal and hence the reputational success (S) of enforcement (function (8)). Also, e_k, LS_k affect utility by affecting the quality of enforcement (Q), given that, depending on the conduct, different legal standards will have different implications for the decision errors and deterrence effects of enforcement. We examine both of these effects below.

As noted in sub-Sect. 2.1 above, we treat LS_k and e_k as if they are related by a continuous step function, as in Fig. 1, where we take LS_k to be given by (2), recognsing that in practice, a number of specific distinct legal standards will be recognized (SPS, MPS, TEB and FEB) higher standards being associated with additional *specific blocks* of economic analysis—where we think of each block as containing a, potentially varying, degree of economic thinking and evidence that can be progressively applied until higher standards are reached. A positive value of LS_k implies that at least some contextual economic analysis $\underline{e}_k$ relating to the *specific* conduct is undertaken. The "Appendix" provides a generalization to continuously increasing e_k and LS_k.

To be more specific, we assume that CAs will be constrained from utilizing economic analysis and evidence below a *mandatory minimum level of e* ($\underline{e}_k$) which is set by laws, guidelines, performance assessment criteria and case-law (setting e below this level would essentially imply that its decision will be annulled by Courts with very high probability) and which to some extent depends on the type of conduct investigated. Clearly there is a minimum e that the CA will use if it relies purely on general presumptions for assessing a specific case, as under a SPS legal standard.

[44] See Katsoulacos et al. (2018) for the analysis of EC data from 1992 to 2017. Other countries' data examined by the author include Canada, France, Greece, Turkey, Russia and South Africa.

However, the mandatory minimum level of e may be higher than that required under a SPS legal standard. The most important mandatory application of economic analysis in the enforcement of CL, beyond that required by a SPS legal standard, is that related to the establishment of market shares and SMP, usually on the basis of the Hypothetical Monopolist test—as for conducts examined under abuse of dominance. Thus below we will take $\underline{e}_k$ to satisfy:

Assumption

$$\begin{aligned} e_{k,i}^{CA,w} &\geq \underline{e}_k \\ \underline{e}_k &\leq \widehat{e}_{k,MPS}^{C,w} \end{aligned} \tag{10}$$

Utility in (7) is also taken to depend on infringement decisions. Why focus on *infringement* decisions? It is true that there will also be acquittal decisions that are appealed, by the parties affected by the allegedly anticompetitive conduct and some of these appealed decisions will also be reversed by the Appeal Courts. There are, however, a number of important reasons why focusing on just infringement decisions seems reasonable. One is that public image or reputation-building is likely to rely mainly on non-reversed appealed infringement decisions rather than on non-reversed appealed acquittals.[45] Political superiors would prefer that CAs consider mainly presumptively illegal (rather than presumptively legal) conducts, that is conducts that, on average, are expected to be socially harmful (and, hence, to infringe CL). This means that CAs in their *ex-officio* or market investigations will focus on such conducts and also their prioritization procedures will put much higher weight to investigating such conducts. Another factor is that, *ceteris paribus*, reaching infringement decisions that are not reversed in courts of appeal will be seen as a much safer and objective predictor of the CA's ability "to deal successfully with hard cases"[46] given that, often, the importance of acquitting a firm from an alleged violation is heavily discounted, as being the anticipated outcome (in view of the excessive accusations made by rivals motivated by purely selfish objectives) and, also, given that a much larger fraction of decisions is likely to be appealed and thus evaluated independently by an independent Court when violation is found (as violators have the incentive to try to avoid monetary and other sanctions as well as reputational costs associated with such decisions). This is confirmed by empirical

[45] CAs are seen by the wider public and their political superiors as institutions established in order to stop firms undertaking genuinely anticompetitive actions with negative impact on large sections of consumers rather than as managing to rightly acquit actions that do not cause any harm. The latter is unlikely to capture the attention of the public and those (like the media) influencing public opinion and to enhance the public image of the agency.

[46] For example, in Russia, one of the many countries in which non-reversed decisions reached is the most important performance criterion used to assess FAS, *only* non-reversed *infringement* decisions enter into the performance assessment. For a review of other performance criteria applied in the case of FAS and in other countries, see Avdasheva et al. (2018). In Schinkel et al. (2014), reputation is derived from the decision of high-profiled but, at the same time, difficult tasks.

evidence, showing that by far the largest number of appeals is against infringement decisions.[47]

Thus, while undertaking the analysis by interpreting D_k as the total number of decisions reached in conduct k is feasible and will not affect our results, focusing on infringements decisions certainly allows us to concentrate on the *empirically relevant* and important sub-set of decisions reached by CAs, given that our interest is also to provide empirically testable propositions concerning the impact of the judicial review process on the decisions that are appealed.[48]

2.4 The CA's cost constraint

Coming next to the CA's cost constraint, we assume that the CA utilizes its resources to detect and investigate cases and reach decisions and to defend its decisions in the Courts of Appeal. In practice the authority will use resources for a number of other activities (such as advocacy and preventing recidivism), but here we will assume for simplicity that the CA will always be able to implement the optimal number of decisions and utilize the optimal amount of economic evidence per case, as determined below, and just allocate the rest of its resources to these other activities.[49]

The CA's cost constraint can be written as:

$$\sum_{k=1}^{K} C_k + C_{other} \leq \overline{C} \tag{11}$$

where

C_{other} = cost of all "other" activities

$\overline{C}$ = total resources available to the CA

C_k = total cost of reaching infringement decisions on conduct k given the LS adopted. This is given by:

$$C_k = c_k^D(e_k(LS_k))D_k + \varphi_k^A(e_k(LS_k), \underline{x}))c_k^A(e_k(LS_k))D_k \tag{12}$$

[47] To give a few examples: in France between 2000 and 2015, 63% of infringement decisions were appealed as against only 16.3% of acquittal decisions that were appealed. In Greece between 1996 and 2015, over 78% of infringement decisions were appealed while less than 14% of acquittals were appealed. In Russia during 2008–2012 a negligible fraction of acquittals were appealed as against a large fraction (of about 40%) of infringement decisions that were appealed (see, Avdasheva et al. 2015). In the EC the appeal rate against infringement antitrust decisions reached 74% between 1992 and 2016—see Katsoulacos et al. (2018).

[48] Empirical work using the theoretical framework presented in this paper has been under way with a number of co-researchers in a number of countries for over three years. The work is based on data sets of antitrust infringement decisions in the EC (1992–2016)—see Katsoulacos et al. (2018), Greece (1996–2015), France (2000–2016), Turkey (1996–2016) and South Africa (2000–2016). See also section with concluding remarks.

[49] This is essentially the same assumption as that made by Harrington (2011, p. 2), who considers the number of cartels successfully prosecuted by a CA, neglecting the issue of the allocation of resources to this relative to other activities that the CA undertakes. See his footnote 2 for a justification of not endogenising the amount of resources allocated to different activities.

where

$c_k^D(e_k(LS_k))$ = cost per *investigation* (decision reached) on conduct k given the LS adopted.

$c_k^A(e_k(LS_k))$ = cost per appeal against decisions reached on conduct k given the LS adopted.

$\underline{x}$ = all other factors that influence the probability of appealing an infringement decision.

We will take it that:

$$\frac{\partial c_k^A}{\partial LS_k}, \frac{\partial c_k^D}{\partial LS_k} > 0, \quad k = 1, \ldots K \tag{13}$$

that is, the cost per investigation and the cost per appeal increase when a higher LS (i.e. one closer to Effect-Based) is adopted (since this will require additional resources for extended economic analysis and evidence to be applied).

From (12), the marginal cost (MC) of *decisions* of type k are equal to the average cost of *decisions* (AC) of type k, or[50]:

$$AC_k^D = \frac{C_k}{D_k} = MC_k^D = c_k^D(e_k(LS_k)) + \varphi_k^A(e_k(LS_k), \underline{x}))c_k^A(e_k(LS_k)) \tag{14}$$

Since an increase in LS_k implies an increase in the average amount of economic analysis and evidence utilized we assume that[51]

$$\frac{dMC_k^D(LS_k)}{dLS_k} = \frac{dAC_k^D(LS_k)}{dLS_k} > 0 \tag{15}$$

3 Optimal legal standards (and economic evidence) and optimal choice of decisions

3.1 Optimal legal standards (and economic evidence)

3.1.1 The $\Phi_{k,i}$ functions

We take the functions $\Phi_{k,i}(e_k^{CA}), i = SPS, MPS, TEB, FEB$, which show the probability of annulment of an infringement decision on conduct k, *given the LS adopted by the Courts*, to be declining step functions of e_k^{CA} for any given LS_k, that have the properties indicated in expressions (17) below.

$$\Phi_{k,i}\left(0 \le e_k^{CA} < \underline{e}_k = \widehat{e}_{k,SPS}^C\right) = \bar{\Phi} = 1, i = SPS, MPS, TEB, FEB \tag{17a}$$

[50] Note here that if φ^A is reduced the AC curve will shift down.

[51] This assumes that the probability of appealing does not fall with LS_k or, if it does, the fall is not significant enough to outweigh the effect on c_k^D.

$$\begin{aligned}\boldsymbol{\Phi}_{k,SPS}\left(\hat{e}^{C}_{k,SPS}\right) &= \hat{\boldsymbol{\Phi}}_{k,SPS} < \boldsymbol{\Phi}_{k,MPS}\left(\hat{e}^{C}_{k,MPS}\right)\\ &= \hat{\boldsymbol{\Phi}}_{MPS} < \boldsymbol{\Phi}_{k,TEB}\left(\hat{e}^{C}_{k,TEB}\right)\\ &= \hat{\boldsymbol{\Phi}}_{TEB} < \boldsymbol{\Phi}_{k,\mathrm{FEB}}\left(\hat{e}^{C}_{k,FEB}\right) = \hat{\boldsymbol{\Phi}}_{FEB} < \bar{\boldsymbol{\Phi}}\end{aligned} \tag{17b}$$

$$\boldsymbol{\Phi}_{k,i}\left(e^{CA}_{k} \geq \hat{e}^{C}_{k,i}\right) = \boldsymbol{\Phi}_{k,i}\left(\hat{e}^{C}_{k,i}\right), i = SPS, MPS, TEB, FEB \tag{17c}$$

$$\begin{aligned}\hat{\boldsymbol{\Phi}}_{k,SPS} &< \boldsymbol{\Phi}_{k,MPS}\left(\hat{e}^{C}_{k,SPS} \leq e^{CA}_{k} < \hat{e}^{C}_{k,MPS}\right)\\ &= \boldsymbol{\Phi}_{1} < \boldsymbol{\Phi}_{k,TEB}\left(\hat{e}^{C}_{k,SPS} \leq e^{CA}_{k} < \hat{e}^{C}_{k,MPS}\right)\\ &= \boldsymbol{\Phi}_{2} < \boldsymbol{\Phi}_{k,FEB}\left(\hat{e}^{C}_{k,SPS} \leq e^{CA}_{k} < \hat{e}^{C}_{k,MPS}\right) = \boldsymbol{\Phi}_{3}\end{aligned} \tag{17d}$$

$$\hat{\boldsymbol{\Phi}}_{k,MPS} < \boldsymbol{\Phi}_{k,TEB}\left(\hat{e}^{C}_{k,MPS} \leq e^{CA}_{k} < \hat{e}^{C}_{k,TEB}\right) = \boldsymbol{\Phi}_{4} < \boldsymbol{\Phi}_{k,FEB}\left(\hat{e}^{C}_{k,MPS} \leq e^{CA}_{k} < \hat{e}^{C}_{k,TEB}\right) = \boldsymbol{\Phi}_{5} \tag{17e}$$

$$\hat{\boldsymbol{\Phi}}_{k,TEB} < \boldsymbol{\Phi}_{k,FEB}\left(\hat{e}^{C}_{k,TEB} \leq e^{CA}_{k} < \hat{e}^{C}_{k,FEB}\right) = \boldsymbol{\Phi}_{6} \tag{17f}$$

Below we discuss the properties indicated by (17):

(i) (17a) says that there is maximum probability of annulment $\overline{\boldsymbol{\Phi}}$ which is the probability with which infringement decisions will be annulled if economic analysis used is lower than the minimum level $\underline{e}_{k} = \hat{e}^{C}_{k,SPS}$.

(ii) (17b) says that, at the optimal level of economic analysis associated with any given legal standard, the associated probability of annulment increases with the legal standard (it is lowest under SPS and highest under FEB which is however associated with a probability of annulment less than $\overline{\boldsymbol{\Phi}}$). That is, in Fig. 2, point D is above and to the right[52] of point B, point K above and to the right of point D and point N above and to the right of point K. Note that we have assumed, without any loss of generality that $\hat{\boldsymbol{\Phi}}_{k,SPS} > 0$, that is a positive probability of annulment when $\hat{e}_{k,SPS}$ is applied, which could be justified if there is some disputability about what is the exact nature of the conduct—the only thing that needs to be determined under SPS. We could assume that $\hat{\boldsymbol{\Phi}}_{k,SPS}$ is zero (so B lies on the horizontal axis) without affecting any of the results below.

(iii) (17c) says that increasing the amount of economic analysis beyond its optimal level $\hat{e}^{C}_{k,i}$, for any *given* legal standard will not affect the probability of annulments under that legal standard. So, for example, the curve for the probability

[52] Given also the inequalities in (3).

of annulment under SPS in Fig. 2 shows a constant probability to the right of B.[53]

(iv) (17d, 17e and 17f) say that the probability of annulment is higher the higher the legal standard for e_k^{CA}, $\hat{e}_{k,SPS}^{C} \leq e_k^{CA} \leq \hat{e}_{k,FEB}^{C}$.

Figure 2 illustrates expressions (17).

The following Lemma follows immediately:

Lemma 1

$$e_{k,i}^{CA} \leq e_{k,i}^{C}, i = SPS, MPS, TEB, FEB$$

that is, CAs will never use economic analysis and evidence beyond $e_{k,i}^{C}$ *(the amount considered appropriate by Courts) for any given* $LS_{k,i}$*. This follows directly from* (17c) *and* (15)*—the latter indicating that* AC_k *is increasing in* e_k^{CA}.[54]

The most important features of the $\boldsymbol{\Phi}_{k,i}$ functions depicted in Fig. 2 are the following. *For any given* $LS_{k,i}$, $i = SPS, MPS, TEB, FEB$, the functions are constant or decreasing with e_k^{CA} up to $\hat{e}_{k,i}^{C}$, the maximum level of e_k^{CA} that a CA will find it optimal to use for that LS_k (by Lemma 1). This is easy to understand. First, given the LS_k, if the CA reduces e_k^{CA} below the (Courts') optimal level we expect that Courts will reverse the CA's decisions with an increased probability (which will be higher the more e_k^{CA} is reduced). Second, we note from Lemma 1, that given the legal standard adopted by Courts, any amount of economic analysis and evidence utilized by the CA beyond what the Courts would consider as the appropriate level of economic analysis and evidence $\hat{e}_{k,i}^{C}$, can and will be neglected by Courts and will not affect the probability of decision annulment.

Also, as we move to a higher LS_k, the functions shift up for all $e_k \geq \underline{e}_k = \hat{e}_{k,SPS}^{C}$ *so the probability of annulment increases for all* $e_k \geq \underline{e}_k = \hat{e}_{k,SPS}^{C}$ *as the* LS_k *increases*. The plausibility of this feature (encapsulated in 17b, d, e, f) is based on the following arguments. While the CA knows the methodologies, tests and potential models that have to be used under, for example, a truncated EB, it may not undertake them in the best/most appropriate/most satisfactory/adequate way as judged by the Court—something that would not arise if the economics used were minimal and simpler as under Modified Per Se and, something that would occur with an even greater probability, if the courts used the more complex economic analysis associated with full

[53] In a more general framework, in which acquittal decisions would also enter the utility function, the implicit simplifying assumption that would be needed here for this to hold would be that appealed acquittals are zero—which is not a huge violation of reality as we saw in Sect. 2.3 above. If appealed acquitals were taken into account Φ would not remain constant, it would increase, as the amount of economic analysis increased beyond its optimal level $\hat{e}_{k,i}^{C}$, for any *given* legal standard. Note, however, that this would strengthen the predictions of Propositions 1–3.

[54] Lemma 1 says that a CA will not increase e_k^{CA} beyond $\hat{e}_{k,i}^{C}$ since this will leave Φ unchanged but will increase AC_k^D. Saying that the CA knows the values of e associated with a specific legal standard that the CA expects to be used by the Courts, we mean that the CA will know the type of tests, evidence and economic analysis (e.g. models for showing foreclosure or consumer harm or economic arguments that can be used to show the presence of efficiencies), that the Court is likely to associate with assessment under this legal standard.

EB.[55] Essentially, increasing economic analysis and moving towards EB increases the disputability by Courts of the assessments made by the CA.[56]

To clarify further this point, note that when the legal standard is relatively low (or of Per Se type) and the application of economics in specific investigations limited, both CA and Courts reach decisions on the basis of general presumptions about the conduct for fairly general populations of this conduct type. Shifting the legal standard towards more effects-based in investigations of conduct of some type k, will require increasing the amount and, usually, the complexity and sophistication of economic analysis and evidence used by the CA. This can increase the probability of annulment by Courts, because it may well imply that it is not possible then to devise a succinctly defined *pre-specified set of easily identifiable and, more or less, unanimously accepted criteria or conditions and tests* on the basis of which the assessment leads to conclusions that are very difficult to dispute. Thus, there is an increase in the disputability of the assessment conclusions—as the Courts can, when evaluating the CA's decision, consider additional or different criteria, tests, models and interpretations to those used by the CA, or, at least, it is more likely for the Courts to enquire whether the CA's analysis "is capable of substantiating the conclusions drawn from it"[57].[58]

This basic premise of our model, that when the LS adopted is closer to Per Se the probability of reversal is lower, is confirmed by empirical evidence. Thus, the reversal rate in abuse of dominance cases in EC (where typically Per Se type standards have been used—see discussion and references in Sects. 1.1 and 1.2) is much lower than for example in mergers or other conducts for which EB standards are used (for the EC see Neven 2006; Geradin and Petit 2010; Katsoulacos et al. 2018). The

[55] Requiring the application of specific theoretical modeling and/or econometric testing for which there is often far from unanimous acceptance in relation to their reliability or robustness.

[56] This is expected to apply with added force when there is no tradition in the application of economic analysis and evidence in legal proceedings and, specifically, in CL enforcement, especially when the latter surpasses a certain amount of sophistication and complexity. Also when judges lack any formal training in economics and the necessary relevant experience in assessing economic arguments.

[57] Hellstrom (2009), ab.cit. p. 7. As noted by Hellstrom (2009), the CFI in *JFE Engineering* stated that "the EC must produce sufficiently precise and consistent evidence to support the firm conviction that the alleged infringement took place". Also, as CFI stated in the more recent *Microsoft* judgment: "The Community Courts must not only establish whether the evidence put forward is factually accurate, reliable and consistent but must also determine whether that evidence contains all the relevant data that must be taken into consideration in appraising a complex situation *and whether it is capable of substantiating the conclusions drawn from it*" (ab.cit. pp. 6–7, our italics).

[58] It should be stressed that this is in no sense contradicted by the fact that historically Courts have sometimes asked for a higher legal standard in assessing specific conducts taking into account the most recent developments in economic theory and evidence. A famous recent example is that concerning RPM in the *Leegin* case in which the US Supreme Court decided that a Per Se assessment cannot be accepted and a more effects-based approach should be applied. Requiring a move towards an effects-based standard as a prerequisite for establishing that the required standard of proof is reached, does not mean that the increased economic evidence associated with the higher legal standard will not be challenged with a higher probability than the evidence associated with a lower standard.

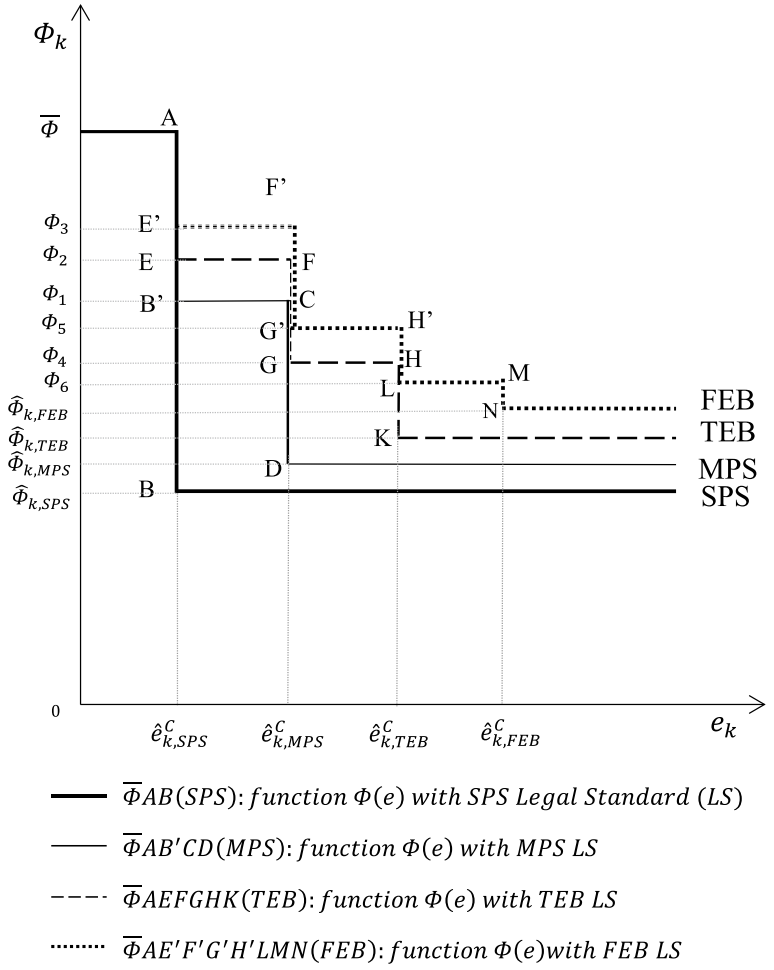

Fig. 2 The annulment probability function

most recent evidence (Katsoulacos et al. 2018) shows that *the rate of annulment of Art.102 cases is indeed very small*—equal to 8.3%[59]since 2002 and 0% since 2007.

3.1.2 The effect of the substantive standard on the extent of economic analysis

Above we have been assuming that the criterion for deciding whether there is violation of CL, the substantive (or, liablity) standard is that of welfare. But, as already

[59] 1 out of 12 appeals (exclusionary and exploitative conduct), which is much lower than, for example mergers, where EB is used (see Neven 2006; Geradin and Petit 2010). Merger cases such as those of Airtours/First Choice, Schneider/Legrand and Tetra Laval/Sidel in which the EC decision was annulled, confirm the point. We are grateful to an anonymous referee for bringing these cases to our attention.

noted above in the introductory section, the substantive standard will, in practice, often be non-welfarist and, in particular, in (continental) Europe the SS has been 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 efficiency (Rey and Venit 2015). We can, alternatively, term this a Consumer Choice (CC) substantive standard (SS) (Coniglio 2017).

The first thing to note about using a CC liability standard is that its adoption implies that using an "effects"-based legal standard will require the application of less economic analysis, since just an "exclusionary effect" has to be established now rather than an "welfare-reducing effect". To clarify this consider for example abuse of dominance conducts. For these conducts, under a CC SS, liability is established just by showing that the conduct is exclusionary.[60] This can in principle be established through a presumption i.e. by a Per Se LS, or with a MPS LS or with a (truncated) "effects-based" (TEB) LS—a full effect-based LS that would require examination of efficiencies and a balancing test is irrelevant now. But, in the last (TEB) case, what is required is showing, in each specific case investigated, whether the conduct in that case is expected to be exclusionary, *without* need to establish a negative welfare impact. While, with an welfarist SS, we need to show that the specific conduct is exclusionary *and* that it has a negative welfare impact. This is one reason why with (non-welfarist) CC SS the amount of economic analysis and evidence will be smaller. More generally and formally, it can be established that:

Lemma 2 *Under a non-welfarist SS, the optimal* LS_k^C *and associated optimal level of* $\widehat{e}_k^C$ *adopted by Courts will tend to be lower than under an welfarist SS.*

Proof Propositions 1 and 2 of Katsoulacos (2019). □

3.1.3 The reputation effect (RE) of additional economic evidence

To determine the optimal economic analysis and evidence utilized by the CA in assessing some conduct type, we use a simplified version of the utility function (7), for conduct k when some LS_k is adopted. To start with, we assume that Eq. (6) is given by

$$R_k(S_k(D_k, LS_k)) = f(D_k)S_k(D_k, e_k(LS_k)) = f(D_k)D_k(1 - \Phi_k(e_k(LS_k))), k = 1, \ldots K \tag{18}$$

and that, for $\alpha > 0$:

$$f(D_k) = \left(\frac{1}{\alpha}\right)D_k^{\alpha-1}, \alpha \leq 1, \tag{19}$$

Then assuming, in this section, without loss of generality, that $\alpha = 1$ we can use the following version of utility function (7):

[60] In this sense Wils (2014) was right to claim that the Commission and Court used an *effects-based approach*: except, that the "effect" that they tried to establish was the effect on competitors (or, consumer choice) rather than the effect on welfare.

$$U_k = D_k[\left(1 - \Phi_\kappa\left(e_k\left(LS_k\right)\right)\right]^\gamma [Q_k(LS_k)]^{1-\gamma}, k = 1, \ldots, K \tag{20}$$

where $0 \leq \gamma \leq 1$. The CA is pure reputation maximising when $\gamma = 1$ and pure welfare maximizing when $\gamma = 0$. Note that, according to (20), a *pure-reputation maximizing* CA (henceforth indicated by CA-R), which does not take into account, when selecting LS and e, the impact of its choices on the quality of enforcement, will choose e by maximizing reputational enforcement success $S_k(D_k, LS_k) = D_k(1 - \Phi_k)$, minus, of course, the cost of enforcement. More generally, the CA will adopt the LS and the amount of economic analysis and evidence that maximize the difference between U_k, given by (20), and C_k. That is, the optimal choice of LS_k and hence, of e_k^{CA} will be given by[61]:

$$max_{LS}\{U_k - C_k\} \text{ or}$$

$$max_{LS}U_k = D_k\{[\left(1 - \Phi_\kappa\left(e_k\left(LS_k\right)\right)\right)]^\gamma [Q_k\left(LS_k\right)]^{1-\gamma}] - AC(e_k\left(LS_k\right)\}, \quad k = 1, \ldots, K \tag{21}$$

and, for a CA that neglects the influence of its choices on the quality of enforcement, this is with ($\gamma = 1$):

$$\max_{LS_k}\{D_k[(1 - \Phi_k(e_k^{CA}(LS_k)) - AC(e_k^C(LS_k)]\} \tag{21'}$$

We can use the term *Average Reputation Effect* (ARE) to indicate:

$$ARE_k(e_k^{CA}(LS_k)) = (1 - \Phi_k(e_k^{CA}(LS_k)) \tag{22}$$

so that (21) becomes:

$$max_{LS}U_k = D_k\{\left[\text{A}RE_k(e_k\left(LS_k\right)\right]^\gamma [Q_k\left(LS_k\right)]^{1-\gamma}] - AC(e_k\left(LS_k\right)\}, \quad k = 1, \ldots, K \tag{23}$$

and (21′) becomes:

$$\max_{LS_k}\{D_k[ARE_k(e_k^{CA}(LS_k)) - AC(e_k^C(LS_k)]\} \tag{23'}$$

where ARE_k is given by (22). So we have:

[61] Using also (14)—neglecting superscript "D" in the AC function. We need also to comment here on the assumption, mentioned above, that D_k is taken not to depend directly on the legal standard. In reality it is likely that adopting higher legal standards, utilising more economic analysis, will reduce the number of infringement decisions. E.g. moving from a MPS legal standard, under which conducts by firms with significant market power are found to infringe the law, to a TEB legal standard under which only conduct with exclusionary effects will be found to infringe the law, could reduce considerably infringement decisions. If this is taken into account in (20), it creates an *additional* force for avoiding higher legal standards—over and above that associated with the increase in the probability of annulment for each decision reached—since now, higher legal standards will reduce reputation (utility) through the effect on D_k. However, this additional force will certainly strengthen all the main results proved below, showing that CAs have powerful incentives to avoid high legal standards when they are concerned with their reputation, so it can be omitted in order to simplify the algebra and presentation of the results.

Lemma 3 *The functions* $ARE_{k,i}, i = SPS, MPS, TEB, FEB$ *have the following properties:*

$$ARE_{k,i}(0 \le e_k^{CA} < \underline{e}_k = \hat{e}_{k,SPS}^{C}) = 1 - \overline{\Phi} = 1,\ i = SPS, MPS, TEB, FEB \quad (24a)$$

$$\widehat{ARE}_{k,SPS}(\hat{e}_{k,SPS}^{C}) = 1 - \hat{\Phi}_{SPS} > \widehat{ARE}_{k,MPS}(\hat{e}_{k,\mathrm{MPS}}^{C}) = 1 - \hat{\Phi}_{MPS} > \widehat{ARE}_{k,TEB}(\hat{e}_{k,\mathrm{TEB}}^{C})$$
$$= 1 - \hat{\Phi}_{TEB} > \widehat{ARE}_{k,FEB}(\hat{e}_{k,\Phi\mathrm{EB}}^{C}) = 1 - \hat{\Phi}_{FEB} > 1 - \overline{\Phi} \quad (24b)$$

$$ARE_{k,i}(e_k^{CA} \ge \hat{e}_{k,i}^{C}) = ARE_{k,i}(\hat{e}_{k,i}^{C}),\ i = SPS, MPS, TEB, FEB \quad (24c)$$

$$\widehat{ARE}_{k,SPS} > ARE_{k,MPS}(\hat{e}_{k,SPS}^{C} \le e_k^{CA} < \hat{e}_{k,MPS}^{C}) = ARE_1 > ARE_{k,TEB}(\hat{e}_{k,SPS}^{C} \le e_k^{CA} < \hat{e}_{k,MPS}^{C}) =$$
$$ARE_2 > ARE_{k,FEB}(\hat{e}_{k,SPS}^{C} \le e_k^{CA} < \hat{e}_{k,MPS}^{C}) = ARE_3 \quad (24d)$$

$$\widehat{ARE}_{k,MPS} > ARE_{k,TEB}(\hat{e}_{k,MPS}^{C} \le e_k^{CA} < \hat{e}_{k,TEB}^{C}) = ARE_4 > ARE_{k,FEB}(\hat{e}_{k,MPS}^{C} \le e_k^{CA} < \hat{e}_{k,TEB}^{C}) = ARE_5 (24e)$$

$$\widehat{ARE}_{k,TEB} > ARE_{k,FEB}(\hat{e}_{k,TEB}^{C} \le e_k^{CA} \le \hat{e}_{k,FEB}^{C}) = ARE_6\ (24f)$$

Proof The properties of the ARE functions follow immediately from (22) [i.e. the fact that ARE = 1 − Φ] and (17), that gives the properties of Φ. The ARE functions are shown in Fig. 3 with the AC function. □

The optimal LS_k for a CA-R (γ = 1), and optimal $\hat{e}_k^{CA-R}$, is given, from (23′) by:

$$\hat{e}_{k,\widehat{LS}_k^{CA}}^{CA-R}(\widehat{LS}_k^{CA}) = \max_{LS_k^{CA}}[ARE_k(e_k^{CA}(LS_k^{CA})) - AC_k^{D}(e_k^{CA}(LS_k^{CA}))]$$

Given the properties of the ARE functions given by Lemma 3 and Fig. 3 we can now get the following results.

Proposition 1 *ACA will never choose a higher legal standard than the legal standard that it anticipates to be used by Courts.*

Proof This follows immediately from the fact that applying a legal standard higher than that anticipated to be adopted by Courts will increase AC_k^D and will leave unchanged ARE_k. □

Proposition 2 *Optimal legal standard and economic analysis utilized by CA under uncertainty (young jurisdictions).*

(i) *Reputation maximizing CA: Consider first a reputation-maximizing CA, in a new jurisdiction in which it is not possible for the CA to know with certainty what legal standard will be considered by the Courts as the right standard for any given conduct.*[62]

[62] Like the jurisdictions of the BRICS (with the exception of South Africa) or the jurisdictions of many developing countries and, a few years ago, those in Centra-Eastern Europe that developed recently competition policy regimes.

Assume that the CA anticipates that the Court will use one between two neighboring standards (i and i+) with equal probability. Then the CA will maximize its anticipated net utility by choosing the lower standard (i.e., i) for as long as AC_k^D is sufficiently convex relative to the increase in the probability of annulment when the CA uses the (wrong) lower standard.

Proof Assume that the CA expects that Courts will adopt legal standard i or legal standard i + with probability (1/2). Then its expected net utility by choosing legal standard i will be:

$$(1/2)[ARE_{k,i}(\hat{e}_{k,i}^C) - AC_k^D(\hat{e}_{k,i}^C)] + (1/2)[ARE_{k,i+}(\hat{e}_{k,i}^C) - AC_k^D(\hat{e}_{k,i}^C)]$$
$$= (1/2)[1 - \Phi_{k,i}(\hat{e}_{k,i}^C) - AC_k^D(\hat{e}_{k,i}^C)] + (1/2)[1 - \Phi_{k,i+}(\hat{e}_{k,i}^C) - AC_k^D(\hat{e}_{k,i}^C)]$$

□

Comparing this with the expected net utility if the CA adopts legal standard i + and given that from (17c) we know that, for $\hat{e}_{k,i+}^C > \hat{e}_{k,i}^C$:

$$\Phi_{k,i}(\hat{e}_{k,i}^C) = \Phi_{k,i}(\hat{e}_{k,i+}^C)$$

we get that the CA will prefer to use legal standard i (rather than i +) iff:

$$2[AC_k^D(\hat{e}_{k,i+}) - AC_k^D(\hat{e}_{k,i})] > ARE_{k,i+}(\hat{e}_{k,i+}) - ARE_{k,i+}(\hat{e}_{k,i}) \tag{25}$$

or:

$$2[AC_k^D(\hat{e}_{k,i+}) - AC_k^D(\hat{e}_{k,i})] > \Phi_{k,i+}(\hat{e}_{k,i}) - \Phi_{k,i+}(\hat{e}_{k,i+}) \tag{25'}$$

that is, for as long as the increase in AC_k^D as a result of using standard i + rather than standard i is sufficiently large relative to the increase in the probability of annulment when the CA applies the economic analysis that would be optimal under the lower standard i, when the standard used by Courts is i+.

If, for example, i = SPS and i + = MPS, then (25′) above is:

$$2[AC_k^D(\hat{e}_{k,MPS}) - AC_k^D(\hat{e}_{k,SPS})] > \Phi_{k,MPS}(\hat{e}_{k,SPS}) - \Phi_{k,MPS}(\hat{e}_{k,MPS}) \tag{26}$$

or using Fig. 2:

$$2[AC_k^D(\hat{e}_{k,MPS}) - AC_k^D(\hat{e}_{k,SPS})] > distance\ (B' - D)$$

If, on the other hand, (26) does not hold, then the CA will prefer to adopt i+ (even though the Court may be using standard i). We note that:

- The likelihood of Proposition 2 holding, that is, the likelihood of the CA adopting a lower LS than the Courts is higher the higher the LS adopted by Courts.

E.g. in Fig. 3, by inspection, if Courts adopt FEB, the CA will certainly adopt TEB. If Courts adopt TEB then the CA will adopt MPS if condition above holds and this condition is less likely to hold when Courts adopt MPS. This is a consequence of the fact that the higher the LS adopted by Courts the larger the LHS of (26) due to the convexity of the AC function and the smaller the RHS of (26).

- The likelihood of Proposition 2 holding will also be higher the greater the increase in Φ as the LSs increase—as this implies that in Fig. 3, the MPS, TEB and FEB lines shift down (and the distance between the lines increases). The increase in Φ will be greater as LSs increase when, for example, Courts are non-specialised or non-experienced in enforcing competition law.

(ii) *Non-reputation maximizing CA* When the CA does not know exactly what legal standard Courts will adopt for any give conduct type, it is much less likely that it will choose the lower of the standards that could be adopted by the Courts, if it is not concerned purely with its reputation, i.e. if it takes into account the impact of its choices on the quality of enforcement.

Proof See the "Appendix". □

Proposition 3 *Optimal legal standard and economic analysis utilized by CA under certainty (mature jurisdictions).*

(i) *Reputation maximizing CA: In a mature jurisdiction in which the CA knows with certainty the legal standard that will be adopted by Courts (say i), if the CA is reputation maximizing then, again, it will adopt the same OR a lower LS. However, the likelihood that it adopts a lower standard is smaller than when the CA makes its choice under uncertainty. Thus lower (closer to Per Se) standards are anticipated to be adopted more often in young, rather than in mature, jurisdictions.*

Proof The CA will maximize its anticipated net utility by choosing to apply the economic analysis associated with the *lower* legal standard (i), when Courts adopt legal standard i +, for as long as:

$$ARE_{k,i+}(\hat{e}^C_{k,i}) - AC^D_k(\hat{e}^C_{k,i})] > ARE_{k,i+}(\hat{e}^C_{k,i+}) - AC^D_k(\hat{e}^C_{k,i+})] \tag{27}$$

or

$$AC^D_k(\hat{e}_{k,i+}) - AC^D_k(\hat{e}_{k,i}) > \Phi_{k,i+}(\hat{e}_{k,i}) - \Phi_{k,i+}(\hat{e}_{k,i+}). \tag{28}$$

□

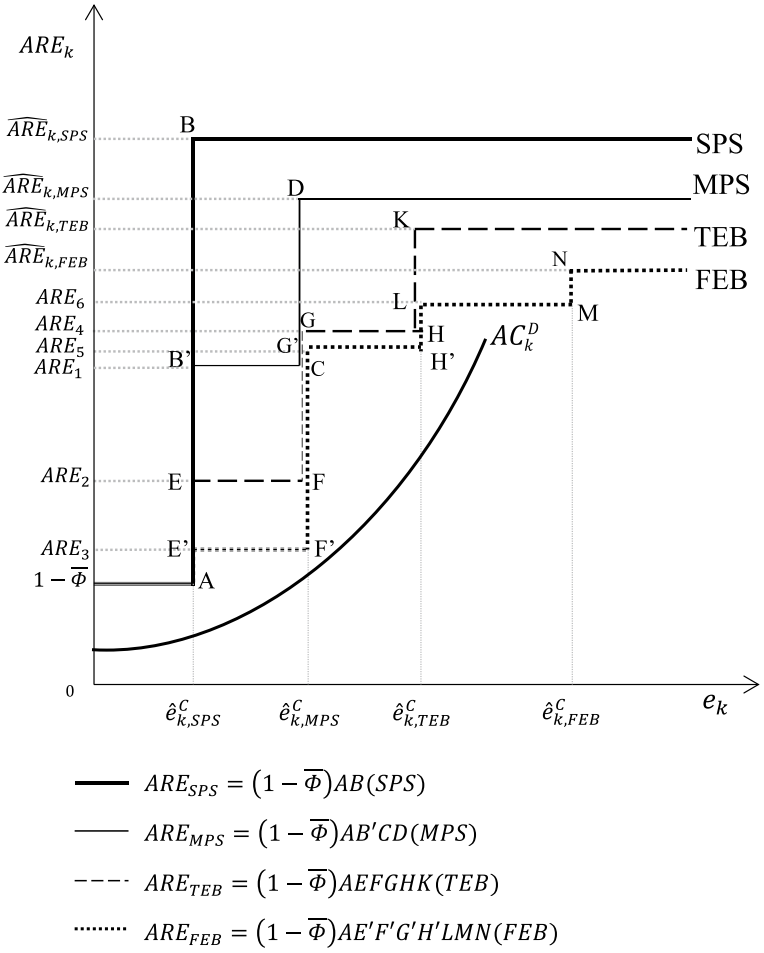

Fig. 3 The Average Reputation Effect function

If for example the CA knows that the Courts consider TEB as appropriate for conduct k then it will choose MPS if:

$$AC_k^D(\hat{e}_{k,TEB}) - AC_k^D(\hat{e}_{k,MPS}) > \boldsymbol{\Phi}_{k,TEB}(\hat{e}_{k,MPS}) - \boldsymbol{\Phi}_{k,TEB}(\hat{e}_{k,TEB})$$

Thus a CA in a mature jurisdiction is less likely to choose a lower standard than that used by Courts, than would be the case in a young jurisdiction.[63] Nevertheless, it is still possible that it will do so, for as long as AC_k^D is sufficiently convex. For example, in Fig. 3, we note that (27) will hold in a comparison of legal standards MPS = i and TEB = i +. We see that in Fig. 3:

[63] Compare (28) to (25') assuming that the legal standards compared are the same in the two cases.

$$ARE_{k,i+}(\hat{e}^C_{k,i}) - AC^D_k(\hat{e}^C_{k,i}) = ARE_{k,TEB}(\hat{e}^C_{k,MPS}) - AC^D_k(\hat{e}^C_{k,MPS})$$

is the distance $G - AC^D_k(\hat{e}^C_{k,MPS})$ and this is greater than $ARE_{k,TEB}(\hat{e}^C_{k,TEB}) - AC^D_k(\hat{e}^C_{k,TEB})$ which is the distance $K - AC^D_k(\hat{e}^C_{k,TEB})$.

Another reason why in young jurisdictions it is more likely for the CA to choose lower standards, i.e. another reason that (25′) is more likely to hold than (28), is that the AC function is likely to be more convex in such jurisdictions—as there is greater scarcity in the specialized knowledge in economics required to apply higher legal standards.

In the "Appendix" we also prove Propositions 2(i) and 3(i) assuming that e_k increases continuously (not in a step-wise fashion) with a corresponding continuous increase in LS_k.

(ii) *Non- reputation maximizing CA* Again, as under Proposition 2 (part (ii)), in the current case too, when the CA makes its choice of legal standard anticipating with certainty what will be adopted by Courts, the above result (i) is less likely to hold if the CA is not pure reputation maximizing, that is, when it takes into account the impact of its choice on the quality of enforcement.

Corollaries of Propositions 1–3:

Corollary 1 *Conducts the assessment of which is more data intensive or for which specialized economic or econometric knowledge has to be used with higher legal standards will have more convex* AC^D_k*, and thus will be more likely to satisfy* (25) *or* (27)*. Thus, for these conducts lower legal standards are more likely to be used than the optimal.*

Corollary 2 *Conducts for which CAs will be less well informed about the standards adopted by Courts—because they may be occurring less often—and for which therefore the CAs will be making choices under uncertainty will be conducts for which it is more likely to be assessed by CAs using lower standards than optimal (for these conducts condition* (25) *rather than* (27) *will apply).*

Corollary 3 *As CAs become (a) more productive over time (which will reduce the convexity of the AC function), or (b) become better informed about the standards adopted by Courts, this may well tend to increase the legal standard adopted. In case (a),* (25) *may cease to hold so the CA will shift to a higher standard, while in case (b), condition* (27)*, rather than* (25) *will become the relevant condition again allowing the CA to shift to a higher standard.*

Corollary 4 *An increase in the legal standard adopted by Courts over time, may not always increase the standard and hence amount of economic analysis and evidence used by a CA-R. For example, if Courts shift from a TEB LS under which, say,* $\hat{e}^{CA-R}_k = \hat{e}^C_{k,TEB}$*, to a FEB LS, this does not imply that the CA will increase e to* $\hat{e}^{CA-R}_k = \hat{e}^C_{k,FEB}$*, though this is more likely to be the case for a CA that takes into account the impact of its choices on the quality of enforcement.*

Proposition 4 *The empirically observed probability of annulment of the CA's decisions may be non-monotonic to increasing* e_k^{CA}.

Proof Recent empirical evidence suggests a U-shaped relation between the probability of annulment of the CA's decisions and the legal standard adopted by the CA (or, a U-shaped relation between e_k^{CA} and Φ). This can be explained by the model above as follows. Assume that Courts adopt for different conducts, e.g. for abuse of dominance practices and vertical constraints, a MPS legal standard, and a TEB legal standard. Now, according to the preceding analysis, when a CA is uncertain about the legal standard chosen by Courts (Proposition 2), or, with certainty, under sufficiently convex AC_k^D (Proposition 3), it may choose, a lower legal standard for some conducts than the legal standard adopted by Courts. Thus the CA may optimally choose for some cases SPS when Courts adopt MPS. According to the model, for the cases that it does so, it will face a higher probability of annulment than if it had chosen the Courts' MPS legal standard. In Fig. 2, if the Court's standard is MPS and the CA chooses SPS the probability of annulment will be at B', while if the CA's standard was MPS, as the Court's, the probability of annulment would be D. But, for other conducts, the CA may find it optimal to choose MPS, when the Court adopts MPS and also to choose TEB when the Court adopts TEB. Under these circumstances, what we will observe empirically is that as the legal standard chosen by the CA increases from SPS to MPS the probability of annulment will decrease from B' to D, while when the legal standard of the CA increases from MPS to TEB the probability of annulment will increase from D to K—this been entirely consistent with the CA making utility maximizing choices. □

Proposition 5 *Comparing jurisdictions in which Courts have non-welfarist, with jurisdictions in which Courts have welfarist, Substantive Standards, the CAs in the former will tend to adopt lower (closer to Per Se) legal standards and less economic analysis.*

Proof Lemma 2 shows that when Courts' SS is non-welfarist the legal standard that they will adopt will tend to be lower than when the SS is welfarist. According to Propositions 1–3 above if Courts use lower legal standards, the CAs will follow, lowering their standards in the same way, *or even more so* (as shown in Propositions 2 and 3). This result is very important for explaining the difference in the legal standards applied between US (where welfarist Courts adopt EB type legal standards) and EU (where non-welfarist Courts[64] adopt Per Se type legal standards) for a large range of conducts concerning vertical restraints and abuse of dominance. □

In relation to the situation in EU, Geradin and Petit 2010) criticize the Courts for not using (higher) legal standards in abuse of dominance cases, as the latest developments in economic theory and evidence suggest they should, annulling the

[64] See above Sect. 1.2 (especially parts on *Intel*) and Sect. 2.1, for discussion and references in relation to this.

decisions of the EC. However, according to our model one can interpret the legal standard choices of the European Courts as been absolutely the right ones *given the SS adopted, which is non-welfarist.* The choices of the EC, to *also* use low legal standards should also be seen as a rational optimal response to what they anticipate of the Courts, in accordance with the predictions of the model developed above. This interpretation is absolutely consistent with that of Wils (2014) position concerning the decision by EC and the GC in the case of *Intel*. The implication is that what is required, for a movement towards more EB legal standards in Europe, is that European Courts adopt consistently an welfarist substantive standard.

3.2 Optimal choice of decisions reached on conduct k

To examine the optimal choice of investigations of, or decisions on, conduct k by a reputation maximizing CA, when a given legal standard, $LS_{k,i}, i = SPS, MPS, TEB, FEB$, is adopted in these investigations, we start by noting that optimality requires that:

$$\frac{\partial U_k}{\partial D_k} = \frac{\partial C_k}{\partial D_k} = MC_k^D(e_k) = AC_k^D(e_k),\ k = 1, \ldots, K \tag{29}$$

that is, at the optimum, the marginal cost of investigations/decisions reached on conduct k under LS_k must equal the marginal impact of the decision on the utility of the CA. From (20), (18) and (19) we can use (suppressing the dependence of Φ and Q on e_k^{CA}, LS_k):

$$U_k = \left[\left(\frac{1}{\alpha}\right)(D_k)^{\alpha}\right]\left[\left(1-\Phi_k\right)\right]^{\gamma} Q_k^{1-\gamma}\Big], 0 < \alpha < 1, 0\gamma 1, k = 1, \ldots, K \tag{30}$$

So, if $\gamma = 1$:

$$\frac{\partial U_k}{\partial D_k} = (D_k)^{\alpha-1}\left(1-\Phi_k\right) > 0, 0 < \alpha < 1, k = 1, \ldots K \tag{31}$$

$$\frac{\partial^2 U_k}{\partial (D_k)^2} < 0$$

Thus, additional decisions always increase the CA's utility but at a diminishing rate. Figure 4 below illustrates the optimal (unconstrained) number of decisions reached on conducts of type k ($\widehat{D}_k$).

Proposition 6 *The optimal number of investigations on conducts of type k will be greater:*

(i) *The smaller the probability (Φ) that decisions on these investigations will be reversed in Courts of Appeal and hence the larger the average reputation effect of these decisions.*

(ii) *The lower the MC = AC of reaching a decision and appealing, as determined by* $(c_k^D,\ c_k^A)$.
(iii) *The lower the probability* (φ_k^A) *that infringement decisions of conduct k lead to appeals since, ceteris paribus, this will make* Φ *smaller.*

Proof Follows from condition (29) and (31) which imply that the optimal number of investigations is determined by:

$$(D_k)^{\alpha-1}\left(1-\Phi_k\right)=AC_k^D \tag{32}$$

□

All parts of Proposition 6 follow immediately from (32) taking into account (14). An important corollary follows from Proposition 6:

Corollary of Proposition 6 (reputation maximizing CA):

Consider a reputation maximizing CA (CA-R) that in the assessment of conduct k uses the legal standard adopted by the Courts and the optimal amount of economic analysis and evidence associated with that legal standard. Then:

(i) The higher the legal standard used for conduct k, the smaller the optimal number of investigations/decisions on this conduct that will be undertaken by a CA-R. Thus, the CA's optimal number of decisions on conducts assessed by higher legal standards will be smaller than the optimal number of decisions on conducts assessed by lower legal standards. Note that this result holds even if marginal costs are unaffected by an increase in legal standards.

Proof For a CA-R, a higher legal standard unambiguously increases Φ and reduces the *ARE* (the only factor that affects the utility of a CA-R), while it increases the *AC* of decisions; so, from (32), it reduces the optimal number of decisions. Even if AC were unaffected the increase in Φ induced by higher legal standards is sufficient to reduce the optimal number of decisions.

(ii) Younger or less experienced jurisdictions, or jurisdictions in which Courts adopt non-welfarist SS and hence lower legal standards, or more generally, jurisdictions that tend to adopt lower (closer to Per Se) legal standards, will be associated, ceteris paribus, with more enforcement in terms of the decisions reached by the CA.

□

Proof Using on average lower legal standards implies that the CA will face on average a lower Φ and this, given Proposition 6, will increase its optimal number of decisions.[65] □

[65] Part (ii) of the corollary to Proposition 6 says that the optimal number of decisions by a CA unconstrained in terms of resources will be higher when it adopts lower legal standards. Alternatively, for a resource constrained CA, the result implies that the number of decisions relative to the resource base of the CA is higher in CAs adopting lower legal standards.

Comparing two jurisdictions in which the choice of legal standards differs quite markedly provides evidence consistent with part (ii) of the above Corollary to Proposition 6. In Russia between 2008 and 2015, the CA (FAS) reached a very large number of antitrust infringement decisions of which 1133 were appealed. For these decisions the legal standard adopted is on average close to Per Se (Avdasheva et al. 2019). In South Africa over a longer period of time (from 2001 to 2016) only 27 antitrust infringement decisions were reached with legal standards approaching full effects- based. Normalizing in terms of employees (about 3000 in FAS, about 200 in the South African Competition Commission, SACC) implies that FAS generates *at least* 2.8 times more decisions per employee than SACC.[66] Of course, in practice, the ceteris paribus assumption may well not hold and other factors, not taken into account in our model, may influence the intensity of enforcement in different jurisdictions.

4 Concluding remarks, recommendations and future research

The modeling framework presented in this article can be used to explain the choice of legal standards when CAs are influenced by both the quality of enforcement and by its reputational success. Concern with reputation implies that CAs will take into account the judicial review process, specifically the Courts' choice of legal standards and the implications of their choices on the probability that Courts will annul their infringement decisions.[67] As a result, we have shown that they may apply sub-optimal economic analysis and evidence in antitrust investigations[68] and to favor legal standards closer to Per Se than to full effects-based. The same tendency to use lower legal standards will be associated with jurisdictions in which substantive standards that are non-welfarist are used. Also, our analysis predicts, these tendencies will be more pronounced in younger jurisdictions in which the CAs are uncertain about Courts' choice of standards and face more convex marginal costs. This reconciles evidence indicating the unpopularity of standards with significant economic analysis content, with the fact that such standards seem likely to be superior, on the basis of traditional error-cost minimization or welfare-maximization arguments on which the existing law and economics literature has concentrated.

Institutional adjustments and other measures could facilitate the expansion in the use of modern economic and econometric analysis and techniques in competition law enforcement. Among these we would put priority on the following:

[66] In FAS the number of decisions per employee is 0.377, while in the SACC it is 0.135, assuming that for FAS all infringement decisions are appealed.

[67] It is also important to reiterate that, often, explicit performance assessment of CAs rely on indicators related to reputational success, such as those measured by the ratio of non-reversed infringement decisions to the overall number of decisions made—Avdasheva et al. (2018).

[68] Even though they are well-staffed with trained scientific personnel.

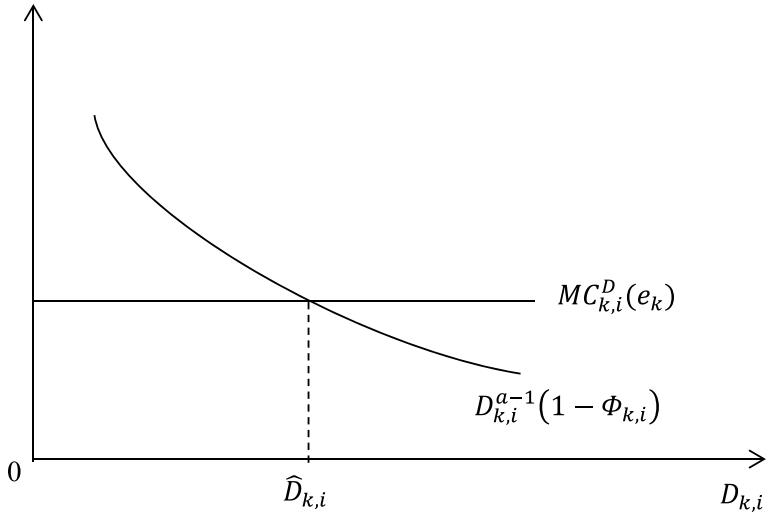

Fig. 4 Optimal number of investigations/decisions

(i) Explicitly incorporating into Competition Law provisions, *substantive standards* that are related to consumer welfare and efficiency.

(ii) Providing incentives to CAs, through appropriate *performance criteria,* related to the welfare effects of enforcement activities, to make legal standard choices taking into account the welfare (rather than just the reputational) implications of these choices.

(iii) Setting up *specialized tribunals* for dealing in the first instance with competition infringement appeals, some of the members of which should be, ideally, economists. As noted in Sect. 2.1 non-specialised appeal courts will tend to choose lower legal standards (associated with less economic analysis) and will tend to be associated with higher annulment rates as LSs increase (Proposition 2, part (i)).[69]

(iv) Even when specialized tribunals are not set-up, taking measures to improve the expertise of judges in handling/assessing economic theory arguments and evidence that would allow them to appreciate differences between and to design appropriate standards and reducing the uncertainty of CAs in relation to the standards that should be adopted (e.g. through *training programs* such as the ones that have been advocated for EU countries by the European Commission recently).[70]

[69] Specialised appeal courts will tend to reduce the degree to which decisions are reversed on appeal, as LSs increase (as one expects when the judges are unable to discriminate, in terms of their quality, between sophisticated economic or econometric arguments). The Competition Appeals Tribunals of UK or South Africa provide good examples of such tribunals.

[70] See also Baye and Wright (2011) and Avdasheva et al. (2015). Also and most importantly, these programs should aim to reduce uncertainty by developing commonly recognized and accepted procedures for taking into account economic analysis and evidence in substantive conduct assessments by Court judges and the CA.

While the main objective of the paper it to offer a conceptual framework for thinking about the choice of legal standards and the extent to which economic analysis is applied in investigations, by utility maximizing Competition Authorities influenced by potentially non-welfarist Courts and performance assessment criteria, many of our main predictions can be empirically tested using information extracted from decisions made by Competition Authorities that went through the appeal process. A first empirical analysis of a large set of (1133) appealed antitrust infringement decisions by the Russian Authority (FAS) that were appealed between 2008 and 2015 has been undertaken and results vindicate many predictions of the model above, while comparative empirical analysis to determine the type of legal standards adopted is currently under way in a number of other countries.[71]

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Appendix

Proof of Proposition 2(ii): Non-reputation maximizing CA facing uncertainty about the legal standard adopted by Courrts

In this case the CA problem is to:

$$max_{LS} U_k = \{\left[\left[\mathrm{A}RE_k(e_k\left(LS_k\right)\right]^{\gamma} Q_k\left(LS_k\right)^{1-\gamma}\right] - AC(e_k\left(LS_k\right)\}, k = 1, \ldots, K \quad \text{(23 repeated)}$$

Then, assuming that i = SPS and i + = MPS, its expected net utility by choosing legal standard i = SPS will be:

[71] See Avdasheva et al. (2015) and Avdasheva et al. (2019). The level of economic analysis applied is measured by a number of different indicators, constructed on the basis of the information contained in the CA decisions. The authors have been pursuing empirical work using the above theoretical background and the methodology for constructing indicators in Katsoulacos et al. (2017b) with research teams covering a number of countries including, the EC, Canada, Greece, France, South Africa and Turkey.

$$\begin{aligned}
&\left(\frac{1}{2}\right)\{[[\mathrm{ARE}_{k,SPS}(\hat{e}^{C}_{k,SPS})]^{\gamma}\hat{Q}\left(LS_k\right)^{1-\gamma}] - AC^{D}_{k}\left(\hat{e}^{C}_{k,SPS}\right)\} \\
&\quad + \left(\frac{1}{2}\right)\{[[\mathrm{ARE}_{k,MPS}(\hat{e}^{C}_{k,SPS})]^{\gamma}\tilde{Q}\left(LS_k\right)^{1-\gamma}] - AC^{D}_{k}\left(\hat{e}^{C}_{k,SPS}\right)\} \\
&= \left(\frac{1}{2}\right)\{[[1-\boldsymbol{\Phi}_{k,SPS}(\hat{e}^{C}_{k,SPS})]^{\gamma}\hat{Q}\left(LS_k\right)^{1-\gamma}] - AC^{D}_{k}\left(\hat{e}^{C}_{k,SPS}\right)\} \\
&\quad + \left(\frac{1}{2}\right)\{[[1-\boldsymbol{\Phi}_{k,MPS}(\hat{e}^{C}_{k,SPS})]^{\gamma}\tilde{Q}\left(LS_k\right)^{1-\gamma}] - AC^{D}_{k}\left(\hat{e}^{C}_{k,SPS}\right)\}
\end{aligned}$$

where $\hat{Q} > \tilde{Q}$, $\hat{Q}$ been the Q achieved when the optimal $LS = \widehat{LS}_k$ is adopted, and $\tilde{Q}$ is the level of Q when a sub-optimal LS is adopted. This expression will be higher than expected net utility if CA adopts i + = MPS, iff:

$$2[AC^{D}_{k}\left(\hat{e}^{C}_{k,MPS}\right) - AC_k(\hat{e}^{C}_{k,SPS})] >$$

$$\{[ARE_{MPS}(\hat{e}^{C}_{k,MPS})]^{\gamma}\hat{Q}\left(LS_k\right)^{1-\gamma}]\} - \{[ARE_{MPS}(\hat{e}^{C}_{k,SPS})]^{\gamma}\tilde{Q}\left(LS_k\right)^{1-\gamma}]\} \tag{33}$$

Comparing (25) and (33), when in (25) i = SPS, i + = MPS, the result follows.

Proof of Propositions 2(i) and 3(i) when the Φ and ARE are not step functions

Here we prove Propositions 2(i) and 3(i) assuming that e_k increases continuously (not in a step-wise fashion) with a corresponding continuous increase in LS_k. Figure 5 below depicts this.

In Fig. 5, apart form the AC function we depict two ARE functions:

$ARE_k\left(\hat{e}_k\left(\widehat{LS}_k\right)\right)$ (curve AFM): this is the Average Reputation Effect if the CA always chooses the optimal $LS_k = \widehat{LS}_k$ adopted by Courts and the optimal $e_k = \hat{e}_k(\widehat{LS}_k)$ associated with the optimal LS_k. This curve is continuously declining given that as the optimal legal standard and $\hat{e}_k$ that is chosen by the CA increases this increases the probability of annulment and hence reduces reputation.

$ARE_k\left(\hat{e}_k\left(\widehat{LS}^{*}_k\right)\right)$ (curve BFL): this is the Averabe Reputation Effect as e_k increases given the optimal LS_k adopted by Courts is $\widehat{LS}^{*}_k$. This is increasing (along BF) as the legal standard of the CA moves from the sub-optimal level $\widehat{LS}^{*}_k - \Delta$ to the optimal level $\widehat{LS}^{*}_k$ and then remains constant as further increases in e_k beyond $\hat{e}_k\left(\widehat{LS}^{*}_k\right)$ will not be taken into account by Courts in assessing the conduct and hence the annulment probability remains constant for e_k beyond $\hat{e}_k\left(\widehat{LS}^{*}_k\right)$.

Consider the two cases where there is certainty that the optimal legal standard is $\widehat{LS}^{*}_k$ and where there is uncertainty—in which case, the CA expects that Courts will adopt either $\widehat{LS}^{*}_k$ or $\widehat{LS}^{*}_k - \Delta$ with probability 1/2.

Certainty Now the CA compares the net utility (FH) when it chooses $\widehat{LS}^{*}_k$ with the net utility if it chooses the lower legal standard $\widehat{LS}^{*}_k - \Delta$ (even though it anticipates that Courts will adopt $\widehat{LS}^{*}_k$) which is equal to BE. It will choose $\widehat{LS}^{*}_k - \Delta$ if BE > FH

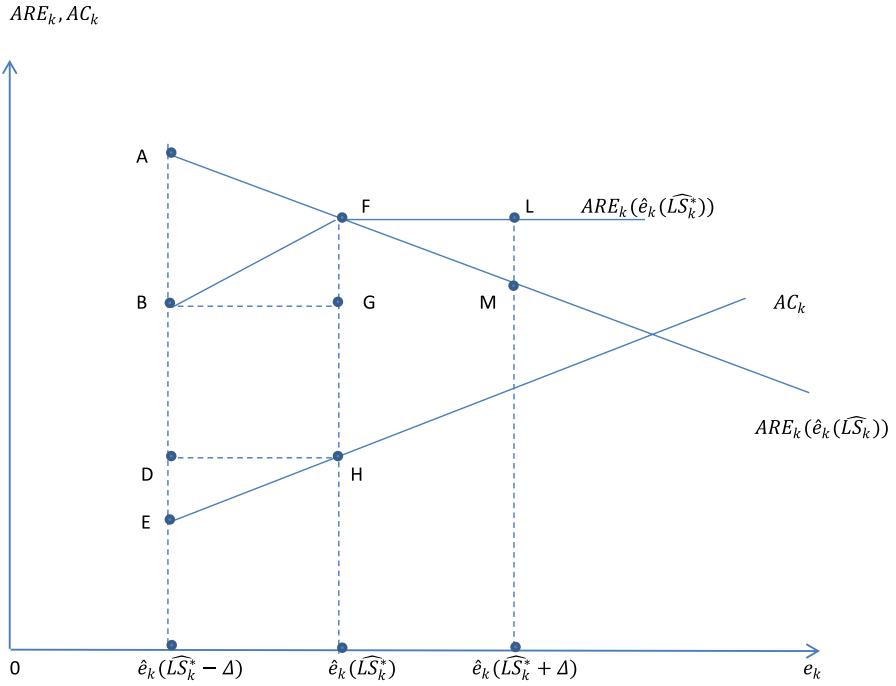

Fig. 5 The choice of legal standard by the CA

or DE > FG. DE is the increase in AC when the LS increases from $\widehat{LS}_k^* - \Delta$ to $\widehat{LS}_k^*$ while FG is the reduction in utility (Average Reputation) when the CA chooses the lower legal standard $\widehat{LS}_k^* - \Delta$ rather than the standard $\widehat{LS}_k^*$ adopted by Courts.

Uncertainty In this case if the CA chooses $\widehat{LS}_k^*$ its net expected utility will be (1/2)(FH) + (1/2)(AH), given that if the CA chooses $\widehat{LS}_k^*$ when the Courts adopt $\widehat{LS}_k^* - \Delta$ its utility (at $\hat{e}_k\left(\widehat{LS}_k^*\right)$) will correspond to that of point A. If on the other hand it chooses $\widehat{LS}_k^* - \Delta$ the net expected utility will be (1/2)(AE) + (1/2)(BE). Comparing, we see that the CA will choose $\widehat{LS}_k^* - \Delta$ if 2(DE) > FG—so the choice of a lower than optimal standard is much greater under uncertainty.

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