Merger selection, evidence provision and the timing of merger control

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Abstract

Merger control impacts the type of merger projects that are submitted, as well as the information provided by the merging parties upon assessment. In this paper we consider the outcomes in terms of selection of types and evidence provision of alternative timings for the merger assessment, pre- or post-consummation of the merger. We show that the selection effect induced by the ex post merger control is welfare-improving, through the deterrence of the most anti-competitive projects. In contrast, the welfare impact of evidence provision under ex post merger control is ambiguous. Balancing these two effects makes possible the welfare comparison between the ex ante and the ex post enforcement.

Keywords: merger control, asymmetric information, evidence provision

JEL classification: L41, K21, D82

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1 Introduction

Merger control is a pillar of competition policy throughout the world. However, the timing of merger control is not the same across the various jurisdictions: in the EU merger projects are solely examined ex ante, before consummation, whereas in the US they may be challenged afterwards.[1] This procedural choice of ex post versus ex ante merger policy enforcement[2] is not only topical (see Shapiro, 2018, 2019, or Salop, 2016), but also likely to substantially modify the outcome of the control of mergers. In particular, it is likely to affect two key aspects of merger control: the merging firms' evidence provision in defense of their project, and the very decision to merge in the first place. The following examples illustrate this.

In January 2004, the Federal Trade Commission closed its investigation of the consummated merger between Genzyme and Novazyme[3]. The FTC's decision not to challenge this merger to monopoly was based on evidence of both a lack of anticompetitive effects and synergies made possible by the merger during the two years that followed the merger[4]. Had the merger been examined before consummation, the mere fact that it led to monopoly would have recommended its prohibition[5]. In contrast, the European Commission prohibited in 2012 the Deutsche Börse/NYSE-Euronext merger to near monopoly on the European financial derivatives market[6], partly because most of the future efficiency gains argued by the parties were not considered as verifiable at the time of the notification[7]. But challenging a consummated merger also lays a heavy burden on the merging firms. Typically, unwinding a consummated merger found to be unlawful is deemed to involve substantial costs for the merg-

[1] In the US, consummated merger challenges even account for about one-fifth of total merger challenges since 2001 (Rosch, 2012).

[2] See the OECD (2014) for the whole range of possible combinations notification-assessment in the different countries.

[3] See details at http://www.ftc.gov/opa/2004/01/genzyme.htm.

[4] See Chairman's Muris statement, available at http://www.ftc.gov/os/2004/01/murisgenzymestmt.pdf.

[5] See Commissioner's Thompson dissenting statement, available at http://www.ftc.gov/os/2004/01/thompsongenzymestmt.pdf.

[6] Case M.6166.

[7] See in particular paragraphs 1187, 1203, 1298, 1324, 1335 and 1337 of the decision.

ing parties, in particular when "unscrambling the eggs" is very difficult due to the strong integration reached by the insiders[8]. Following decisions such as Chicago Bridge (2005)[9], post-close challenges are deemed to create uncertainty among companies, thereby possibly chilling business activity[10].

In this paper we examine how these features of merger control, namely the selection of submitted projects and the evidence provision, are impacted by the timing of assessment: before or after the consummation of the merger. Based on a model where the agency as well as the merging firms produce costly information on the merger type, and where an ex-post prohibition is costly for the insiders, we challenge the conventional wisdom holding that the ex post assessment yields a trade-off between the informational advantage for the agency and a costly risk for firms.

Explicitly, we consider mergers that have both pro- and anticompetitive effects, but this is the firms' private information. The key assumption is that the enforcement relies on the confrontation of evidence, and this confrontation takes place either before (ex ante) or after the closing (ex post). In order for the merger to be cleared, the merging firms must provide verifiable costly evidence on pro-competitive arguments in favor of their merger, such as efficiency gains for instance, enough to counterbalance the evidence provided by the competition agency on the anticompetitive effects it has identified during the assessment.[11]

[8] Again, see OECD (2014).

[9] https://www.ftc.gov/enforcement/cases-proceedings/0110015/chicago-bridge-iron-company-nv-chicago-bridge-iron-company

[10] See for instance http://www.deallawyers.com/blog/2005/01/undoing-done-deals-the-chicago-bridge-decision.html: "Post-close challenges paralyze markets because they threaten to strip companies of acquired assets and of years of independent product development that they would have engaged in but for the futile attempt to acquire a competitor. [...] Further, even if divestiture does return a company to the position it was in before the merger, the company would be at a disadvantage compared to competitors who have moved on and continued to develop next-generation products during that time. Lost opportunities could be considerable."

[11] For instance, the European Merger Regulation makes clear that an otherwise anticompetitive merger can be cleared provided that the benefits from the merger outweigh the negative effects, but the burden of proof is on the merging parties - see Paragraph 87 of the Horizontal Merger Guidelines.

The merging firms' evidence provision involves a direct cost but also a substantial opportunity cost, due to the delay that the firms agree to incur when they decide to submit to the lengthy assessment by the CA, and which will prevent them from turning to alternative projects.[12] In addition, ex post merger dismantling is supposed to be costlier for the firms than having their project prohibited ex ante, before the actual consummation.[13]

As compared with the pre-merger assessment, the post-closure merger control triggers two changes. First, the extra cost incurred by the insiders will induce self selection, by leading certain merging firms to refrain from merging. This selection effect of the ex post control is always welfare-improving because the deterred mergers are always anticompetitive. But the extra cost may also lead firms to accept to incur a higher cost of evidence provision ex post - this will be termed the informational effect of the ex post control. The welfare impact of the informational effect is ambiguous, because both pro- and anticompetitive merging firms may be induced to incur the cost of evidence provision to defend their merger. We identify the cases where the ex post enforcement yields a higher expected welfare, thanks to a positive informational effect, and also the sufficient conditions ensuring that a negative informational effect is lower than the positive selection effect, again making the ex post control preferable.

We argue that the shape of the distribution of merger types is critical. Explicitly, the ex post control is optimal whenever the CA is likely to face very anticompetitive mergers and very efficient mergers. Instead, whenever there is a low competitive risk associated with the merger, i.e. the merger type distribution is concentrated around the medium range, where both competitive effects of mergers, positive and negative, are relatively close, then the ex ante control of mergers is more efficient. The intuition goes as follows: first, the ex post enforcement is more efficient for very anticompetitive and very pro-competitive mergers, since

[12] Ormosi (2012) shows for instance that even merger projects with high efficiency gains may prefer to give up the lengthy and costly efficiency defence procedure, which stresses that the cost of evidence provision is a key feature of the merger control process.

[13] Arguably, we use a very stylized model to deal with the timing of merger control. While there are many features characterizing the difference between the ex ante and the expost enforcement, we opt to focus exclusively on the private cost incurred by the merging parties in case of ex post assessment, because we study the ensuing incentives in terms of evidence production.

the very anticompetitive mergers will be deterred, while the very pro-competitive mergers will have incentives to invest in evidence provision, thereby reducing the risk of type I errors in case of control by the CA. Both effects are welfare-improving. In contrast, mergers with intermediate anticompetitive effects are less efficiently controlled ex post. These mergers are not deterred because they are profitable enough to incur the extra cost in case of ex post prohibition, and they even have higher incentives to invest in evidence provision to reduce the risk of a ban. This increased level of evidence in their favor makes the prohibition of these merger types more difficult ex post than ex ante.

In terms of related literature, few papers address the optimal timing of enforcing competition policy. Barros (2003) and Berges et al. (2008) study the opportunity of mandatory notifications for the agreement exemptions under Art.101 TFEU, while Choe and Shekhar (2010) consider the same question, of compulsory ex ante notifications, but in the case of mergers. We, in contrast, focus on the role of evidence provision, both before and after merger consummation, while the existing papers ignore this point.[14] Moreover, we endogenize the evidence available. We also complement in a dynamic framework Lagerlöf and Heidhues (2005), who discussed the costly evidence production, but in order to establish the desirability of an efficiency defense in merger control. To our knowledge, there is only one paper, Ottaviani and Wickelgren (2011), dealing with the impact of the (exogenous) information available on the timing of merger control. They show that the ex post enforcement always performs better as long as firms' profits are not too risky. We reach a different conclusion based on alternative assumptions: asymmetric information between the agency and the merging firms both under ex ante and ex post enforcement, and fully endogenizing the information available ex post. Finally, our paper is also related to the literature studying the changes in the population of mergers due to a change in enforcement (see among others Besanko and Spulber 1993, Sørgard 2009, Armstrong and Vickers 2010, Nocke and Whinston 2013, or Burguet and Caminal 2015).

[14] Dertwinkel-Kalt and Wey (2016) also devise a model of merger control with information acquisition, but in order to study the role of remedies under different institutional settings, i.e. adversarial vs inquisitorial systems.

2 The model

We consider a reduced-form merger control game between two risk-neutral agents: the merging firms and the competition authority.

All merger projects enhance market power, and thereby increase prices and/or lower product quality and/or diversity, but may also generate a pro-competitive effect, such as cost savings or a quality increase due to synergies. We consider the population of mergers to be heterogenous w.r.t. the size of this pro-competitive effect. For this we consider a continuous-type framework where e denotes the size of the pro-competitive effects. Let e be distributed according to cdf $F(x)$ on the interval $[\underline{e}, \overline{e}]$, with $\int_{\underline{e}}^{\overline{e}} ef(e)de$ the expected average level of efficiency gains and $f(e)$ the density function. The profit gain from merger is denoted $\pi(e)$ for type e, and is increasing with e. Let $\pi(\underline{e}) \geq 0$. The type of a given merger is the insiders' private information.

The CA applies a consumer surplus welfare standard. Denote $W(e)$ the change in consumer surplus due to a merger of type e: $W(e)$ is increasing with e, and to avoid trivial cases we assume that $W(\underline{e}) < 0 < W(\overline{e})$. Let $\widetilde{e}$ denote the welfare-neutral type, i.e. such that $W(\widetilde{e}) = 0$. Then we have $\widetilde{e} > \underline{e}$.[15]

We model the merger control as an information investment game, enabling the confrontation of evidence between the CA and the insiders. This confrontation can take place either before ("ex ante") or after the merger consummation ("ex post"), and may lead to errors because parties find and provide more or less convincing pieces of evidence.[16]

First, to challenge the merger, the CA must provide evidence on the anticompetitive effects

[15] These assumptions on the monotonicity of profit and consumer surplus functions are compatible with Cournot competition with homogenous goods (see Neven and Röller 2005, p.833-834), as well as with price competition for some specifications of product differentiation (see Neven 2001, p.432-433).

[16] Note that it is far from obvious that ex post it is possible to provide convincing evidence on the merger at no cost. Take for instance an observed increase in post-merger market price(s). To challenge the merger the agency would first need to prove causation, i.e. the fact that the price change is due to the merger and not to some other cause, whereas to defend their merger the merging firms would have to argue that quality-adjusted or product diversity-adjusted prices did not increase.

of the merger.[17] The cost of evidence provision for the agency, denoted x, is distributed on the interval $[0, +\infty[$ according to the cdf $G(x)$. We assume that if it invests to obtain evidence, the CA actually obtains it, and thereby actively challenges the merger.

When challenged by the CA, and in order to secure the merger approval, the merging firms need to provide in response enough evidence on the merger's pro-competitive effect to counterbalance the agency's own evidence on the merger's anticompetitive impact.[18] We assume that if the insiders invest in information, incurring the cost c, this will increase the probability to provide convincing sufficient evidence from 0 to $h(e) > 0$ with $h'(e) > 0$. We interpret c as encompassing both the direct cost of evidence as well as the opportunity cost engaging in evidence provision instead of for instance delaying alternative profitable projects due to the lengthy merger control process.[19] Parameter c is thus of the same magnitude as the merging firms' profit (Ormosi, 2012).

Finally, and so as to write off any other source of exogenous bias in the ex post vs. ex ante enforcement comparison, let the investment cost in evidence provision be the same for the firms as well as for the agency, both ex ante and ex post. Importantly, if the merger is banned after consummation, and thus the insiders are constrained to undo their merger ex post, they incur an additional fixed cost equal to $k > 0$.

We consider the following timing of the game:

Stage 1: The CA decides whether or not to control mergers ex ante. This decision is observed by the firms.

Stage 2: Merging firms observe their type e and decide whether to engage in merger or not.

Stage 3: The CA observes its cost of control x and decides whether to challenge or not

[17] To fix ideas, one can think about this as a simplified version of the European setting, where the EC needs to argue convincingly likely anticompetitive effects in order for a merger project to be subjected to a Phase II investigation.

[18] Such convincing arguments in favor of their merger may be the merger efficiency gains, an easy market access, a fast pace of innovation, or incentives to increase or maintain product quality.

[19] Various surveys (see e. g. Twynstra Gudde/NMa, 2005) indicate mergers are abandoned in anticipation of an active merger control.

the submitted merger.

Stage 4: If the merger is challenged, firms decide to provide evidence counterbalancing the agency's at cost c .

A merger project will be accepted if the CA's evidence on the anticompetitive effect is met by overwhelming proofs in favor of the pro-competitive effect brought by the insiders, or if the CA does not challenge the merger because of lack of evidence. Otherwise, the merger is challenged and blocked.

We determine next the Perfect Bayesian Equilibria of this game.

3 Merger selection and evidence provision: ex post vs ex ante merger control

In this section we compare the outcome of merger control depending on whether it take place before or after the merger consummation.

Ex ante enforcement

With ex ante merger control, there is no ex post unscrambling of the merger, so it is optimal for the insiders, whatever their type, to engage in merger at stage 2. The only decision left to discuss is that of evidence provision at stage 4 in order to secure merger approval in case of a challenge by the agency. More precisely, type e insiders will invest in evidence provision incurring a cost c iff $h(e)\pi(e) > c$, hence an efficiency gains threshold e^I above which the merging firms provide convincing information with probability $h(e)$.

At the previous stage (3) the CA challenges the merger iff the welfare gain from merger control, $\int_{Max(e^I,\underline{e})}^{\overline{e}} h(e)W(e)f(e)de - \int_{\underline{e}}^{\overline{e}} W(e)f(e)de$, exceeds its cost, x. Denote x^{ea} the resulting cost threshold below which the agency invests in evidence provision to challenge a merger.

The following proposition summarizes the outcome of the ex ante control:

Proposition 1 *The ex ante assessment has a unique PBE where the CA challenges the*

merger iff $x \leq x^{ea}$ *and where the firms always engage in merger. In equilibrium, the firms with* $e > Max(e^I, \underline{e})$ *invest in evidence provision in case of a challenge.*

Proof. Follows from the above discussion. ■

The intuition is straightforward: ex ante, because firms have always incentives to engage in merger, the decision to challenge the merger is the result of a trade-off between banning pro-competitive merger types ($e > \widetilde{e}$) and clearing anticompetitive projects ($e < \widetilde{e}$).

Ex post enforcement

Recall that the only exogenous difference between the ex ante and the ex post assessment is the extra cost incurred by firms in case the CA blocks the merger. The merging firms may decide not to merge so as to avoid that extra cost. Therefore we first discuss below the insiders' decision to engage in merger under the ex post assessment.

If the merger is challenged post-consummation, type e insiders invest in evidence provision iff $\pi(e) > \frac{c}{h(e)} - k$. This yields a threshold $e^I(k)$ above which the insiders provide convincing evidence with probability $h(e)$, where $e^I(k)$ decreases with k : ex post, they are more inclined to incur a costly merger control process to avoid the even costlier merger dismantling.

At the previous stage, anticipating this investment in evidence provision, and also the possibility of a merger challenge by the agency, type e insiders choose whether to engage in merger or not. Whenever type e firms expect the agency to challenge the merger with probability G, their merger is profitable iff $G \times Max(h(e)\pi(e) - (1 - h(e))k - c, -k) + (1 - G) \times \pi(e) \geq 0$. This condition implicitly determines the cut-off merger type, indifferent between merging and not merging, denoted $\widehat{e}(G, k)$. Insiders decide to engage in merger for enough efficiency gains, i.e. for $e \geq \widehat{e}(G, k)$. Note that the higher the probability of control G, the higher the minimum level of efficiency gains that insiders need in order to merge - thus, $\widehat{e}(G, k)$ is increasing in G.

As for the agency, it will control mergers only if it is worth doing so, given the cost of evidence provision and the expected population of mergers actually submitted. Explicitly, the CA expects only types $e > \widehat{e}$ to merge, and challenges mergers iff $\int_{Max(\widehat{e}, e^I(k))}^{\overline{e}} h(e)W(e)f(e)de -$

$\int_{\widehat{e}}^{\overline{e}} W(e)f(e)de \geq x$. Denote $\widehat{x}(\widehat{e})$ the critical level of merger control cost below which the CA challenges the merger. Note that the higher the expected marginal merger-type $\widehat{e}$, i.e. the more pro-competitive the submitted mergers, the lower will be the critical level $\widehat{x}(\widehat{e})$, and thus the lower the probability $G(\widehat{x})$ for the merger to be challenged.

The PBE of the ex post enforcement game obtains at the intersection of best reply functions $\widehat{x}(\widehat{e})$ and $\widehat{e}(G(\widehat{x}), k)$, and is characterized as follows:

Proposition 2 *a) The ex post assessment has a unique PBE where the CA challenges the merger iff* $x \leq x^{ep} \equiv \widehat{x}(e^{ep})$ *and the insiders engage in merger iff* $e \geq e^{ep} \equiv \widehat{e}(G(x^{ep}), k)$. *In equilibrium, the firms with* $e > Max(e^I(k), e^{ep})$ *invest in evidence provision in case of merger challenge.*

b) In equilibrium, $e^I(k) < e^I$ *and* $\underline{e} \leq e^{ep} < \widetilde{e}$.

Proof. See the Appendix. ■

The PBE is unique, defined by the cost threshold below which the CA controls mergers (x^{ep}), and the efficiency level above which the firms merge (e^{ep}) and provide evidence ($e^I(k)$). The higher cost (k) in case of ex post ban induces the insiders to provide evidence for a lower level of efficiency gains than with ex ante enforcement ($e^I(k) < e^I$): provided firms engage in merger, they will provide more information with ex post enforcement. In addition, and in contrast with the ex ante enforcement, there also exists an efficiency threshold above which the merging firms decide to engage in merger, due to the higher cost associated with a possible ex post ban. This extra cost k reduces the expected merger profitability, and thereby the incentives to merge. If k is high enough, it induces a selection of types beforehand, and only the insiders with sufficiency efficient gains will submit their merger. However, the corresponding cut-off efficiency level will clearly be below $\widetilde{e}$, meaning that anticompetitive mergers will be submitted with ex post enforcement, or, equivalently, the ex post enforcement necessarily involves underdeterrence. This is due to the imperfect selection of types - otherwise, by controlling mergers, the CA would trigger only pro-competitive mergers being submitted, but then it would no longer need to control mergers, i.e. that would not be an equilibrium.

We now compare the outcomes of ex ante and ex post merger enforcement, to obtain the following:

Proposition 3 *The ex post control yields a higher expected welfare if the probability of both very high and very low levels of efficiency gains is sufficiently high.*

Proof. See the Appendix. ■

This result is driven by the size of and interplay between the two welfare effects of the ex post merger control. The first is a "selection" effect: some anti-competitive mergers are no longer submitted, because of the higher expected cost of a post-consummation ban. The selection effect is always welfare-improving, because all deterred mergers are anti-competitive ($e^{ep} < \widetilde{e}$). The second effect is "informational": insiders are more likely to invest in evidence provision. Its welfare impact is however ambiguous: fewer pro-competitive mergers are blocked since they provide more often information, but possibly more anti-competitive mergers get cleared because anti-competitive types that merge invest in evidence provision although they did not ex ante. The potentially negative informational welfare effect is low if the share of anti-competitive mergers producing evidence is also low. Furthermore, the higher the share of most anti-competitive mergers being deterred, the higher the positive selection effect. Thus, the more concentrated the distribution of merger types around its extreme values, the higher the positive selection effect and the lower the negative informational effect, i.e. the more likely that the ex post enforcement be optimal.

4 Some concluding remarks

This paper examined the extent to which two key features of merger control, the self-selection of submitted projects and the evidence provision upon assessment, are impacted by the timing of the merger policy enforcement: before or after the consummation of the merger. The self-selection of submitted projects is always welfare-improving under ex-post merger policy, since the most anticompetitive mergers are deterred from merging. In contrast, evidence provision with post-closure merger control can be welfare-decreasing, because anticompetitive mergers

have higher incentives to provide evidence in favor of their merger. Therefore, if the share of such types is high, the expected social benefit from ex post control is lower. We thus conclude that the welfare comparison between ex ante and ex post control depends on the shape of the distribution of merger types. In particular, the ex post assessment is shown to be welfare-increasing when there are a lot of very bad and very good mergers that may take place.

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5 Appendix

Proof of Proposition 2. a) For a given probability G for the merger to be challenged, type e merges iff $e > \widehat{e}(G,k)$; $\widehat{e}(G,k)$ increases with G, with $\widehat{e}(0,k) = \underline{e}$.

Given this, the CA believes that types $e > \widehat{e}$ will merge. Then it will challenge the merger iff $x < \widehat{x}(\widehat{e})$. We know that $\widehat{x}(\widehat{e})$ is decreasing in $\widehat{e}$, and $\widehat{x}(e) = 0$ for any $e \geq \widetilde{e}$ and $\widehat{x}(\underline{e}) > 0$. The cut-off strategy of the CA leads to $G = G(\widehat{x})$.

At the PBE, denote the cut-off values of e by e^{ep} and of x by x^{ep} respectively. They must satisfy: $e^{ep} = \widehat{e}(G(x^{ep}),k)$ and $x^{ep} = \widehat{x}(e^{ep})$. The properties of $\widehat{e}(G(x),k)$ and $\widehat{x}(\widehat{e})$ ensure the uniqueness of x^{ep} and e^{ep}.

b) $e^I(k) < e^I$ because $k > 0$, and $e^{ep} < \widetilde{e}$ because $\widehat{x}(e) = 0$ for $e \geq \widetilde{e}$.

Either $e^{ep} = \underline{e}$ or $e^{ep} > \underline{e}$,depending on the relative position of $\widehat{e}(G(\widehat{x}),k)$, where $\widehat{e}(G(\widehat{x}),k)$ is increasing in k. Then for k high enough we have $\widehat{e}(\varepsilon,k) > \underline{e}$ for ε very small, in which case $e^{ep} > \underline{e}$. ■

Proof of Proposition 3. The expected welfare writes:

- with ex post control: $G(x^{ep}) \int_{Max(e^{ep},e^I(k))}^{\overline{e}} h(e)W(e)f(e)de + (1-G(x^{ep})) \int_{e^{ep}}^{\overline{e}} W(e)f(e)de - \int_0^{x^{ep}} ug(u)du$;

- with ex ante control: $G(x^{ea}) \int_{Max(\underline{e},e^I)}^{\overline{e}} h(e)W(e)f(e)de + (1-G(x^{ep})) \int_{\underline{e}}^{\overline{e}} W(e)f(e)de - \int_0^{x^{ea}} ug(u)du$.

We focus on intermediate values of c i. e. such that $e^I(k) < \widetilde{e}$ and $e^I > \underline{e}$, and show that there is always a distribution of e s.t. the ex post control yields a higher expected welfare.

Note that if $e^{ep} > e^I$, (high k), the expected welfare is higher ex post than ex ante. We thus focus below on $e^{ep} < e^I$:

For a given x, the expected welfare writes:

$Max(\int_{Max(e^{ep},e^I(k))}^{\overline{e}} h(e)W(e)f(e)de - x, \int_{e^{ep}}^{\overline{e}} W(e)f(e)de)$ ex post, and $Max(\int_{e^I}^{\overline{e}} h(e)W(e)f(e)de - x, \int_{\underline{e}}^{\overline{e}} W(e)f(e)de)$ ex ante.

We examine the difference (denoted Δ) between the ex post and the ex ante expected welfare in every possible case:

(a) no merger challenge ex post nor ex ante: $\Delta = \int_{\underline{e}}^{e^{ep}} W(e)f(e)de$; the higher $(F(e^{ep}) - F(\underline{e}))$, the higher Δ.

(b) merger challenge both ex post and ex ante: $\Delta = \int_{Max(e^{ep},e^I(k))}^{e^I} h(e)W(e)f(e)de$; if $(F(\widetilde{e}) - F(e^{ep}))$ is low enough, $\Delta \geq 0$.

(c) no merger challenge ex post but challenge ex ante: $\Delta = \int_{e^{ep}}^{\overline{e}} W(e)f(e)de - \int_{e^I}^{\overline{e}} h(e)W(e)f(e)de + x$; the lower $(F(\widetilde{e}) - F(e^{ep}))$ and the higher $(F(\overline{e}) - F(\widetilde{e}))$, the higher Δ, which may be positive.

(d) challenge ex post but not ex ante: $\Delta = \int_{Max(e^{ep},e^I(k))}^{\overline{e}} h(e)W(e)f(e)de - x > \int_{e^{ep}}^{\overline{e}} W(e)f(e)de > \int_{\underline{e}}^{\overline{e}} W(e)f(e)de > \int_{e^I}^{\overline{e}} h(e)W(e)f(e)de - x$; therefore, the expected welfare is higher ex post.

Thus, expected welfare is higher with ex post enforcement for distributions with large enough weight on $[\underline{e}, e^{ep}]$ and $[\widetilde{e}, \overline{e}]$ and small enough weight on $\left[e^I(k), \widetilde{e}\right]$. ■