COMPETITION LAW ENFORCEMENT IN DYNAMIC MARKETS: PROPOSING A FLEXIBLE TRADE-OFF BETWEEN FINES AND BEHAVIOURAL INJUNCTIONS

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Competition Law Enforcement in Dynamic Markets: Proposing a Flexible Trade-off between Fines and Behavioural Injunctions*

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Abstract

In abuses of dominance cases, competition authorities typically impose both pecuniary sanctions and behavioural injunctions. These instruments serve distinct but complementary functions: fines primarily deter anti-competitive behaviour; injunctions seek to restore conditions conducive to competition on the merits. Yet, the effectiveness of such behavioural remedies remains contested. They often entail long-term obligations and are vulnerable to strategic circumvention or to uncertainties inherent in competitive and technological dynamics. In this paper, focusing on the European Union (EU)'s context, we propose a two-tiered sanctioning framework that addresses the drawbacks of behavioural injuctions: an initial fine, payable immediately, and a conditional component whose imposition – both in terms of activation and magnitude – would depend on the observed implementation and effects of the behavioural obligations. This structure aims to enhance both the flexibility and credibility of remedies, while preserving deterrence.

Keywords: Abuses of dominant position; fines; behavioural injunctions; dynamic competition; responsive regulation.

JEL Classification: K21, L41.

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1 Introduction

The sanction of anticompetitive practices serves a dual purpose: deterrence, primarily through financial penalties, and the restoration of competitive conditions, achieved through injunctions, particularly behavioural remedies. However, both economic literature and ex post evaluations conducted by competition authorities have questioned the deterrent effect of such sanctions as well as the effectiveness and efficiency of remedial measures. For instance, the 2017 and 2018 European Commission decisions on *Google Shopping* and *Google Android* have shed light on the limits of both the deterrent power of fines and the rehabilitative potential of behavioral injunctions (Marsden, 2020). One of the main challenges faced by competition authorities when imposing behavioural remedies stems from informational imperfections – both ex ante, in their design, and ex post, in their implementation. These difficulties are further exacerbated by technological and competitive disruptions, as highlighted by the literature on dynamic competition (Sidak and Teece, 2009). Dynamic competition may rapidly render the terms of the "regulatory contract" embodied in long-term behavioural remedies obsolete or even counterproductive. In this paper, we argue that a flexible instrument for restoring competition may be particularly well-suited to a market environments increasingly shaped by dynamic competition.

Beyond the question of the legitimacy and effectiveness of behavioural remedies, crafting competition decisions solely on financial sanctions and structural injunctions raises two key challenges. First, financial sanctions serve only a deterrence function; they do not restore competitive conditions ex post. If the penalty is too low, it may merely be perceived by firms as the cost of doing business. This is especially true for firms with "deep pockets", as today's dominant platforms. Second, structural remedies are rarely applied in U.S. antitrust enforcement (Hovenkamp, 2024), and have never been used in a prohibition decision under European Union (EU)'s competition law. Not only do they constitute a significant infringement on property rights – subjecting them to rigorous judicial scrutiny – but they may also result in substantial efficiency losses. This is particularly true when the affected firms operate complementary businesses or benefit from network effects (Cusumano et al., 2019; Jacobides and Lianos, 2021). Yet the idea of "unscrambling the eggs" is gaining renewed traction (Kwoka and Valletti, 2021), including in recent high-profile cases. As noted by Steve Lohr in *The New York Times*, "the U.S. wants to break up Google and Meta" reflecting a growing appetite for structural interventions in tech antitrust enforcement (Lohr, 2025).

In this regard, the conventional combination of financial sanctions and behavioural remedies in competition decisions is well-justified. It allows for the pursuit of the two complementary objectives of deterrence and restoration of competitive conditions. However, the more imperfect the available information and the more turbulent the markets, the more the balance between the deterrent effect of the sanction and the restorative function of the behavioural remedy may be compromised.

The first scenario involves ineffective or even counterproductive injunctions due to design flaws – a case of adverse selection. Maintaining such remedies for the entire prescribed duration may impose unnecessary welfare costs – both for the firm and for the economy as a whole – or, alternatively, may prove inconsequential for the sanctioned firm. In the first situation, the firm is penalised by the remedy without it actually addressing the competition issue. In the second, the firm would effectively face only the financial penalty as a consequence of its past conduct.

The second scenario does not stem from adverse selection but rather from moral hazard. A lack of cooperation or opportunistic behavior by the sanctioned firm may undermine the effectiveness of the imposed remedies, stripping them of their substance. In such cases, the remedies may once again become ineffective or even counterproductive in terms of competition, leaving the financial penalty as the only real sanction imposed on the firm.

The third scenario arises when competitive turbulence is sufficiently high to make behavioural remedies either ineffective or counterproductive. Their rigidity may prevent them from restoring competitive conditions or may impose unnecessary constraints on the sanctioned firm, leading to inefficiencies.

These scenarios are not equally likely to occur in contemporary market; for instance, dominant positions across related and unrelated markets are hard to contest even in the medium-to-long run and in case of competitive turbulence. However, addressing them requires conceptualising the sanctioning framework as a form of regulatory contract, with revision clauses that could be activated in response to specific events or market developments. Given that behavioural remedies are designed to produce effects over an extended period, it is desirable that the sanctioning framework remains adaptable and subject to revision. In a sense, our call for exploring flexible tools of competition policy goes in line with the emergence of a "smart-contract"-type mechanism, with interventions being shaped by "if-then" clauses that allow to account for a continuously evolving context.

In what follows, we discuss how such a system could be designed and implemented. Section 2 presents a literature review focusing on fines and behavioural injunctions – emphasizing their intended effects, the operational hurdles associated with injunctions, and the potential for a dynamic synthesis of these tools. Section 3 presents our core proposition: linking a portion of the fine to the successful implementation of behavioural remedies. This approach allows for the modification or removal of injunctions should they prove ineffective or inefficient, thereby preserving the fines' deterrent impact. We illustrates our proposal through a stylised model. Section 4 discusses the advantages and potential drawbacks of the proposal from an economic and legal perspective. Section 5 concludes.

2 Literature Review

This section positions our proposal within and contributes to several strands of the existing literature. First, we review the law and economics of monetary fines, with a focus on the debate surrounding their deterrent effect and their limitations as antitrust sanctions (Subsection 2.1). Then, we examine the legal and conceptual framework of European antitrust injunctions, clarifying their distinctive features and their evolving role in enforcement (Subsection 2.2). Finally, we reflect on the challenges and potential of behavioural injunctions, with particular attention to their effectiveness and adaptability in dynamic market environments (Subsection 2.3).

2.1 The law and economics of monetary fines

The law and economics literature has been concerned with the determination of the “optimal fine”. The seminal work by Becker (1968), addressing the economics of crime, laid the groundwork for understanding the deterrent objectives of monetary fines. Landes (1983) applied Becker’s model to cartels, marking the beginning of a literature on optimal fining for anticompetitive behavior. The literature on the optimal cartel fine evolved with contributions from Buccirossi and Spagnolo (2007), who proposed a method to estimate the illicit gains from cartels, and Allain et al. (2015), who formalised a model of fines further developed by Heimler and Mehta (2012) for abuse of dominance cases. Harrington (2014) expanded this model to include the duration of the violation as a factor.

The discussion on the practical application of optimal fine theories to real-world enforcement was advanced by Wils (2006) and Geradin et al. (2013), who highlighted the challenges of implementing fines that align with theoretical optimality. Despite the elegance of optimal fine theories, their relevance in setting practical fines remains an empirical question. Studies by Cohen (1996), Bolotova et al. (2009), and Connor and Miller (2013) have explored variations in fine’s patterns, finding a direct and significant relationship between cartel fines and the economic damages caused by collusion.

The debate over whether current fining practices achieve deterrence is still ongoing. Combe and Monnier (2011, 2013) argued that there is significant under-deterrence in the EU, a position challenged by Allain et al. (2015), who suggested that fines might already be sufficiently deterrent or even excessive. This evolving dialogue points out the complexity of determining and implementing fines that effectively deter anticompetitive behavior while avoiding the pitfalls of under- or over-deterrence. The determination of fines involves not only the calculation in relation to the entity’s turnover, but also a sophisticated assessment of the fine’s deterrent impact[1], informed by a blend of theoretical insights and empirical evidence.

2.2 The scope of European antitrust injunctions

This subsection delineates the conceptual boundaries between injunctions, merger remedies, and commitments, while also distinguishing injunctions from interim measures. An interim measure (IM) refers to a provisional antitrust agencies’ action adopted by a competition authority to avert imminent and irreparable harm to the market or to competitors while a comprehensive investigation is ongoing. These measures are intended to safeguard the status quo and deter the aggravation of anticompetitive behavior until a definitive ruling is issued. IMs are thus applied on a temporary basis to halt conduct suspected of violating EU competition rules – such as abuses of dominant position or anticompetitive agreements – thereby ensuring that markets remain competitive, and

[1]Even if fine calculation in the context of EU competition policy guidelines is intrinsically a backward-looking exercise, its incentivising purpose induces some forward-looking preoccupations. For instance, in the *Google Shopping* case, the deterring effect of the fine was supported by the application of a 1.3 coefficient to the quantum of the sanction.

consumer interests are protected during the investigative phase. Emphasizing the necessity of prompt regulatory intervention to address anticompetitive practices, Margvelashvili and Bagashvili (2024) argue for the revitalisation of IMs as a powerful mechanism for timely action in digital markets, particularly under conditions of legal uncertainty.

It is also necessary to distinguish between injunctions and commitments. In contrast to merger remedies and commitments, which are typically proposed by firms, injunctions represent a binding measure imposed by competition authorities. Commitment procedures are often favored when the competition authority aims to secure both the cessation of the anticompetitive practices in question and the remediation of their effects. Negotiated remedies can even benefit competitors by restoring the conditions necessary for competition on the merits. By foregoing the imposition of a fine – and thereby diminishing the decision's deterrent effect – the competition authority instead places greater weight on restoring competitive conditions.[2]

Behavioural injunctions can be further classified into two main types: those that mandate the cessation of a specific anticompetitive practice without a restorative aim, and those that seek to reinstate market conditions to a counterfactual state, reflecting the equilibrium that would have prevailed absent the anticompetitive conduct.

Assigning a restorative function to behavioural injunctions presents conceptual and practical challenges. The foundation of competition law is the adjudicatory model, primarily designed to enforce dissuasive sanctions. While halting practices that harm competition is straightforward, the role of behavioural injunctions extends into preventative and corrective realms. Restorative injunctions aim to undo the market distortions caused by prohibited practices, essentially resetting market dynamics to their natural state. Conversely, preventive injunctions are designed to obstruct future anticompetitive behaviors by the infringing firm. In the context of the digital economy, such measures may include mandates on service interoperability, data portability, and restrictions against tied or bundled sales, among others. A behavioural injunction can be interpreted as a regulatory action as opposed to a fine. It is not only a sanction of a (past) infringement of a general rule of conduct but a specific intervention constraining the behavior of a given market player for several years at its disadvantage.

These behavioural injunctions inherently shape the future conduct of market participants, effectively serving as a regulatory mechanism within antitrust law (Dunne, 2014). This perspective suggests that injunctions, particularly those with restorative and preventive objectives, transcend traditional punitive functions, instead operating as proactive tools for maintaining competitive market structures.

[2]For an example of commitment procedures related to a self-preferencing practice comparable to the Google Shopping case quoted above, see the Amazon Buy Box case decision of December 2022 (Mouton and Rottembourg, 2024).

2.3 Reflections on the challenges and flexibility of behavioural injunctions

The literature highlights two major areas of concern regarding behavioural injunctions: the handling of injunctions that are partially effective or inefficient, and the reconciliation of rigid injunctions with the dynamic challenges presented by competitive markets.

A stream of academic literature highlights the limitations of behavioural remedies, drawing parallels between these remedies and regulatory measures in terms of rigidity, cost, and potential misalignment with market realities. This critique is particularly pronounced in the United States, where a distinct preference for structural rather than behavioural merger remedies prevails (Majumdar, 2021). Proponents of this viewpoint argue that antitrust agencies, much like courts, lack both the comprehensive insight into market dynamics and the practical capacity to ensure the effective implementation of behavioural remedies.

Within this scholarly discourse, Kwoka and Moss (2012) analyse the efficacy and implications of behavioural remedies in antitrust enforcement, highlighting the challenges inherent in the oversight and management of these measures. They advocate for a more critical assessment of their functional role and overall effectiveness. Similarly, Polemis and Oikonomou (2018) investigate the effectiveness of remedies in merger cases from both EU and Member States' perspectives, shedding light on the complexities and outcomes associated with their application. Taken together, these contributions underscore a larger debate in antitrust literature, questioning whether behavioural remedies genuinely address competitive concerns. They call for a reevaluation of the reliance on behavioural remedies in certain jurisdictions, suggesting a more balanced and context-specific approach to antitrust enforcement.

Effectively addressing the flexibility challenges of behavioural remedies requires drawing on two key theoretical frameworks. First, the literature on "incomplete contracts" or "decisions under uncertainty" provides a valuable lens through which to analyse the difficulties inherent in designing and enforcing such remedies. Foundational contributions in this area – such as Hart (2017) and Hart and Moore (1988) – underscore the limitations of contractual arrangements that cannot anticipate every possible future scenario. Their insights into moral hazard, hold-up problems, and principal-agent relationships highlight the challenges of maintaining behavioural remedies over time, especially in the face of unforeseen market developments.

Second, the notion of uncertainty relevant to behavioural remedies goes beyond principal-agent issues and contractual gaps. It also encompasses "radical uncertainty" arising from complex market dynamics, fast technological innovation, and evolving competitive landscapes (Petit and Teece, 2021; Bougette et al., 2024). This broader view of uncertainty underscores the inherent constraints of behavioural remedies, which are often premised on assumptions of market stability and predictability – assumptions that may not hold in rapidly changing environments.

Overall, injunctions may remain in force for several years, during which their original rationale, effectiveness, and proportionality can diverge significantly due to shifting market conditions and technological progress. Moreover, strategic realignments among market participants may render existing injunctions obsolete, counterproductive, or even harmful to overall welfare. A notable example is the 2010 *Ticketmaster/Live Nation* merger, in which the Department of Justice imposed behavioural remedies to ensure fair dealing and avoid vertical foreclosure in the live event industry. However, the merged entity adapted its commercial strategy in ways that diluted the effectiveness of the original remedies, prompting the Department of Justice (DOJ) to renegotiate the consent decree nearly a decade later.[3]

2.4 Learning process and responsive remedies

Antitrust decisions can also be analysed from a more dynamic perspective. First, they can be framed within a learning process for the competition authority. Secondly, a parallel can be drawn to the concept of "responsive regulation".

Cosnita-Langlais and Tropeano (2022) examine the impact of antitrust commitments on the efficiency of competition law enforcement. Their analysis highlights the trade-off between litigation and negotiated settlements, the latter offering a faster resolution of cases while reducing administrative costs. However, the authors emphasize that excessive reliance on commitments can weaken the deterrent effect of antitrust enforcement and limit the creation of legal precedents, which are essential for guiding future decisions.

Adopting a dynamic perspective, the study argues that litigation plays a crucial role in enhancing competition authorities' understanding of anticompetitive behavior. By litigating cases, authorities gain valuable insights that improve their ability to assess future violations. However, when cost considerations lead authorities to favour commitment procedures, they may underestimate this learning effect, resulting in suboptimal enforcement decisions over time. Ultimately, the authors argue that behavioural remedies should be applied selectively, particularly in contexts where deterrence is critical and market conditions are highly unpredictable. A more balanced approach, integrating strategically both litigation and commitments is necessary to ensure effective antitrust enforcement.

Another relevant theoretical anchor lies in the economics of incentive contracts, particularly the well-known structure of two-part payment schemes. In such models, an agent receives a fixed transfer, often covering basic costs or acting as a reservation utility, alongside a variable component that depends on effort or observed outcomes (see, e.g., Pfeiffer, 2016). Our proposal mirrors this logic in a reversed enforcement setting: the fine comprises an unconditional first tier, imposed at the time of the decision, and a conditional second tier, which acts as a responsive mechanism linked to the observed cooperation of the firm and the actual effectiveness of the imposed remedies. In

[3] The proposed merger between Ticketmaster and Live Nation was announced on February 10, 2009, the same day the DOJ filed a complaint alleging a violation of Section 7 of the Clayton Act. See *Complaint, U.S. et al. v. Ticketmaster Entertainment, Inc. and Live Nation, Inc.*, Case 1:10-cv-00139, available at `https://www.justice.gov/atr/case/us-et-al-v-ticketmaster-entertainment-inc-et-al`. The Final Judgment was approved on July 30, 2010, following a public comment period that began on June 15, 2010. See *Final Judgment*, `https://www.justice.gov/atr/case/us-et-al-v-ticketmaster-entertainment-inc-et-al`. Due to subsequent concerns over compliance, the court entered an Amended Final Judgment on January 28, 2020, extending the decree and reinforcing behavioral obligations. See *Amended Final Judgment*, `https://www.justice.gov/atr/case-document/file/1241016/download`.

this sense, the second fine operates analogously to a penalty for insufficient compliance effort or for failed restoration of competition, just as variable rewards in incentive contracts aim to encourage optimal effort.

Building upon this perspective, the concept of responsive regulation offers another valuable framework for understanding competition law enforcement. Ayres and Braithwaite (1992) pioneered the concept of responsive regulation, advocating for a regulatory framework that transcends the traditional dichotomy between deregulation and command-and-control approaches. Their model advocates for a regulatory strategy characterised by flexibility and responsiveness to the actions of regulated firms. Expanding on this foundation, Baldwin and Black (2008) outline a comprehensive framework for achieving truly responsive regulation, incorporating learning and adaptive mechanisms into regulatory processes. Within the context of antitrust law, Wils (2006) examines the nuanced calibration of fines according to the gravity of infringement and the financial capacity of the offending firms, illustrating a responsive methodology to antitrust sanctions. Given the unpredictable outcomes of injunctions against a backdrop of uncertain competitive and technological evolution, it is imperative that behavioural injunctions are not only crafted with precision but also administered with a philosophy of "responsive competition law enforcement" (Makris, 2023).[4]

The ambition to achieve a specific outcome via long-term injunctions cannot be realised through static decisions, especially in the context of rapidly evolving markets. Instead, it requires a framework that emphasizes flexibility in decision-making and responsiveness in execution. This approach transcends the mere imposition of sanctions to deter repeat offenses and to signal to third parties the economic ramifications of non-compliance. It aims to cultivate a competition landscape that is dynamically beneficial and aligned with collective objectives. However, there are scenarios in which the dual goals of deterrence and restoration may need to be reevaluated: the intrinsic limitations of injunctions to realign competitive dynamics, non-compliance by the targeted entity, or the emergence of ineffectiveness or adverse impacts during the enforcement of injunctions. In such instances, it may be judicious to reconsider or rescind the injunctions, thereby narrowing the focus to purely deterrent measures.

[4]The responsive regulation approach has been subject to criticism, particularly due to the uncertainty faced by firms, notably with respect to the difficulty of self-assessing the compliance of their actions and the discretionary margin available to the authority in interpreting a given situation – potentially leading to an escalation strategy whereby increasingly stringent remedies may be imposed. The discretion afforded to the authority may have, at best, ambivalent effects on firms' incentives to meet the expected outcomes (Sauter, 2024). The literature further offers examples of responsive regulation applications beyond the framework proposed by Makris (2023). For instance, Nielsen and Parker (2009) examine the experience of the Australian Competition and Consumer Commission (ACCC), which bears responsibility for both competition enforcement and the regulation of restrictive or unfair commercial practices. His analysis highlights that responsive regulation can be operationalised along two distinct logics. The first is grounded in the concept of restorative justice, while the second follows a tit-for-tat rationale. The former is outcome-oriented, whereby the revision of injunctions depends on the restoration of competitive conditions. The latter is behaviour-based, relying on the assessment of the firm's conduct in response to the injunction.

2.5 Our contribution to the literature

Our contribution lies at the confluence of two theoretical questions in the economics of competition law. The first concerns the complementarity or substitutability of the different components of competition sanctions. As discussed above, financial penalties serve a deterrent function, while behavioural remedies aim to restore conditions for undistorted competition. However, could there be situations where the impossibility of implementing effective remedies justifies a higher financial penalty? This reasoning could apply in a static sense (at the time of the decision) but also dynamically. If, at a later stage, it becomes evident that the behavioural remedies should be lifted, the financial penalty could be adjusted accordingly.

The second question is directly related to this point. The deterrent part of a decision to sanction an abuse of a dominant position is based on a backward-looking assessment. The amount of the fine is determined on the basis of the value of the relevant sales at the time of the infringement, but the chosen coefficient of gravity already corresponds to a forward-looking objective in that it is part of a deterrent logic. Injunctions, on the other hand, only make sense in a forward-looking context. However, these injunctions can be spread over a long-time horizon. Two difficulties arise. The first difficulty, a classic one in competition matters, relates to the ability of the authorities to anticipate future market developments. This problem is also observed in the context of merger control (Bougette et al., 2024, 2025), and it also arises in the context of debates on taking account of the competitiveness dimension in competition decisions. The second difficulty is the lack of flexibility in the decision, especially in the injunctive part. How can the consequences of (difficult to predict) changes in the market and in the behaviour of companies be considered without being able to revise the remedies? Once again, the contract parallel comes to the fore. Shouldn't a rigid contract be replaced by a flexible one that can be modified during its term to take account of any contingencies that may arise?

Long-term public-private contracts, such as highway concessions, have such characteristics.[5] Their duration may not be rigidly fixed ex-ante but may be defined endogenously. The achievement of a certain level of profit after the recovery of the capital invested may allow the public party to activate an exit option. In the field of the economics of regulation, the concept of responsive regulation is also part of this flexible contract logic, which makes it possible to adapt to developments that could not be predicted ex ante and to penalise the failure of regulated firms to cooperate. Makris (2023) has suggested applying this scheme to the field of competition law to adjust the conditions of injunctions over time.

[5] For a formal analysis of fixed-term highway franchises, see Engel et al. (2001).

3 Our Proposal

3.1 The idea in a nutshell

We propose a dynamic adjustment of the sanctions system by modulating, where necessary, the deterrent (monetary sanction) and remedial (behavioural injunction) components. While monetary fines and behavioural injunctions serve complementary roles by targeting different outcomes – deterrence and the restoration of competition on the merits, respectively – our approach advocates for a degree of ex-post flexibility, akin to interconnected vessels. If it seems collectively desirable to lighten remedies during their execution period, this must be done, but it is also necessary to reinforce the dissuasive effect of the sanction. In essence, flexibility should not undermine the power to deter.

To address this, our proposal features a dual-component financial penalty system. The first part is a fixed sum due immediately (a *baseline* fine), while the second will be contingent upon the premature cessation of behavioural injunctions. In other words, should the injunctions no longer produce the expected effects, their termination would result in the payment of the second part of the fine. This ensures that any reduction in the remedial aspect of the judgment is counterbalanced by bolstering its deterrent element. It might also prevent the perpetuation of both unnecessary and excessively costly injunctions not only for the sanctioned firm but also for the economy as a whole.

In navigating the complexities of enforcing antitrust regulations, we advocate for a nuanced strategy that dynamically balances monetary fines and behavioural injunctions. This approach is predicated on the premise that the effectiveness of injunctions can fluctuate over time, requiring adjustments to ensure ongoing deterrence and market functioning.

Monetary fines should be modulated in response to the evolution of injunctions. Our framework recommends increasing penalties when an injunction proves to be unnecessary or fails to deliver the expected outcomes. Such adjustment is intended to counteract potential ineffectiveness and limit unintended adverse effects resulting from the injunction. Furthermore, the rationale should be to enhance deterrence and preserve market integrity. This approach aims to strengthen the deterrent effect of financial penalties, particularly when the original grounds for an injunction become obsolete. From both a welfare and competition perspective, the proposal seeks to remove any market barriers inadvertently created by injunctions that turn out to be superfluous or harmful.

3.2 A stylised formalisation of our proposal

We formalise our proposal through a stylised model that highlights the trade-offs we are interested in. The model features two actors, the competition authority and a firm subject to a sanction due to anticompetitive behaviour.

A firm c with market power engages in an anticompetitive practice that yields an extra profit $\pi_c > 0$. If the practice is not prevented or remedied, it causes a social harm $D > 0$.

After observing the firm's (mis)behavior, the competition authority a can impose a *remedy.*

Initially, the remedy is a two-part instrument: $r = (f,\, b)$, where $f \geq 0$ is a *baseline monetary fine*, and $b \geq 0$ is a *behavioural injunction*. Through deterrence and the restoration of competition, social harm is expected to decrease: $D(r) < D$. If new information (including on changed market conditions) indicates that b is failing to achieve its goal, the competition authority can switch to a new remedy structure, replacing $(f,\, b)$ with a purely monetary penalty

$$(f + \Delta f(b, \omega),\, 0),$$

where $\Delta f(b, \omega) \geq 0$ is an *incremental fine* that accounts for the inefficiency or obsolescence of b under state ω. ω captures the arrival of a signal to the authority regarding the failure of the original (f, b) to achieve its goals.

The following timeline illustrates our proposal. *First*, the competition authority imposes the two-part remedy $r = (f, b)$ on the firm engaging in abusive conduct. *Second,* the state ω is realised, representing new information related to the inefficiency of the b part of the original remedy. We do not model ω as a random event but rather as a deterministic shift in the state of world, as we *assume* – for the sake of illustrating our proposed mechanism – that conditions will change, making b inefficient. When ω realises, $D(r)$ increases: $D(r_{-\omega}) < D(r_\omega) \leq D$, with $D(r_{-\omega})$ and $D(r_\omega)$ indicating, respectively, the impact of the remedy on harm D before and after ω realises. The authority can either keep (f, b) or switch to $\big(f + \Delta f(b, \omega),\, 0\big)$, incurring a one-time switching (administrative) cost $S \geq 0$ if it changes the remedy. *Third,* payoffs are determined by the *final* remedy $(\tilde{f},\, \tilde{b})$ in place (either the original or the switched).

Under the final remedy $\tilde{r} = (\tilde{f}, \tilde{b})$, the company pays a fine $\tilde{f}$ and must comply with a behavioural injunction of intensity $\tilde{b}$ (equal to 0 in case of switch). We capture:

Firm's extra profit: $\tilde{\pi}_c - \tilde{f} - c(\tilde{b})$, where $c(\tilde{b})$ is the compliance cost of the injunction $\tilde{b}$, with $c(0) = 0$.

Autority's payoff / social surplus: $\tilde{\Pi}_a = -\,D(\tilde{r}) \;+\; \tilde{f} \;-\; k(\tilde{b}) \;-\; \mathbb{1}\{\text{switch}\}\, S$, where $k(\tilde{b})$ is the cost to design, enforce, and monitor the injunction, and S is the (fixed) cost to switch from (f, b) to $(f + \Delta f(b, \omega), 0)$.

Once ω is realised, the Authority compares:

$$\Pi_a^{\text{ex-ante}} \;=\; \Big[-\,D(r_{-\omega}) + f - k(b)\Big]$$

versus

$$\Pi_a^{\text{ex-post}} \;=\; \Big[-\,D(r_\omega) + \big(f + \Delta f(b, \omega)\big) - k(0) - S\Big],$$

Since $k(0) = 0$ (no behavioural injunction to monitor if $\tilde{b} = 0$) , the Authority will switch if

$$\Pi_a^{\text{ex-post}} > \Pi_a^{\text{ex-ante}},$$

i.e.,

$$
\begin{aligned}
-D(r_\omega) + f + \Delta f(b,\omega) - S &> -D(r_{-\omega}) + f - k(b) \\
\Delta f(b,\omega) - S &> D(r_\omega) - D(r_{-\omega}) - k(b),
\end{aligned}
$$

In other words, if the net additional compensation to social harm provided by the incremental fine is bigger than the net increase in social harm due to realisation of the inefficience of b.

The stylised model highlights how, in the choice between a two-part penalty and a pure fine (a baseline plus an ex post component activated if the behavioural injunction is withdrawn), the received complementarity between f and b is preferable ex ante. However, the ex post flexibility to switch to a pure fine is valuable if the authority discovers that maintaining b is inefficient once ω is realised. As we discussed at length in the previous Sections, dynamic markets (such as those shaped by digital technologies) are often subject to the arrival of novel information. In other words, there are a series of likely data-generating process behind the realisation of ω that make the switch of our proposed mechanism an optimal choice.

3.3 Reasons for injunctions' failure

We consider three different scenarios that can lead to an update in ω – that is, to a failure of injunctions –, and thus to the need to activate the conditional part of the fine: (i) failure to restore competition (the injunction doesn't reinstate necessary competitive conditions due to the non-cooperation of the penalised dominant player); (ii) design-related shortcomings (the injunction does not yield the anticipated results owing to its inherent design flaws); and (iii) inefficacy in evolving markets (the injunction becomes redundant or less impactful due to changing market dynamics).

3.3.1 The injunction fails to reinstate competitive conditions

If the injunction does not restore the essential prerequisites for genuine competition due to non-cooperation from the penalised dominant entity, then the second part of the fine is required. It might result from opportunistic behavior. Our logic consists in imposing sanctions for such actions by enforcing the payment of the secondary segment of the fine. Our primary concern is to identify and to define the nature and extent of non-cooperation (is the firm responsible e.g., it is the result of an opportunistic behavior?). In this case, the question, becomes: is this mechanism implementable within EU competition law? Some legal dimensions and case law can be raised.

First, national competition laws of Member States may provide for sanctions in cases of non-compliance.[6] Second, such provisions are effectively implemented in competition law enforcement.

[6] This is, for instance, the case of the French Commercial Code, specifically Article L.464-2. This article states: *"The Autorité de la concurrence may impose on the parties concerned periodic penalty payments not exceeding 5% of the average daily total worldwide turnover, for each day of delay from the date it fixes, to compel them: a) to comply with a decision that has required them to cease anticompetitive practices, to comply with a decision that has imposed specific conditions, or to comply with a decision that has rendered commitments binding [...]; b) to comply*

Three illustrative examples can be provided. Additional monetary sanctions may be imposed in cases of non-compliance with injunctions issued as part of interim measures.[7] Fines can also be imposed in cases of failure to comply with behavioural commitments.[8] In a similar vein, significant additional fines may be levied where firms engage in opportunistic behavior in the implementation of remedies imposed in merger control procedures.[9] Furthermore, in the context of conditional merger approvals, it is important to highlight that a firm may be required to divest strategic assets in case of failure to comply with initial remedies. These so-called *crown jewels* provisions are exemplified by a decision of the German competition authority in August 2005.[10]

3.3.2 Ineffectiveness of injunction due to design flaws

An injunction may fail to deliver its intended outcomes because of inherent flaws in its design. In such cases, it is legitimate to question whether the conditional fine should still be enforced, or whether a revision of the behavioural injunction would be more appropriate.

A central concern in such scenarios is the assignment of responsibility for the failure of the injunction. It is essential to distinguish the potential culpability of the firm from that of the competition authority. Even in contexts of asymmetric information or adverse selection on the part of the authority, it would not be legitimate to penalise a firm for the inadequacy of a remedy it did not design. In addition, injunctions may lose their relevance over time due to shifting market dynamics, further complicating enforcement.

Relevant insights can be drawn from the field of merger control, where regulations formally allow for the adjustment of remedies when they are found to be ineffective. However, to the best of our knowledge, this provision has only been invoked once, and was ultimately not applied in practice (Bougette et al., 2024). This limited use suggests that, while the mechanism exists, it remains under-utilised.

In light of these challenges, it is necessary to establish a clear institutional framework specifying who has the authority to initiate corrective measures. Whether this role should be assumed by the competition authority, an external trustee, or the dominant firm itself must be clearly defined. Moreover, the conditions under which such corrective action can be triggered should be explicitly stated to ensure legal certainty, accountability, and procedural fairness.

3.3.3 The injunction becomes inefficient or redundant due to shifts in the market landscape

Over time, an injunction may become inefficient or redundant as a result of evolving market conditions. Although still in force, the injunction might place disproportionate constraints on the

with measures ordered pursuant to Article L.464-1."

[7]See French Competition Authority, Decision 21-D-17 of July 2021, regarding compliance with the injunctions imposed on Google in Decision 20-MC-01 of 9 April 2020.

[8]See European Commission / Microsoft, June 2013.

[9]See French Competition Authority, Decision 11-D-12 of September 2011 (TPS/Canal+); and Decision 18-D-16 of July 2018 (FNAC/Darty).

[10]BKartA, August 2005, Decision B1-29/05 – Werhahn/Norddeutsche Mischwerke.

dominant undertaking, especially if its market position remains unthreatened or has evolved. In such cases, maintaining the injunction may no longer produce tangible benefits for consumers and could even hinder competitive dynamics.

In light of this, it is important to consider how an exit strategy could be initiated when the continued enforcement of the injunction becomes unwarranted. Three main options can be envisaged. First, the firm subject to the injunction could proactively initiate the process by demonstrating that the measure no longer serves its intended purpose. Second, a so-called *rendez-vous* clause could be embedded in the initial decision. This mechanism would automatically trigger a review of the injunction's effectiveness after a defined period. Third, an independent trustee could be empowered to monitor compliance and market outcomes, and recommend termination of the injunction based on objective evidence.

The decision to lift an injunction before the end of its intended duration raises several important issues related to enforcement credibility and economic incentives. First, there is a risk of deterrence erosion: terminating the injunction without any financial consequence could significantly weaken the deterrent effect of competition law sanctions and reduce firms' incentives to comply. Second, the possibility of early termination may justify the imposition of compensatory measures. In particular, it could be appropriate to require the firm to pay a portion of the conditional (second-tier) fine as a form of compensation for the incomplete implementation of the behavioural remedy. Third, the quantification of this compensatory amount deserves careful consideration. One approach would be to calculate it as a percentage of the initially envisaged second fine, using the duration of effective implementation relative to the full term of the injunction. This *pro rata temporis rule* would ensure proportionality and predictability. Finally, the adjustment could incorporate a discounting mechanism, reflecting the time value of enforcement and the delayed nature of outcome assessment. This would allow the final amount to better align with both legal certainty and economic rationality.

To preserve the effectiveness of competition law enforcement, we propose that authorities retain the option to revise the monetary fine upward if the behavioural injunction becomes unnecessary or fails to deliver its expected effects. This recommendation underscores the need for flexibility in remedy design, allowing competition authorities to respond effectively to changing market conditions while preserving both deterrence and fairness. Nevertheless, this option should be subject to careful scrutiny from both economic and legal perspectives.

4 Discussion

In this Section, we explore the practical and theoretical implications of our proposed enforcement mechanism. We examine the three distinct scenarios we presented in Subsection 3.3 in which the mechanism might be applied, related to issues of compliance, design flaws in remedies, and changing market conditions. We then consider the broader economic and legal implications of the mechanism we propose, assessing both its potential benefits and the challenges it may pose in terms of incentives, legal certainty, and institutional design. This discussion aims to provide a critical evaluation of the feasibility, robustness, and normative desirability of a flexible, responsive approach to antitrust sanctions.

4.1 Analysis of the three scenarios

In the simplest case, the company is found to have breached its obligations. The second part of the fine could then be applied in the same way as in non-compliance proceedings. The initial decision would then provide for the automatic application of the second part of the fine if the letter of the injunction is not complied with. However, a new decision would be required, which could be limited to a finding of non-compliance without having to discuss its effects.

The most problematic case is one in which the remedy fails to produce the expected effects due to its intrinsic design flaws. This is quite possible, given that the competition authority operates in a context of imperfect information and that even initially well calibrated remedies may progressively prove ineffective or even counterproductive because of competitive turbulence. Abandoning behavioural injunctions in favour of appealing the second part of the fine may, under certain conditions, be advantageous for the firm. It may regain degrees of freedom and no longer be subject to competitive constraints. Moreover, the obligation to pay the second part of the fine increases the cost of the sanction and guarantees a deterrent effect for the company (signal of recidivism) and for other operators who may implement similar strategies in the future (price signal provided by the case law).

However, could this mechanism not also be seen as an additional financial penalty linked to an error on the part of the authority rather than a fault on the part of the company? It would therefore be necessary to provide companies with an appeal mechanism in such circumstances. However, this would require a very complex economic assessment. However, judicial control would be even more necessary as the unilateral power of the competition authority would act as an option available to it to terminate the procedure at its own discretion by demanding payment. This unilateral termination could in some cases be advantageous to the company, but it would have to be open to challenge, for example if the company considered that it had implemented the orders in a compliant manner.

The corporate appeal we describe here would make sense in a mechanism in which the second part of the fine played the role of a potential (and announced ex ante) sanction associated with non-compliance with injunctions. Our proposal is somewhat different. It considers that injunctions are to some extent a sanction for the dominant firm's past conduct. They have a dual role: punitive and restorative. If the restorative effect turns out to be illusory, if it imposes disproportionate collective costs, or even if it is counterproductive, it is preferable to end the injunction and replace it with an increase in the sanction (i.e., to abandon the restorative objective in favour of the punitive role). However, our mechanism reduces the discretionary nature of this kind of procedure and guarantees a certain degree of predictability for the firm concerned, at least as regards the amount of the additional penalty that may be imposed (which could, moreover, decrease over time according to a simple *prorata temporis* rule based on the duration of the initial injunction).

The last case corresponds to the one in which the exit demand is linked to factors that are completely external to the authority and the company. Market dynamics may make injunctions collectively harmful. The legal question can be approached from two angles. First, who decides when the exit mechanism is triggered? It could be one of the two parties or an independent third party charged with monitoring the results of the injunctions. The advantage of this mechanism would be that early termination would depend on compliance with the effects of the injunction and not, as in the previous case, on verification of compliance with the letter of the injunction. The exit process could be initiated by a trustee whose powers would be broader than those of the usual competition procedures. The authority's decision whether to follow its proposals could be appealed by the company. A particular case for attention might be a situation where the exit could be initiated by the firm itself. Giving the sanctioned firm an exit option could create a risk of opportunism. It could choose between the costs induced by the competitive disadvantage linked to the injunction and the financial costs linked to the amount of the remaining fine to be paid. The certainty of the amount for the firm (and the information asymmetries it enjoys *vis-à-vis* the antitrust authority) may lead it to a settlement in which the second part of the fine appears as a cost of doing business. This could be problematic in terms of lucrative misconduct.

There is another point to be considered in the context of our discussion of competition proceedings. So far, we have considered the case of procedures under Article 7 of Regulation 1/2003, i.e., prohibition decisions. We have considered the case of negotiated procedures only in parallel with commitments. Failure to comply with commitments leads to the imposition of a fine. This was the case, for example, with Microsoft following the disappearance of the choice screen in its Internet browser. However, in such a case, the fine is linked to non-compliance with the letter of the commitments and is not conditionally (but with a defined amount) announced ex ante in the initial decision. Our solution has some parallels with this mechanism, but differs from it in a number of key respects.

Another of the negotiated procedures might be worth considering in that it might be compatible with our mechanism and perhaps lend itself to simplified implementation. These are the settlement procedures. In these procedures, the decision combines the imposition of a fine (lower than that which would be applied in a contentious procedure) with commitments voluntarily entered into by the company. It would be possible to apply our mechanism to such a transactional procedure in the following way: the "contract" between the authority and the accused company includes an exit clause that can be activated at the company's request (at a cost determined by the difference between the penalty imposed and that which would have been imposed in a contentious decision based on an adversarial procedure). However, this is an administrative decision and not a private contract to which the theory of efficient breach could be applied. This implies the possibility of refusal on the part of the authority and the possibility of an appeal mechanism.

4.2 Economic and legal discussions

Beyond the analysis of operational scenarios, we provide a structured evaluation of our proposal through both economic and legal lenses. Table 1 presents the pros and cons of our proposal. In summary, the positive aspects primarily stem from its effects on incentives and the resulting gains in flexibility, while the negative aspects mainly arise from the costs and practical challenges associated with implementing the mechanism.

The advantages can be grouped into two main categories. The first advantage lies in maintaining the deterrent effect of sanctions, even if the imposed obligations must be lifted before their full execution. This deterrent effect is further reinforced by the possibility of requiring payment of the second installment of the fine should the firm's behavior hinder the achievement of the remedies' intended objectives. In this regard, the deterrent effect is either preserved or strengthened in response to market dynamics that render injunctions inadequate (exogenous effects) or to the emergence of moral hazard (endogenous effects), which must be sanctioned within a framework of responsive regulation. The second advantage of our proposal lies in its flexibility. In this regard, it addresses the challenges associated with a dynamic conception of competition, as previously highlighted. Given the impossibility of fully anticipating market developments ex ante, our procedure prevents the continued enforcement of remedies that may become inappropriate or even counterproductive.

However, the proposed procedure also entails risks and costs that must be taken into account. The first issue concerns the identification of market dynamics that would justify triggering the adjustment clause of the 'contract.' This identification problem also extends to assessing the behaviour of the firm subject to the injunction. Specifically, how can one disentangle, when observing the ineffectiveness or inefficiency of a remedy, the influence of exogenous factors (such as market dynamics beyond the firm's control) from that of endogenous factors (such as an opportunistic strategy implemented by the sanctioned firm)? The question then arises as to whether the appointment of a trustee (ex-ante) and/or the establishment of an appeal procedure (ex post) would be necessary to mitigate the risk of discretionary decisions that could create legal uncertainty for the firm concerned. The second issue relates to its direct and indirect costs. Two dimensions can be single out here. The first dimension relates to the collective cost. Our proposed mechanism also entails indirect costs, as it inevitably influences the incentives of the sanctioned firm and may, as a result, alter the efficiency of its market behavior. The second dimension is related to the sanctioned firm behavior. Our proposal could require the sanctioned firm to provision the entire amount of the financial penalty imposed, which may both constrain its investment capacity and affect its incentives. Indeed, the firm might weigh the actual payment of the second instalment of the fine against the potential benefits of non-compliance with the injunction, adopting a cost of doing business approach. This calculus is further facilitated by the fact that the amount of the second instalment is predetermined.

It may be appropriate to further substantiate the proposed incentive mechanism, given that the risk of non-compliance remains substantial. First, we could question the structure of the conditional sanction. A preliminary question may concern the relative proportion between the fixed and conditional components of the sanction. Shouldn't the conditional component, at a minimum, equal the net present value of the opportunity cost associated with complying with the injunction? Such a calibration would serve to align economic incentives with regulatory compliance objectives.

Second, we could consider the temporal discounting of the conditional part of the fine and the end-of-period incentives. Indeed, as the conditional sanction is subject to a pro rata temporis discount, would this not create a perverse incentive for the sanctioned firm to "breach the contract" towards the end of the compliance period? In such a setting, the residual cost may be perceived as negligible, thereby weakening the incentive to comply fully as the deadline approaches.

Third, we should asses to what extent the fine predictability may favor strategic trade-offs. The fact that the amount of the conditional sanction is either known ex ante or can be readily estimated may facilitate cost–benefit arbitrage of the "cost of doing business" type. Predictability of the sanction might thus undermine its deterrent effect by allowing firms to internalize the sanction as a manageable cost.

In this regard, if the second-tier sanction is envisaged as a response to moral hazard, one may argue that mere ex ante knowledge of the monetary penalty is insufficient to preserve the intended incentive effect. It may therefore be necessary to introduce an additional sanction — such as a formal characterisation of recidivism — which would expose the firm to significantly harsher penalties in the event of subsequent violations of competition law. Such a mechanism could help restore informational asymmetry and reinforce the deterrent power of regulatory enforcement.

Pros: incentives and flexibility	**Cons:** risks and difficulties in implementation
Preservation of Deterrence Even if the injunctions can be removed, it mustn't impair the global deterrence.	**Distorted Incentives** Implementing effectively and promptly the injunction can make it not necessary anymore and trigger the request of payment of the second part of the fine. Extreme reactions: un-compliance and over-compliance (the longer the duration of the injunctions, the lower the expected payment).
Adaptability Coping with uncertainty regarding markets' evolution.	How to separate design flaws from opportunism (adverse selection from moral hazard)? Risk of additional litigations. Risk of administrative discretion.
Modulation Providing a flexible tool that can be modulated.	**Role of Intermediaries** What role for a trustee or an arbitration body?
Costs of Misconduct Even if the competitive pressure made the initially dominant firm is challenged, the firm must pay the social cost induced by its initial misbehaviour to signal the expected cost for potential wrongdoers on any market.	**Market Dynamics** How to assess market dynamics to decide on early termination of the injunction? How to establish a counterfactual?
	Financial Consequences Considering firms' financial duties. Should a firm provision the entire amount of the fine?

Table 1: Key considerations regarding deterrence, implementation, and adaptability

From a legal standpoint, our proposed mechanism may legitimately raise concerns in terms of due process of law as it can increase the discretion margin of the competition authority. However, this risk may be counteracted if a new decision must be issued (guaranteeing an appeal procedure). We can also add the judicial control in a "conventional" decision provides an assessment of the necessity, adequacy, and proportionality of the injunction but only in an ex-ante perspective. If a revision decision is issued such assessment will be also performed "ex post". Such a mechanism may enhance the protection of the firm sanctioned as it would benefit from an effects-based assessment (except cases in which the remedies are inefficient because of its lack of cooperation).

Indeed, several issues might arise at the legal level. For example, could the EU General Court (or a supervisory authority in a Member State) rule on such a mechanism, particularly if a firm questions the proportionality of the sanction? In the same vein, what would happen in the event of an appeal against the second part of the fine (for example, if an appeal against the initial fine is rejected)?

5 Conclusion

In this paper, we propose a two-tiered sanctioning framework that addresses the drawbacks of behavioural injuctions, with a particular focus on the EU. We suggest to devise a mechanism featuring an initial fine, payable immediately, and a conditional component whose imposition — both in terms of activation and magnitude — would depend on the observed implementation and effects of the behavioural obligations. This structure aims to enhance both the flexibility and credibility of remedies, while preserving deterrence.

Our proposal is aligned with Makris (2023)'s idea to transpose the logic of responsive regulation developed by Braithwaite (2017) to the field of competition enforcement. In particular, a competition authority may engage in agile strategies of escalation or de-escalation in competitive sanctions to punish firms' failure to cooperate or comply, or conversely to encourage such attitudes, or to take account of changes in the competitive situation.

Making decision mechanisms more flexible does not imply that competition authorities become more sector-specific regulators. However, making the enforcement of competition rules responsive means moving away from the adjudicatory model to set the competition authority's action over time, and adapting decision mechanisms to the observation of technological and competitive dynamics and to the cooperation of the sanctioned firm. The introduction of rendez-vous clauses that can be activated by either the firm or the authority avoids the risks inherent in a static enforcement model. As Makris (2023) notes, "*to avoid static enforcement [...] is particularly important in fast-paced, dynamic markets where a remedial solution given at given time may be inadequate or excessive a few years later*" (p.241).

Our proposal advocates for a bifurcated approach to enforcement. It addresses the trade-off that authorities face in the context of markets that are rapidly evolving or are characterised by turbulence and uncertainty. The difficulty associated is to strike a right balance. Indeed, the proposed trade-off entails the choice between an enforcement mechanism based on fines or behavioural injunctions (remedies). This paves the way for a discussion on whether financial penalties and behavioural injunctions should complement or replace each other. While fines and injunctions are often used in a complementary way, we advocate for their substitutability within the framework of a flexible decisional tools. It is essential, however, to meticulously craft criteria for such an adaptive design. We have outlined criteria for the design of a mechanism that is adjusting in response to changes in market conditions, and that can shift the balance of enforcement towards fines when unexpected developments limit the scope of remedies or make them unfit. Yet, this is not merely an exercise in refining economic instruments; it also involves navigating legal boundaries, issues of signal transparency, rights of defence as part of judicial oversight, and the assurance of legal certainty for market participants.

Some extensions of our work may consist in envisaging flexibility solely within the realm of behavioural injunctions, by embedding contingency clauses into the "regulatory contract." An alternative approach would involve allowing the substitution of structural for behavioural remedies in cases where the latter prove ineffective. The DoJ's proposed remedies in the *Google Search* case illustrate such a trade-off: while the DoJ recommends a structural separation between Google Search and Google Chrome, it initially requires only behavioural remedies to ensure that Google Search and Android are operated independently, but calls for a structural breakup if Google fails to comply with these management rules.[11] Finally, a dynamic approach involving varying combinations of fines and behavioural remedies could also be implemented in other regulatory domains – such as financial regulation – where regulatory bodies similarly rely on a mix of punitive and corrective instruments.

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[11] US v Google LLC and State of Colorado et al. v Google LLC, Plaintiffs' Revised Proposed Final Judgment, cases n°1:20-cv-03010-APM and n°1:20-cv-03715-APM, United States District Court for the District of Columbia, 7 March 2025.

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