# Class Actions and Private Antitrust Litigation*

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**Abstract**

The paper analyzes the effect of private antitrust litigation on firms' ability to collude and charge supracompetitive market prices. When the cost of litigation is below a threshold, firms charge high market prices, accommodate lawsuits, and accept the litigation costs as just another cost of doing business. By contrast, when the cost of litigation is above the threshold, the firms charge lower market prices and deter litigation. We model the class action as a mechanism that allows plaintiffs to lower their litigation costs, and show that class actions may or may not be privately and socially desirable. We also show that the firms' private incentives to block class action lawsuits may be either aligned with the social incentives, socially excessive, or socially insufficient. Various extensions, such as settlement, contingent fee compensation, fee shifting (loser-pays-all rule), and damage multipliers (treble damages), are also examined.

JEL Codes: D21, K12, K21, K41, L41

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# 1 Introduction

In the United States, victims of corporate misconduct and illegal business practices can sometimes consolidate their individual lawsuits into a single class action, so as to achieve economies of scale and other benefits.[1] Examples of successful class action litigation against corporations include products liability lawsuits, pricing fixing and other antitrust lawsuits, lawsuits by employees against an employer alleging, for instance, discrimination, and securities class actions by public investors. In 1980, the U.S. Supreme Court extolled the class-action mechanism, saying "aggrieved persons may be without any effective redress unless they may employ the class-action device."[2] In subsequent decades, the class action flourished in the United States.

The class action has been in decline in recent years, however. This is due to several factors. Foremost, the U.S. Supreme Court tightened the requirements for class certification in *Wal-Mart Stores, Inc. v. Dukes* and *Comcast Corp. v. Behrend*, significantly raising the barriers for new class actions.[3] Furthermore, businesses commonly deflect class actions by requiring consumers, employees, and investors to waive their rights to bring class actions. When purchasing a cell phone plan, for example, consumers are required to sign away their right to litigate and agree to channel their complaints through company-sponsored individual arbitration.[4] In a series of landmark rulings, including *Concepcion* and *Italian Colors*, and most recently *Epic Systems*, the US Supreme Court upheld private contracts that block class actions.[5]

[1]See for example Dam (1975), Miller (1998), Bone (2012), and Rosenberg and Spier (2014). Notwithstanding the possible benefits, the class action has always been controversial. Many scholars and practitioners have argued that the system is inefficient and engenders a new type of agency problems, that between plaintiffs and their representative lawyers.

[2]See *Deposit Guar. Nat'l Bank v. Roper,* 445 U.S. 326, 339 (1980). Rule 23 of the Federal Rules of Civil Procedure, adopted in 1966, allows lawsuits to be brought on behalf of a class of victims who have allegedly suffered harm.

[3]See *Wal-Mart Stores, Inc. v. Dukes*, 564 U.S. 338 (2011), and *Comcast Corp. v. Behrend*, 569 U.S. 27 (2013).

[4]In recent years, these contractual arrangements have proliferated. See Gilles (2005). Recent federal legislation, such as The Fairness in Class Action Litigation Act of 2017 (FICLA), is also viewed as hostile to class actions.

[5]See *AT&T Mobility LLC v. Concepcion*, 563 U.S. 333 (2011), *American Express Co. v. Italian Colors Rest.*, 133 S. Ct. 2304 (2013), and *Epic Systems Corp. v. Lewis*, 138 S. Ct. 1612 (2018) (holding that mandatory, individual arbitration clauses in employment contracts are consistent with both the Federal Arbitration Act and the National Labor Relations Act). In stark contrast, the Consumer Financial Protection Bureau (CFPB) sought to protect class actions in consumer financial contracts. CFPB is a federal agency formed in accordance with the Dodd-Frank Act after the recent financial crisis and is in charge of overseeing and regulating consumer financial contracts, such as credit card agreements and mortgage contracts. After a notice and comment period, CFPB issued a rule ("Arbitration Agreements Rule"), prohibiting mandatory arbitration clause in certain consumer

This paper analyzes the private and social desirability of class action lawsuits in the context of private antitrust litigation.[6] We focus on possible price fixing by firm-defendants in a market, and the class action is modeled as a mechanism that allows consumer-plaintiffs to lower their cost of bringing lawsuits against the firm-defendants. Our analysis produces several results. Importantly, the analysis shows that class action lawsuits may or may not be socially desirable. In some circumstances, the threat of class actions may force the firms to lower their prices to avoid lawsuits. But if the class action mechanism makes lawsuits very cheap and easy to bring, firms may simply accept litigation as a necessary cost of business and engage in even more egregious anti-competitive conduct. We show that, depending on the circumstances, the firms' private incentive to block class action lawsuits may be socially excessive or socially insufficient.

To explore these ideas, we present a simple model where firm-defendants collude to fix their prices in the shadow of future litigation. A higher price-cost markup raises the level of damages that the consumers can collect, if the firms are indeed found guilty of price fixing. We examine two cases: forward-looking (sophisticated) consumers and myopic (unsophisticated) consumers. Forward-looking consumers have rational expectations, and understand that they may receive damage payments from the firms in the future. These sophisticated consumers view the expected damage payments as a rebate that partially offsets the purchase price of the product.[7] Myopic consumers do not foresee being plaintiffs in the future, and focus only on the sticker price when deciding whether or not to purchase the product.

The most profitable strategy for the colluding firms depends on the consumers' cost of bringing private antitrust lawsuits. We analyze the firms' pricing strategies for three different regions of litigation costs: a high-cost region where the firms engage in unbridled collusion and lawsuits never arise, an intermediate-cost region where the threat of litigation disciplines the market price, and a low-cost region where firms collude and endure lawsuits in equilibrium. For each region we perform local comparative statics to see how lowering the consumer-plaintiffs' costs of bringing lawsuits affects prices, profits, consumer surplus and social welfare. We also examine

financial contracts, on July 10, 2017. The US Congress overturned the rule by a 51-50 vote (Vice President Pence casting the tie-breaking vote) on October 24, 2017. See Ackerman and Hayashi (2017).

[6]Private antitrust litigation is both a substitute and a complement for public enforcement of antitrust violations in the United States. Between 1975 and 2012, 92% of all antitrust lawsuits filed in US District courts were brought by private parties rather than by government agencies. See Sourcebook of Criminal Justice Statistics Online, *www.albany.edu/sourcebook/tost*5.*html*

[7]In particular, the "effective price" paid by consumers is the up-front purchase price minus the future net damages award (the damages award minus their litigation cost).

the (potentially discontinuous) changes in welfare when costs move across regions.

First, when the consumers' cost of bringing lawsuits is above a threshold, then the firms are effectively immune from litigation. Since consumers face high barriers to bringing lawsuits against the firms, the firms will collude and fix their prices at unconstrained monopoly levels. From the firms' perspective, this is the ideal outcome; from the perspective of consumers and the social planner, this is suboptimal. Consumers must pay a high price for the products, and the market suffers the conventional deadweight loss from restricted supply. Given that there is no litigation in equilibrium, though, there is no deadweight loss from litigation.

Second, when the consumers' cost of bringing suit is in an intermediate region, the firms will deter lawsuits by distorting the price below the monopoly level. If the firms charged the unconstrained monopoly price, then the consumers would file antitrust lawsuits, and resources would be spent on litigation. In this intermediate case, the firms lower the market price to just below the point where the consumers are indifferent between bringing suit and not bringing suit.[8] Note that when the consumers' cost of bringing suit falls, the market price must fall too. The lower market price harms the firms' profits, but increases consumer surplus and benefits society more broadly (the deadweight loss shrinks).

Third, when the consumers' cost of bringing private antitrust lawsuits is in a low region, then the colluding firms will choose to accommodate lawsuits. Instead of deterring lawsuits by charging a very low price, the colluding firms will instead raise their prices to monopoly levels. Here, the colluding firms make a conscious decision to accept the costs of litigation as simply another cost of doing business. In this low region, the firms and the consumers are better off when, on the margin, it is cheaper for consumers to bring private antitrust lawsuits. Lower costs correspond to lower effective prices for consumers, higher demand for the product, and higher profits for the firms.

Using this simple framework, we ask the following question: are class action lawsuits socially desirable? If one simply examines the three regions in isolation, class actions increase social welfare: In the intermediate-cost region where litigation is deterred, lowering the cost of bringing suit forces the colluding firms to lower their price-cost margins; in the low-cost region where litigation is accommodated, lowering the cost of bringing suit reduces the effective price that consumers pay and lowers the firm's cost of doing business. However, social welfare falls precipitously when the cost

[8]Distorting the market price has a negative direct effect (the firms' profit margins shrink), but has a positive strategic effect (the firms avoid being sued).

of litigation crosses from the intermediate-cost region into the low-cost region. The intermediate-cost region enjoys both lower prices and no litigation costs. The low-cost region suffers from two problems: monopoly pricing and costly equilibrium litigation. We prove that social welfare is highest when the consumer's cost of bringing suit is at the very bottom of the intermediate-cost region.

Our model shows that the private incentives to block class action lawsuits may be either aligned with the social incentives, socially excessive, or socially insufficient. Within the low-cost region, the private and social incentives to block class actions are aligned. Both producer and consumer surplus are higher when the consumers' cost of litigation falls. In the intermediate and high cost regions, the firms' private incentive to block class actions may be socially excessive. When the consumers' litigation cost falls, it can also lower the equilibrium price, thereby increasing consumer surplus and social welfare. But, of course, because the firm profits will suffer, they have no incentive to allow class actions. Finally, we show that the firms sometimes obtain higher profits moving from the intermediate-cost region to the low-cost region. Since the low-cost region suffers from monopoly pricing and equilibrium litigation, moving from the intermediate to the low-cost region is socially harmful. In that case, the firms' incentive to block class actions is socially insufficient.

We also extend the basic analysis is several directions. First, our main analysis assumes that all lawsuits go to trial. We show that in a world of frictionless settlement, the threat of litigation does not deter collusion and cannot improve social welfare. In reality, however, settlement is not frictionless, and so private antitrust litigation will have some deterrent effect. In that light, we examine the problems of asymmetric information between the consumer-plaintiffs and firm-defendants and the possible settlement failures. Furthermore, although our main model assumes that the litigants pay the fixed costs of legal services, the same results hold with contingent fee attorneys and a perfectly competitive market for legal services. When the market for legal services is not perfectly competitive and the contingent fee attorneys earn rents in equilibrium, on the other hand, firms are worse off and are even more likely to impose class action waivers. Fee-shifting rules and damage multipliers are also discussed.

Our model is closely related to those that investigated the real effects of treble damages in private antitrust litigation. Breit and Elzinga (1974) and Easterbrook (1985) have argued that far-sighted consumers will take into account future damage awards when making their purchase decisions.[9] In models with costless litigation, Salant (1987) and Baker (1988) show formally that damage remedies have neutral

[9]Easterbrook (1985, 451) notes that if consumers "have perfect information and enforcement is costless, they view the future recovery as a cents-off coupon attached to each purchase."

welfare consequences. Besanko and Spulber (1990) show that this neutrality does not hold when the cartel has private information about the costs of production and expected damages are under-compensatory (an assumption that we will relax). None of these papers fully characterize the equilibrium pricing strategies with costly litigation, explore the comparative statics, or derive the welfare implications presented here.[10]

# 2 The Model

Suppose there is a unit mass of consumers. Each consumer demands at most one unit of the good and has valuation $v \in [0, \overline{v}]$. The valuations are distributed according to a strictly positive and differentiable probability density function $f(\cdot)$ and corresponding cumulative density function $F(\cdot)$. Conditional on equilibrium price $p$, the aggregate demand is given by

$$D(p) = \int_p^{\overline{v}} f(v)dv$$

There are $N > 1$ firms in the market with the identical, constant marginal cost of $c \in [0, \overline{v})$. Both the number of firms ($N$) and the constant marginal cost ($c$) are common knowledge. Firms sell homogeneous products. Consumers costlessly observe all posted prices and other non-price terms (such as a class action waiver) in the market before deciding whether (and from whom) to purchase.

We now define some important notation. If the equilibrium market price is $p$ then the aggregate industry profit is given by

$$\Pi(p, c) = \int_p^{\overline{v}} (p - c)f(v)dv = D(p)(p - c) \tag{1}$$

Without any collusion, the unique Bertrand equilibrium is given by all firms charging $p = c$ and earning zero profits. With perfect collusion, on the other hand, the firms would agree to set the price at the monopoly level

$$p^m(c) = \arg\max \Pi(p, c). \tag{2}$$

Finally, social welfare is

$$W(p, c) = \int_p^{\overline{v}} (v - c)f(v)dv. \tag{3}$$

[10]Spulber (1989, 592) briefly discusses litigation costs and how they constrains the firms' markup.

From the social welfare function, the first-best outcome is obtained (i.e., social welfare is maximized) when $p = c$.

Suppose that there are antitrust laws that allow consumers to bring lawsuits when the market price is above marginal cost, $p > c$. Consumers who have purchased the product can then sue the firms to collect damages $d = \theta(p-c)$ where $\theta \in (0,1)$. There are different interpretations of the parameter $\theta$. It could simply be the probability that the plaintiffs will successfully present evidence of collusion. Alternatively, $\theta < 1$ could reflect court error or a pro-defendant bias where the court gives a "haircut" of $1-\theta$ to the actual overcharge. By tweaking notation, it could also reflect a biased assessment by the court of the firm-defendants' marginal costs. Note that since $\theta < 1$, the expected damage award is not fully compensatory. We will see shortly that the assumption also implies that the firms are not completely deterred from colluding on price. Later in the paper we extend the analysis to allow $\theta \geq 1$ (e.g. through supra-compensatory damages).

Litigation is expensive for both the consumers and the firms. The litigation costs per unit sold are $k_p > 0$ for the consumers (the plaintiffs) and $k_d > 0$ for the firms (the defendants). We assume that $c + k_d < \overline{v}$, and let $k = k_p + k_d$ be the total per unit litigation cost. Given the positive litigation cost, consumers will bring suit if only if it is profitable: $k_p < \theta(p-c)$. When indifferent ($k_p = \theta(p-c)$), we assume that consumers do not bring suit. Note that while each consumer places a different valuation on the product, each consumer's cost of litigation is the same. This assumption is made for simplicity. We interpret class actions as a mechanism that reduces the plaintiffs' cost of bringing lawsuits. In particular, we model class actions as reducing the per-plaintiff litigation cost from $k_p$ to $\Delta k_p$ where $\Delta \in (0,1)$.[11] With class actions, consumers will bring suit when $\Delta k_p < \theta(p-c)$. For now, we assume that only the consumers who actually purchased the product can bring suit or join the class. We will relax this assumption later in the paper.

The timing of the game is as follows. At $t = 1$, the $N$ firms offer to sell homogeneous products at price, $p$, and with or without a class action waiver. We implicitly assume that the firms are acting in their joint interest, and have mechanisms to enforce their collusive agreement.[12] The offer terms are observed by all consumers. At $t = 2$, the consumers decide whether to purchase the product. After purchasing the product, at $t = 3$, consumers decide whether to bring suit to collect damages for any

[11] When plaintiffs' multiple lawsuits are consolidated into a single class action, the defendants can also enjoy the economies of scale. We can allow the defendant-firms' litigation cost to decrease (to $\Lambda k_d$ where $\Lambda \in (0,1)$), but the substantive results will not change.

[12] They might accomplish this through repeated interaction with low or no cost of detection.

overcharges. If lawsuits are brought, the per-unit litigation costs $k_p > 0$ and $k_d > 0$ are borne and per-unit damages $d = \theta(p - c)$ are paid at $t = 4$. For simplicity, there is no time discounting. The solution concept is subgame-perfect Nash equilibrium.

We consider two cases. Section 2.1 considers forward-looking consumers who apply higher-level reasoning and foresee being plaintiffs in ex post litigation. Those consumers will treat any future damage award, minus the litigation cost, as a (expected) rebate when making their purchase decisions. Section 2.2 consider "myopic" (less sophisticated) consumers who do not foresee being plaintiffs in litigation. That is, myopic consumers assume that there will be no ex post litigation and no rebate. After the purchase, however, they will bring suit if it is in their interest to do so. For each of these two cases, we will perform comparative statics on the plaintiffs' litigation costs ($k_p$). Unlike the consumers, we assume that the firms are always forward-looking.

## 2.1 Forward-Looking (Sophisticated) Consumers

Suppose that consumers understand fully at the time of purchase that there will be an opportunity to sue in the future for overcharges. If $p \leq c + k_p/\theta$ or $k_p \geq \theta(p - c)$, lawsuits are prohibitively expensive. Knowing that they will not bring suit, consumers purchase the product if and only if $v \geq p$. If $p > c + k_p/\theta$, on the other hand, then $k_p < \theta(p - c)$ and consumers are willing to pay the litigation cost of $k_p$ to collect the damages of $\theta(p - c)$ through the lawsuit. In anticipation of this, a consumer will purchase the product if and only if $v \geq p - \theta(p - c) + k_p$. This is the *effective price* that a consumer pays for the product after accounting for the "rebate" and the litigation cost. In general, the effective price ($x(p)$) may be written as follows:

$$x(p) = \begin{cases} p & \text{if } p \leq c + k_p/\theta \\ (1 - \theta)p + \theta c + k_p & \text{if } p > c + k_p/\theta \end{cases} \tag{4}$$

Note that $x(p)$ is a strictly increasing function of $p$ (since $\theta \in (0, 1)$).

Given $x(p)$, we can characterize the firms' aggregate profits as a function of $p$. If $p < c + k_p/\theta$, the firms' aggregate profits are $\Pi(p, c) = D(p)(p - c)$ as defined above. When $p > c + k_p/\theta$, the firms' effective profit margin per unit sold, after taking into account the future litigation cost and damages, is $p - c - \theta(p - c) - k_d$. Using the definition of $x(p)$ and remembering that $k = k_p + k_d$, the firms' effective profit margin can be written as $x(p) - c - k$.[13] When $p > c + k_p/\theta$, the firms' profit

[13] Rearranging (4) gives $p = \frac{x(p) - \theta c - k_p}{1 - \theta}$, and plugging this expression into $(1 - \theta)(p - c) - k_d$ gives the result.

is $\Pi(x(p), c+k) = D(x(p))(x(p)-c-k)$. In the following analysis, it is useful to represent the firms' profits as a function of the effective price, $x$:

$$\text{Profit} = \begin{cases} \Pi(x,c) & \text{if } x \leq c + k_p/\theta \\ \Pi(x, c+k_p+k_d) & \text{if } x > c + k_p/\theta \end{cases} \tag{5}$$

The firms and the consumers together are bearing litigation cost $k = k_p + k_d$ and the firms' aggregate profit function reflects this.

Note that, just like the effective price $x(p)$, the firms' (aggregate) profit function is discontinuous at $p = c + k_p/\theta$. When $p < c + k_p/\theta$, consumers do not bring lawsuits, so that $x(p) = p < c + k_p/\theta$ and the firms' profits reflect the production costs only, $\Pi(p,c)$. When the price is slightly higher, so that $p = c + k_p/\theta + \varepsilon$ where $\varepsilon > 0$ is very small, consumers bring lawsuits. In that case, we get $x(p) = p + (1-\theta)\varepsilon > c + k_p/\theta$. Taking the limit as the price approaches $p = c + k_p/\theta$ from above, the (aggregate) profits are $\Pi(p, c+k) < \Pi(p,c)$.

We now define an important piece of notation. Let $\widehat{k}_p$ to be the implicit solution of the following equation:

$$\Pi\left(c + k_p/\theta, c\right) = \Pi\left(p^m(c+k), c+k\right) \tag{6}$$

where $k = k_p + k_d$. The left-hand side of (6) represent the aggregate profits the firms earn if they charge $p = c + k_p/\theta$. Since $k_p = \theta(p-c)$ in this case, no lawsuits are filed and consumers purchase the product if and only if $v \geq p = c + k_p/\theta$. The right-hand side of represents the maximal profits for (hypothetical) firms with marginal costs $c + k$.[14] The condition given in (6) is illustrated graphically in Figure 1. The upper parabola represents the firms' aggregate profits when there is no litigation; the lower parabola represents the aggregate profits when there is litigation. As $k_p$ rises, the upper parabola remains fixed and the lower parabola shifts downwards. When $k_p = \widehat{k}_p$, the aggregate profits the firm can generate while bypassing litigation (the peak of the upper parabola) are the same as the maximum profits they can earn while allowing litigation. The following lemma shows that $\widehat{k}_p$ exists and is unique.

**Lemma 1.** *There exists a unique $\widehat{k}_p \in (0, \theta(p^m(c) - c))$ that satisfies (6).*

*Proof of Lemma 1.* Consider the left-hand side of (6). When $k_p = 0$ the left-hand side is $\Pi(c,c) = 0$, and when $k_p = \theta(p^m(c) - c)$ the left-hand side is $\Pi(p^m(c), c)$, which is the monopoly profit without the threat of litigation. The left-hand side is a strictly

[14] When $k_p = 0$, the left-hand side of 6, $\Pi(c,c)$, is zero while the right-hand side is positive. As $k_p$ rises, the left-hand sides increases so long as $c_p + k_p/\theta < p^m(c)$ and decreases thereafter. The right-hand side is everywhere decreasing when $k_p$ rises.

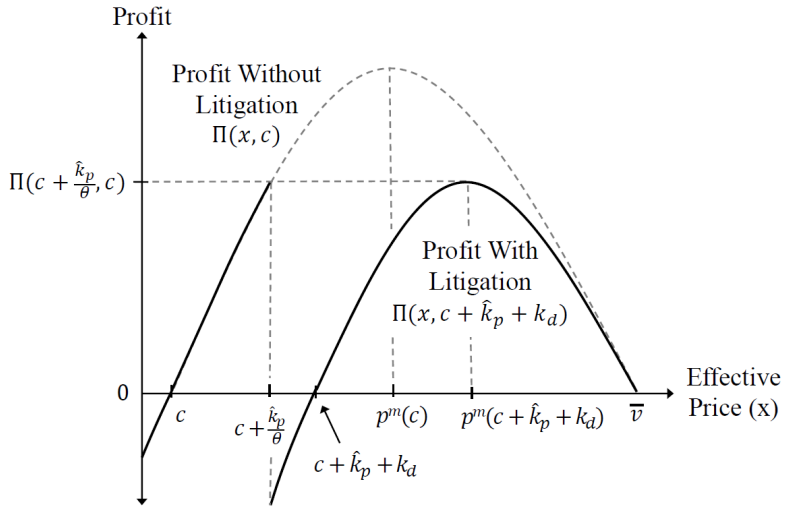


Figure 1: Definition of $\widehat{k}_p$

increasing function of $k_p$ for all $k_p \in [0, \theta(p^m(c) - c))$. Now consider the right-hand side of (6). First, since $k = k_p + k_d > 0$, we have $\Pi(p^m(c+k), c+k) \in [0, \Pi(p^m(c), c))$. Further, since $c + k_d < \overline{v}$, we know that when $k_p = 0$, $\Pi(p^m(c + k), c + k) > 0$. Conditional on $\Pi(p^m(c+k), c+k) > 0$, when we differentiate $\Pi(p^m(c+k), c+k)$ with respect to $k_p$, with the envelope theorem, we get $-D(x(p)) < 0$ whenever $\Pi(p^m(c + k), c + k) > 0$. Hence, the right-hand side is strictly decreasing with respect to $k_p$ whenever $\Pi(p^m(c + k), c + k) > 0$ and is equal to zero otherwise. Taken together, there is a unique $\widehat{k}_p \in (0, \theta(p^m(c) - c))$ that solves equation (6) implicitly. □

The threshold plaintiff litigation cost, $\widehat{k}_p$, plays an important role in our analysis of the firms' pricing strategy. When $k_p < \widehat{k}_p$, because the consumers' litigation cost is sufficiently low, the firms are better off allowing lawsuits in equilibrium and realizing profits $\Pi\left(p^m(c + k), c + k\right)$: the right-hand side of (6) is larger. As $k_p$ rises, $p^m(c+k)$ also rises, while $\Pi\left(p^m(c + k), c + k\right)$ falls. On the other hand, when $k_p > \widehat{k}_p$, firms will set the price just high enough to eliminate lawsuits in equilibrium: the left-hand side of (6) is larger. As $k_p$ rises, both $c + k_p/\theta$ and $\Pi\left(c + k_p/\theta, c\right)$ rise. When $k_p \geq \theta(p^m(c), c)$, the firms can charge the unconstrained monopoly price without having to face any lawsuits. This allows us to establish the following result.

**Proposition 1.** *The prices, litigation decisions, firm profits, and social welfare depend on the plaintiffs' litigation costs $k_p$ as follows:*

1. *If $k_p < \widehat{k}_p$, the effective price is $p^m(c + k)$ and lawsuits are brought in equi-*

*librium.*[15] *Aggregate firm profits are* $\Pi(p^m(c+k), c+k)$ *and social welfare is* $W(p^m(c+k), c+k)$. *As* $k_p$ *increases, both firm profits and social welfare decrease.*

2. *If* $k_p \in [\widehat{k}_p, \theta(p^m(c) - c))$, *the price is* $c + \frac{k_p}{\theta}$ *and no lawsuits are brought in equilibrium. Aggregate firm profits are* $\Pi(c + \frac{k_p}{\theta}, c)$ *and social welfare is* $W(c + \frac{k_p}{\theta}, c)$. *As* $k_p$ *increases, firm profits increase, but social welfare decreases.*

3. *If* $k_p \geq \theta(p^m(c) - c)$, *then the price is* $p^m(c)$ *and no lawsuits are brought. Aggregate firm profits are* $\Pi(p^m(c), c)$ *and social welfare is* $W(p^m(c), c)$. *As* $k_p$ *increases, both firm profits and social welfare stay constant.*

The results of Proposition 1 are straightforward. When the consumer-plaintiffs' litigation cost is in the highest region, $k_p \geq \theta(p^m(c) - c)$, the firms can simply collude on the monopoly price of $p^m(c)$ and consumers will not sue since lawsuit is prohibitively expensive. The colluding firms are insulated from litigation in this case. When $k_p < \theta(p^m(c) - c)$, on the other hand, there will be litigation if the firms charge $p^m(c)$. The firms have two choices. First, they could drop their (collusive) price to avoid litigation altogether. Second, they might accommodate litigation and raise their price to reflect the costs of litigation. The firms' choice depends on the magnitude of $k_p$.

Figure 2 shows the equilibrium effective price as a function of the plaintiff's litigation costs, $k_p$. When the plaintiff's litigation costs are low, $k_p < \widehat{k}_p$, the firms accept that current sales will generate future litigation. The colluding firms treat the litigation costs and the future damage payments as just another cost of doing business, and set price accordingly. In this case, the effective price is $p^m(c + k_p + k_d)$, the monopoly price when the unit cost is $c + k_p + k_d$. When the plaintiff's litigation cost is in the middle region, $k_p \in [\widehat{k}_p, \theta(p^m(c) - c))$, the firms find it worthwhile to set the price just low enough to deter lawsuits, $p = c + k_p/\theta$. When the plaintiff's litigation cost is in the high region, $k_p \geq (p^m(c) - c)$, the the firms are unconstrained by future litigation and set the price at the monopoly level, $p^m(c)$.

Figure 3 shows aggregate firm profits and social welfare as a function of the plaintiff's litigation cost, $k_p$. When $k_p < \widehat{k}_p$, in equilibrium, consumers file suit after purchasing the product. Notice that the firms' profits are falling as $k_p$ rises in this region, just as they would if the firms' production costs were to increase. Increasing the plaintiff's litigation costs in this range also harms social welfare directly (since litigation is even more wasteful) and indirectly through an increase in the effective price and the associated reduction in demand. Note also that even as $k_p$ goes to zero,

[15] At the time of purchase, consumer pays a price of $\frac{p^m(c+k) - \theta c - k_p}{1-\theta} > p^m(c+k)$.

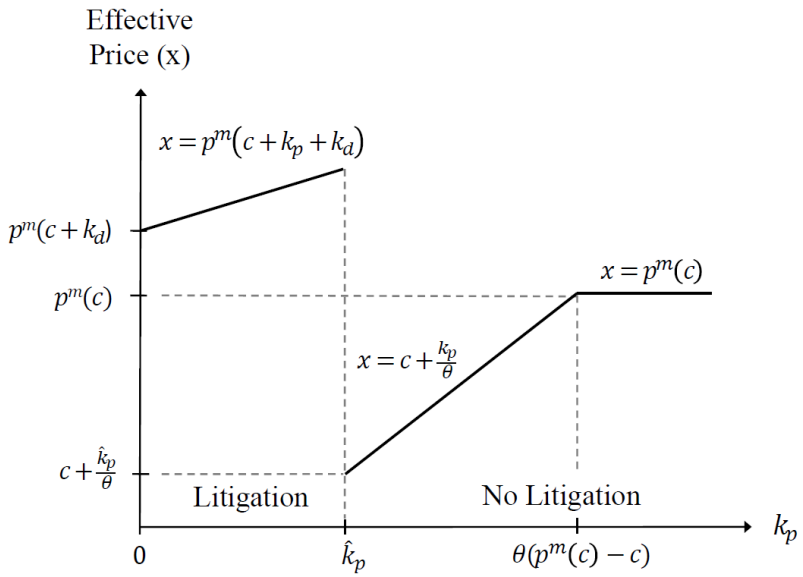


Figure 2: The Effective Price

both the social welfare and the firm profits stay below those under the unconstrained monopoly price ($p^m(c)$). The reason is that even when $k_p = 0$, firms still face a positive litigation cost ($k_d > 0$), which generates a welfare loss from litigation and also imposes a higher marginal cost on the firms ($c + k_d$), thereby reducing the aggregate demand.

When the plaintiff's litigation cost rises and crosses into the middle region, $k_p \in [\widehat{k}_p, \theta(p^m(c) - c))$, the firms lower their prices to $c + k_p/\theta$ in order to avoid costly litigation. This helps consumers and also increases social welfare, as shown by the discontinuity of the social welfare function when $k_p = \widehat{k}_p$. The increase in social welfare comes from two sources: (1) more consumers purchase the product because the (effective) price is lower; and (2) there is less wasteful litigation spending. When $k_p$ rises in this middle region, firms are better off (since they can raise their prices closer to $p^m(c)$ and still avoid lawsuits) but social welfare falls (as the higher prices harm consumers and create a larger dead-weight loss).

Finally, when the consumer-plaintiff's litigation costs are in the highest region, $k_p > \theta(p^m(c) - c)$, then the firms can charge the unconstrained monopoly price $p^m(c)$ and avoid litigation. Increasing $k_p$ has no affect on profits or social welfare in this region. The following corollary follows immediately from Proposition 1.

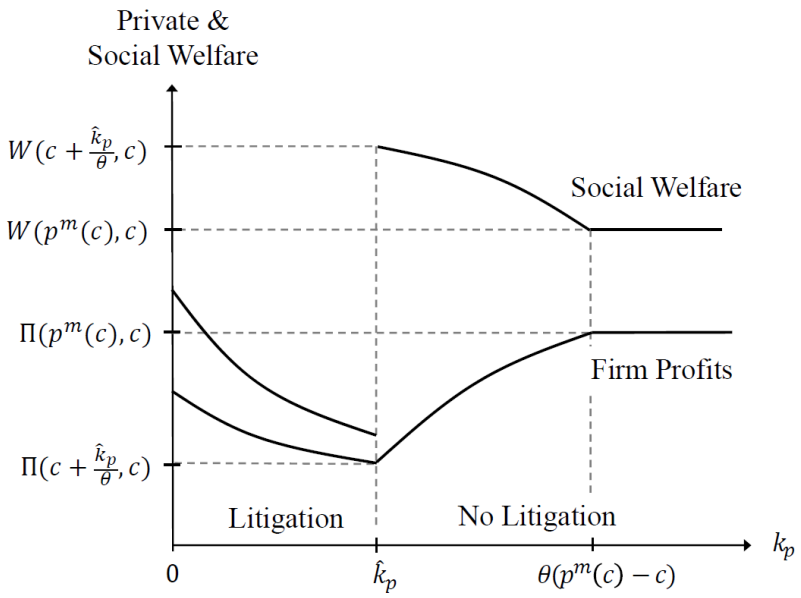


Figure 3: Private and Social Welfare

**Corollary 1.** *Firm profits are maximized when the plaintiff litigation costs are sufficiently high, $k_p \geq \theta(p^m(c) - c)$. The firms charge the monopoly price, $p^m(c)$, and no lawsuits are brought. Social welfare is maximized when $k_p = \widehat{k}_p$. The firms charge $\widehat{p} = c + \frac{\widehat{k}_p}{\theta} < p^m(c)$ and no lawsuits are brought.*

The firms would clearly like to squelch all possible litigation and charge the unrestricted monopoly price of $p^m(c)$. This is possible only when the costs of litigation $k_p$ are prohibitively high. With $k_p \geq \theta(p^m(c) - c)$, consumers will not bring suit even if the firms were to charge $p^m(c)$. In that case, firms can engage in unbridled collusion and earn profits of $\Pi(p^m(c), c)$. Consider instead the opposite extreme where $k_p = 0$. In this case, consumers will bring lawsuits whenever $p > c$. The firms and the forward-looking consumers will internalize the firms' litigation costs ($k_d$). The firms will raise the actual price to the point where the effective price paid by consumers is $p^m(c + k_d)$ and the profits would be $\Pi(p^m(c + k_d), c + k_d)$, which is strictly less than $\Pi(p^m(c), c)$.

Interestingly, Corollary 1 tells us that it is not in society's interest for the plaintiff's litigation costs to be too small. If plaintiffs could costlessly bring litigation against the firms for overcharges, the firms would not simply give up and charge marginal cost. Instead, they will accept litigation as another cost of doing business and will raise their prices to reflect this. According to Proposition 1, if $k_p = 0$, the effective price charged by the firms would be $p^m(c + k_d) > p^m(c)$ and social welfare would be

$W(p^m(c+k_d), c+k_d) < W(p^m(c), c)$. The society is strictly worse off (compared to the case where the plaintiffs' litigation cost is prohibitively high) when plaintiffs can costlessly bring lawsuits.[16] Since social welfare is decreasing in the plaintiff's litigation costs in the lowest region, we know that the socially optimal litigation cost is not in the lowest region. In the middle region, $k_p \in [\widehat{k}_p, \theta(p^m(c)-c))$, the firms set the price to just deter litigation, $p = c+k_p/\theta < p^m(c)$. If we were to start from $k_p = \theta(p^m(c)-c)$ and gradually decrease $k_p$, litigation will be kept off the equilibrium path while the price chosen by the firms will gradually decrease. As firms' profits decrease, social welfare increases. Social welfare will obtain the maximum when $k_p = \widehat{k}_p$. Examining all three regions, we see that the socially optimal litigation cost is $k_p = \widehat{k}_p$.

This reasoning allows us to evaluate class actions and class action waivers. So far, we have assumed that each consumer will bring a lawsuit on an individual basis. Now suppose, instead, that the consumers can bring a class action against the firms for colluding on price. Recall that the class action lowers the per-plaintiff litigation cost from $k_p$ to $\Delta k_p$ where $\Delta \in (0,1)$. If, instead, firms require consumers to sign a class action waiver (and the consumers do so as a condition of purchase), we assume that the consumers' individual litigation cost remains $k_p$. The following proposition shows how the firms' incentive in imposing class action waivers can either be consistent with or diverge from the social welfare objective.

**Proposition 2.** *Suppose the firms can require class action waivers from consumers as a condition of sale, thus blocking class actions and raising the consumers' cost of bringing private antitrust lawsuits. There exists $\overline{k}_p \in (\widehat{k}_p, \theta(p^m(c)-c))$, such that $\Pi(c+\frac{\overline{k}_p}{\theta}, c) = \Pi(p^m(c+k_d), c+k_d)$.*

1. *When $k_p \leq \widehat{k}_p$, firms will allow class actions $\forall \Delta \in (0,1)$, and this is socially efficient.*
2. *When $\widehat{k}_p < k_p < \overline{k}_p$, firms will block class actions if $\Delta \geq \overline{\Delta}(k_p)$, and allow class actions otherwise, where $\overline{\Delta}(k_p)$ is given by $\Pi(p^m(c+k_d+\overline{\Delta}k_p), c+k_d+\overline{\Delta}k_p) = \Pi(c+\frac{k_p}{\theta}, c)$. When the firms allow class actions, this is socially inefficient.*
3. *When $k_p \geq \overline{k}_p$, firms will block class actions $\forall \Delta \in (0,1)$. If $\Delta \geq \frac{\widehat{k}_p}{k_p}$ ($\Delta < \frac{\widehat{k}_p}{k_p}$), firms' blocking class actions is (weakly) socially inefficient (efficient).*

[16] Even if the firms' litigation cost were zero ($k_d = 0$), firms will still charge $p^m(c)$ and earn $\Pi(p^m(c), c)$. As $k_d \to 0$, social welfare will converge to $W(p^m(c), c)$. With costless litigation, we get the invariance result.

*Proof of Proposition 2.* Foremost, we show that $\exists\ \overline{k}_p \in (\widehat{k}_p, \theta(p^m(c)-c))$, such that $\Pi(c+\frac{\bar{k}_p}{\theta}, c) = \Pi(p^m(c+k_d), c+k_d)$. From Lemma 1 and Proposition 1, we know that when $k_p = 0$, firms make a joint profit of $\Pi(p^m(c+k_d), c+k_d)$; when $k_p \geq \theta(p^m(c)-c)$, they make $\Pi(p^m(c), c)$; and when $k_p = \widehat{k}_p$, they make $\Pi(p^m(c+\widehat{k}_p+k_d), c+\widehat{k}_p, k_d)$. Also, as $k_p$ rises from zero to $\widehat{k}_p$, firms' aggregate profit continuously decreases from $\Pi(p^m(c+k_d), c+k_d)$ to $\Pi(p^m(c+\widehat{k}_p+k_d), c+\widehat{k}_p, k_d)$, and, as $k_p$ rises from $\widehat{k}_p$ to $\theta(p^m(c)-c)$, firm profit continuously increases, from $\widehat{k}_p$ to $\theta(p^m(c)-c)$ to $\Pi(p^m(c), c)$, such that $\Pi(p^m(c+\widehat{k}_p+k_d, c+\widehat{k}_p, k_d) < \Pi(p^m(c+k_d), c+k_d) < \Pi(p^m(c), c)$. Hence, $\exists\ \overline{k}_p \in (\widehat{k}_p, \theta(p^m(c)-c))$, such that $\Pi(c+\frac{\bar{k}_p}{\theta}, c) = \Pi(p^m(c+k_d), c+k_d)$.

Turning to the case when $k_p \geq \overline{k}_p$, we know that decreasing $k_p$ will only (at least weakly) decrease the firms' profits. Hence, the firms will not allow class actions $\forall \Delta \in (0,1)$. If $\Delta \geq \frac{\widehat{k}_p}{k_p}$, so that $\Delta k_p \geq \widehat{k}_p$, this is (at least weakly) socially inefficient, since by reducing $k_p$ to $\Delta k_p$, social welfare can only increase. On the other hand, if $\Delta < \frac{\widehat{k}_p}{k_p}$, firms not allowing class actions is socially efficient, since, with $\Delta k_p < \widehat{k}_p$, $W(p^m(c+k_d+\Delta k_p) < W(c+\frac{k_p}{\theta}, c)$.

Now suppose $k_p \leq \widehat{k}_p$. We know from Proposition 1, that the firms endure litigation in equilibrium; and by reducing litigation cost from $k_p$ to $\Delta k_p$, both firm profit and social welfare increase. Hence, firms will not impose class action waiver and this is socially efficient.

Finally, suppose $k_p \in (\widehat{k}_p, \overline{k}_p)$. From Proposition 1 and Lemma 1, we know that, as $k_p$ decreases from $\overline{k}_p$ to zero, firm profits initially decrease until $k_p = \widehat{k}_p$, and then increase until $k_p = 0$. We also know that when $k_p = \overline{k}_p$, firms earn a profit of $\Pi(p^m(c+k_d), c+k_d)$. Hence, for every $k_p \in (\widehat{k}_p, \overline{k}_p)$, $\exists \overline{\Delta}(k_p) > 0$, such that (1) $\Pi(p^m(c+k_d+\overline{\Delta}k_p), c+k_d+\overline{\Delta}k_p) = \Pi(c+\frac{k_p}{\theta}, c)$; (2) $\forall \Delta < \overline{\Delta}(k_p)$, $\Pi(p^m(c+k_d+\Delta k_p), c+k_d+\Delta k_p) > \Pi(c+\frac{k_p}{\theta}, c)$; and (3) $\forall \Delta \geq \overline{\Delta}(k_p)$, $\Pi(p^m(c+k_d+\Delta k_p), c+k_d+\Delta k_p) \leq \Pi(c+\frac{k_p}{\theta}, c)$. For any given $k_p \leq \widehat{k}_p$, therefore, if $\Delta < \overline{\Delta}(k_p)$, firms will allow class actions; and if $\Delta \geq \overline{\Delta}(k_p)$, firms will impose class action waivers. If firms allow class actions ($\Delta \geq \overline{\Delta}(k_p)$), $W(p^m(c+k_d+\Delta k_p, c+k_d+\Delta k_p) < W(c+\frac{k_p}{\theta}, c)$. □

The reasoning behind the statements Proposition 2 is fairly straightforward. Whether or not the firms will require the consumers to sign a class action waiver—thereby blocking class action lawsuits – depends on the consumers' individual litigation cost. The easiest case is when $k_p \leq \widehat{k}_p$. In this case, because litigation takes place in equilibrium and the firms treat that as another cost of doing business, it is in their interest

to lower the litigation cost, for instance, by allowing consumers to bring a class action. Interestingly, as the individual litigation cost decreases from $k_p$ to $\Delta k_p$, not only will the firms' aggregate profits increase, but the social welfare also increases. The increase in social welfare comes from the fact that the deadweight loss from litigation has gotten smaller and also that the lower marginal cost leads to a lower equilibrium price, thereby serving a larger consumer base.

At the opposite end, when $k_p \geq \overline{k}_p$, because the consumers' litigation cost (without class action) is sufficiently high and firms' profits will only decrease when the consumers' litigation cost decreases, firms have no incentive to allow class actions. Whether the firms' imposing class action waivers is socially efficient depends on the magnitude of $\Delta$. If $\Delta$ is small (i.e., $\Delta < \frac{\widehat{k}_p}{k_p}$), allowing class actions will decrease social welfare, and the firms' imposing class action waiviers is socially efficient. On the other hand, if $\Delta$ is sufficiently large (i.e., $\Delta \geq \frac{\widehat{k}_p}{k_p}$), by allowing class actions, while still keeping litigation off the equilibrium path, the equilibrium price will (at least weakly) decrease, thereby increasing social welfare. The firms' imposing class action waivers in that setting is socially inefficient.

Finally, when the consumers' litigation cost (without class action) falls in the middle region, $\widehat{k}_p < k_p < \overline{k}_p$, whether or not the firms will require a class action waiver depends on both $k_p$ and the magnitude of $\Delta$. If, for instance, $k_p > \widehat{k}_p$ and $\Delta$ is sufficiently close one, allowing class actions will only decrease the firms' profits. On the other hand, if $\Delta$ is sufficiently close to zero, firms will want to allow class actions in equilibrium. When class actions are allowed, however, social welfare is strictly lower. This is because, without the class action, firms are already charging a sufficiently low price to keep litigation off the equilibrium path and, therefore, social welfare is relatively high. When class actions are allowed, social welfare decreases due to all the litigation cost in equilibrium.

## 2.2 Myopic (Less Sophisticated) Consumers

So far, we have assumed that the consumers are sophisticated and forward-looking so that they take into consideration the possible rebate they receive ex post when making their purchase decision. Now, suppose that consumers are myopic (less sophisticated), and are not aware at the time that they purchase the product that they will have an opportunity to bring a lawsuit in the future.[17] The consumers decide whether to

[17]Some degree of "myopia" surely exists in practice. Individual consumers purchase many products, and likely do not have the information necessary to determine whether they may be able to bring suit ex post.

purchase the product solely on their valuations ($v$) and the price ($p$), so the demand is always $D(p)$. After they purchase the product, they then learn that there was price fixing and make a choice about whether to sue the firms. Firms, on the other hand, are forward-looking.

There are different ways one can evaluate social welfare in settings where parties have systematic misperceptions. We will evaluate social welfare from an ex post perspective. Thus, any damage award paid by the firm and received by the consumers has a neutral effect on welfare (although it was not anticipated by consumers ex ante). Social welfare can therefore be evaluated by looking at the quantity sold and the litigation costs that are spent, rather than grappling with misperceptions of consumers at the time of purchase.

As before, if $p < c + k_p/\theta$, then lawsuits have negative expected value and so consumers do not sue. The firms' aggregate profits are $\Pi(p, c) = D(p)(p - c)$. If $p > c + k_p/\theta$, then consumers will bring suit and recover damages of $d = \theta(p - c)$. The profit margin in this case is $p - c - \theta(p - c) - k_d$. The firms' profits when $p > c + k_p/\theta$ are $D(p)[(1 - \theta)(p - c) - k_d)] = (1 - \theta)\Pi\left(p, c + \frac{k_d}{1-\theta}\right)$. Taken together, we have:

$$\text{Profit} = \begin{cases} \Pi(p, c) & \text{if } p \leq c + k_p/\theta \\ (1 - \theta)\Pi\left(p, c + \frac{k_d}{1-\theta}\right) & \text{if } p > c + k_p/\theta. \end{cases} \tag{7}$$

Profits are, as before, a discontinuous function of price. When the price rises and crosses the threshold $p = c + k_p/\theta$ then firm profits fall for two reasons. First, the firms have to pay a rebate $\theta(p - c)$ to the consumers. Second, the firms need to pay litigation costs $k_d$. This drop in profits for the firms is particularly severe since consumers do not expect to bring suit at the time that they are purchasing the good. In the previous section, the forward-looking consumers increased their demand for the product in expectation of the rebate. With myopic consumers, this does not happen.

We now characterize the monopoly price as a function of the plaintiff-consumer's litigation cost, $k_p$. We first define $\tilde{k_p}$ to be the implicit solution of the following equation:

$$\Pi\left(c + \tfrac{k_p}{\theta}, c\right) = (1 - \theta)\Pi\left(p^m\left(c + \tfrac{k_d}{1-\theta}\right), c + \tfrac{k_d}{1-\theta}\right) \tag{8}$$

The left-hand side of (8), which is identical to the left-hand side of (6), represents firm profits when $p = c + k_p/\theta$ and the consumers do not sue. Recall that this is the highest price that can be charged that will avoid future lawsuits. The right-hand side of (8) is the maximized value of the firm profits in (7) when consumers bring suit (even though they did not expect to at the time of the purchase). As in the case with

forward-looking consumers, an implicit solution to (8) exists, is unique, and satisfies $\widetilde{k}_p \in (0, \theta(p^m(c) - c)$, which is proven in the following lemma.

**Lemma 2.** *There exists a unique $\widetilde{k}_p \in (0, \theta(p^m(c) - c))$ that satisfies (8).*

*Proof of Lemma 2.* Consider the left-hand side of (8). When $k_p = 0$, the left-hand side is $\Pi(c, c) = 0$. As $k_p$ rises, the left-hand side rises and reaches its maximum value of $\Pi(p^m(c), c)$ when $k_p = \theta(p^m(c) - c)$. The right-hand side of (8) does not depend on $k_p$, is strictly positive, and is smaller than $\Pi(p^m(c), c)$. Taken together, there is a unique $\widetilde{k}_p \in (0, \theta(p^m(c) - c))$ that solves equation (8) implicitly. □

As in the case with forward-looking consumers, the threshold litigation cost $\widetilde{k}_p$ plays an important role when consumers are myopic and do not expect to become plaintiffs in litigation ex post when they are making a purchase decision ex ante. Comparable to Proposition 1, we have the following result, that divides the equilibrium price, firm profits, and social welfare into three regions, depending on $k_p$.

**Proposition 3.** *Suppose the consumers are myopic and do not anticipate being plaintiffs in litigation. The prices, litigation decisions, firm profits, and social welfare depend on the plaintiffs' litigation costs $k_p$ as follows:*

1. *If $k_p < \widetilde{k}_p$ then the price is $p^m\left(c + \frac{k_d}{1-\theta}\right)$ and lawsuits are brought. Firm profits are $(1-\theta)\Pi\left(p^m\left(c + \frac{k_d}{1-\theta}\right), c + \frac{k_d}{1-\theta}\right)$ and social welfare is $W\left(p^m\left(c + \frac{k_d}{1-\theta}\right), c + k\right)$.*

2. *If $k_p \in [\widetilde{k}_p, \theta(p^m(c) - c))$ then the price is $c + \frac{k_p}{\theta}$ and no lawsuits are brought. Firm profits are $\Pi(c + \frac{k_p}{\theta}, c)$ and social welfare is $W(c + \frac{k_p}{\theta}, c)$.*

3. *If $k_p \geq \theta(p^m(c) - c)$ then the price is $p^m(c)$ and no lawsuits are brought. Firm profits are $\Pi(p^m(c), c)$ and social welfare is $W(p^m(c), c)$.*

Although the results in Proposition 3 are largely comparable to those from Proposition 1 (except for the substitution of $\widetilde{k}_p$ for $\widehat{k}_p$), there is an important difference between the two cases. When consumers are forward-looking and $k_p < \widehat{k}_p$, as $k_p$ rose or fall, so did the equilibrium price and firm profits. This was because changing $k_p$ affected the amount of rebate that the forward-looking consumers were expecting to receive, which, in turn, affected their willingness to pay for the product. When the consumers are myopic, however, because they do not anticipate being plaintiffs in litigation, when $k_p < \widetilde{k}_p$, even as $k_p$ changes, consumers' willingness to pay for the product does not change. Hence, when $k_p < \widetilde{k}_p$, firm profits are given by $(1-\theta)\Pi\left(p^m\left(c + \frac{k_d}{1-\theta}\right), c + \frac{k_d}{1-\theta}\right)$, which is invariant to changes in $k_p$.

The following corollary, which is similar to Corollary 1, establishes that the firms' profits are maximized when $k_p$ is large enough so that the firms can charge the unconstrained monopoly price. As before, it is not in society's interest for the plaintiffs' litigation cost to be too small. Social welfare is maximized when $k_p$ is lowered just to the point where pricing is constrained and no lawsuits are brought in equilibrium.

**Corollary 2.** *Suppose that consumers are myopic and do not anticipate being plaintiffs in litigation. Firm profits are maximized when the plaintiff litigation costs are sufficiently high, $k_p \geq \theta(p^m(c) - c)$. The firms charge the monopoly price, $p^m(c)$, and no lawsuits are brought. Social welfare is maximized when plaintiff litigation costs are $\widetilde{k}_p$ implicitly defined in (8). The firms charge $\widetilde{p} = c + \frac{\widetilde{k}_p}{\theta} < p^m(c)$ and no lawsuits are brought.*

As the final exercise, now suppose that the consumers can bring a class action against the firms for colluding on price. As before, we assume that the class action lowers the per-plaintiff litigation cost from $k_p$ to $\Delta k_p$ where $\Delta \in (0, 1)$. Just as before, if the firms require consumers to sign a class action waiver (and the consumers do so as a condition of purchase), we assume that the consumers' individual litigation cost remains at $k_p$.[18] The following proposition, comparable to Proposition 2, shows firms' incentive in imposing class action waivers, and whether such incentives are consistent with the social welfare objective when the consumers are myopic.

**Proposition 4.** *Suppose the firms can require class action waivers from myopic consumers as a condition of sale, thus blocking class actions and raising the consumers' cost of bringing private antitrust lawsuits.*

1. *When $k_p \leq \widetilde{k}_p$, firms will be indifferent between allowing class actions and blocking them, even though allowing class actions is socially efficient.*

2. *When $k_p > \widetilde{k}_p$, firms will (weakly) prefer to block class actions, and this may or may not be socially efficient.*

*Proof of Proposition 4.* Foremost, suppose $k_p \leq \widetilde{k}_p$. From Proposition 3, we know that the firm profits are given by $(1-\theta)\Pi\left(p^m\left(c + \frac{k_d}{1-\theta}\right), c + \frac{k_d}{1-\theta}\right)$, which is invariant to changes in $k_p$. Hence, the firms are indifferent as to whether to impose a class action waiver. However, we know that $W\left(p^m\left(c + \frac{k_d}{1-\theta}\right), c + k\right)$ is increasing as $k_p$ decreases. Hence, firms' imposing class action waivers is socially inefficient.

[18] With myopic consumers, since they do not expect to bring suit ex post anyway, we can assume that the fact that the firms ask them to sign a class action waiver does not, all of a sudden, make them realize the value of a lawsuit and revise their reservation value for the product.

Now, suppose $k_p > \widetilde{k}_p$. From Propositions 3 and 4, we know that when $k_p \in [\widetilde{k}_p, \theta(p^m(c) - c))$, firm profits are $\Pi(c + \frac{k_p}{\theta}, c)$, which is increasing with respect to $k_p$. When $k_p \geq \theta(p^m(c) - c)$, firm profits are $\Pi(p^m(c), c)$, which is invariant with respect to changes in $k_p$. In short, $\forall k_p$, equilibrium profits are, at least weakly, increasing with respect to $k_p$. Therefore, firms have no strict incentive to allow class actions. Not allowing class actions is socially inefficient, for instance, whenever $\Delta k_p \geq \widetilde{k}_p$. $\square$

Unlike the case with forward-looking consumers, when consumers are myopic, firms will never have a strictly positive incentive to allow class actions, and they will always, at least weakly, prefer imposing class action waivers. When the firms are charging $p \leq c + k_p/\theta$ and allow litigation ex post, because myopic consumers do not take into consideration the possible rebate they receive ex post when making purchase decisions, from the firms' perspective, allowing class actions and increasing the ex post rebate does not allow them to charge a higher price (and increase their profits) ex ante. Hence, they have no strictly positive incentive to allow class actions. Furthermore, when the firms are setting $p = c + k_p/\theta$ to avoid litigation or $p = p^m(c)$ and realize the unconstrained monopoly profit, allowing class actions can only reduce the firms' profits. Hence, the firms will have a weak incentive to require class action waivers as a condition of sale.

The firms' private decision to make the class action waiver a condition in the sales contract may or may not be socially efficient. When $k_p \leq \widetilde{k}_p$, for instance, we know that lowering the consumers' litigation cost from $k_p$ to $\Delta k_p$ will increase social welfare (even though the firms' profits do not change). Similarly, when $k_p > \widetilde{k}_p$, decreasing $k_p$ to any level equal to or greater than $\widetilde{k}_p$ would be welfare increasing. In either of these cases, firms will be either indifferent to, or have a strict incentive against, allowing class actions. On the other hand, when $k_p > \widetilde{k}_p$ but $\Delta k_p < \widetilde{k}_p$, allowing class actions is socially inefficient, and the firms' imposing class action waivers is socially efficient.

## 2.3 Comparison

Having presented the respective analyses on forward-looking and myopic consumers, in this subsection, we compare the two regimes. The comparison of equilibrium prices, firm profits, and social welfare under the two regimes renders some interesting results. To facilitate this, we foremost compare $\widehat{k}_p$ defined in (6) with $\widetilde{k}_p$ defined in (8) in the following lemma.

**Lemma 3.** *The threshold value of $k_p$ for myopic consumers is smaller than the threshold for forward-looking consumers: $\widetilde{k}_p < \widehat{k}_p$.*

*Proof of Lemma 3.* Compare equations (6) and (8) defining $\widehat{k}_p$ and $\widetilde{k}_p$, respectively. The left-hand sides are identical. The right-hand side of (6) is $\max D(p)(p-c-k)$ where $k = k_p + k_d$. This is strictly larger than $\max D(p)[p-c-k-\theta((p-c)-k_p)]$, which is the right hand side of (8). It follows that $\widetilde{k}_p < \widehat{k}_p$. □

The reasoning behind Lemma 3 is straightforward. With myopic consumers, when litigation is allowed in equilibrium, even though the firms bear the litigation cost, they do not get the benefit of increased demand. This implies that the firms will generally prefer to push the litigation off the equilibrium path. That is, the range of values of $k_p$ under which the firms would be willing to push the litigation off the equilibrium will be larger with myopic consumers than with forward-looking consumers: $\widetilde{k}_p < \widehat{k}_p$. With this result, we can compare the market outcomes when consumers are myopic to the outcome when consumers are forward-looking. The following proposition shows that the firms are (at least weakly) worse off when consumers are myopic than when the consumers are forward-looking.

**Proposition 5.** *When $k_p < \widetilde{k}_p$, firm profits are lower with myopic consumers than with forward looking consumers. Social welfare is higher with myopic consumers than with forward-looking consumers if and only if $\frac{k_p}{k_d} < \frac{\theta}{1-\theta}$. When $k_p \in [\widetilde{k}_p, \widehat{k}_p)$, firm profits are lower and social welfare is higher with myopic consumers than with forward-looking consumers. If $k_p \geq \widehat{k}_p$, firm profits and social welfare are the same with either myopic or forward-looking consumers.*

*Proof of Proposition 5.* Suppose $k_p < \widetilde{k}_p < \widehat{k}_p$. Firm profits are $\max D(p)(p-c-k)$ when consumers are forward looking and $\max D(p)[p-c-k-\theta((p-c)-k_p)]$ when consumers are myopic. The latter is smaller than the former. Social welfare is higher with myopic consumers if and only if $p^m(c+\frac{k_d}{1-\theta}) < p^m(c+k)$. This is true when $c+\frac{k_d}{1-\theta} < c+k$, or $\frac{k_p}{k_d} < \frac{\theta}{1-\theta}$.

Now, suppose $k_p \in [\widetilde{k}_p, \widehat{k}_p)$. When consumers are myopic, the firm sets $p = c + k_p/\theta$ and no suits are brought. When consumers are forward-looking, the firm could adopt the same strategy and set $p = c + k_p/\theta$ and get the same profits as with myopic consumers. But the firms do not do so when consumers are forward-looking, because they find it more profitable to set $p = p^m(c+k) > c + k_p/\theta$, even though lawsuits will be brought. By revealed preference, the firm's profits are higher when the consumers are forward-looking. Social welfare is lower with forward-looking consumers, because (1) the equilibrium price is higher and (2) litigation costs are incurred.

Finally, when $k_p \geq \widehat{k}_p$, we know that with either myopic or forward-looking consumers, the firms will set $p = c + k_p/\theta$ or $p = p^m(c)$, while avoiding ex post litigation. In either

case, the firms get to realize the profit of $\Pi(p^m(c+k_p/\theta, c)$ or $\Pi(p^m(c), c)$, regardless of whether the consumers are myopic or forward-looking. □

When the plaintiffs' litigation costs are very low, $k_p < \widetilde{k}_p$, there will be litigation in equilibrium whether consumers are myopic or forward looking. The firms are clearly worse off with myopic consumers since myopic consumers are less likely to purchase the product. Social welfare may be lower or higher, depending on the ratio of the litigation costs. If the defendant-firms' litigation cost is zero, then (from the firms' perspective) they are in a profit sharing deal with the plaintiffs where the firm keeps $(1-\theta)D(p)(p-c)$, so the firms set the monopoly price $p^m(c)$. With forward-looking consumers, the price would be higher, $p^m(c+k_p)$ since consumers would anticipate bearing their own litigation costs and this would be incorporated into the firms pricing strategy. So, social welfare is higher with myopic consumers. When $k_d$ grows, the firm will distort its price upwards when consumers are myopic, lowering social welfare relative to that for forward-looking consumers.

When $k_p \in [\widetilde{k}_p, \widehat{k}_p)$, firms that would have charged a high price and accepted the fact of litigation when consumers are forward-looking will instead charge a low price to avoid litigation when they are myopic. This raises social welfare not only because the equilibrium price is lower but also because costly litigation is avoided. Finally, when $k_p \geq \widehat{k}_p$, regardless of whether the consumers are myopic or forward-looking, firms either charge unbridled monopoly price ($p^m(c)$) or price just high enough to avoid litigation ($c+k_p/\theta$). Since the equilibrium prices are the same and no litigation takes place, the firm profits and social welfare are the same whether the consumers are myopic or forward-looking.

# 3 Extensions

Having presented the main analysis, we now consider several extensions. They include: (1) settlement with either symmetric or asymmetric information, (2) plaintiff-attorneys who receive compensation based on the litigation outcome (contingent fee compensation), where the market for legal services may or may not be perfectly competitive; (3) fee shifting (English rule) between the plaintiff-consumers and the defendant-firms, where the loser pays the fees of the winner; and (4) damages multipliers, such as treble damages.

## 3.1 Settlement

In the main model, cases go to trial whenever $k_p < \theta(p-c)$ and lawsuits occur in equilibrium when $k_p < \widehat{k}_p$ for forward-looking consumers (Proposition 1) and when

$k_p < \widetilde{k}_p$ for myopic consumers (Proposition 3). Since trials impose a deadweight loss of $k = k_p + k_d$, however, the parties have an incentive to settle out of court.

We consider two information settings. Under symmetric information, all cases settle before trial. With forward-looking consumers, we show that the firms are able to realize the unconstrained monopoly profit, $\Pi(p^m(c), c)$, regardless of $k_p$. Class action waivers become unnecessary for the firms. On the other hand, with myopic consumers, even when all cases settle, firms cannot realize unconstrained monopoly profit and the firms will have an incentive to impose class action waivers. Under asymmetric information, where the consumers are aware of whether their lawsuits are meritorious but the firms are not, settlement negotiations sometimes fail and cases may go to trial. Even when the firms settle with all plaintiff-consumers, we show that the firms cannot realize unconstrained monopoly profit. The firms are also more likely to impose class action waivers.

### 3.1.1 Settlement under Symmetric Information

Suppose that information is symmetric at the time of settlement bargaining: all the relevant parameters (including whether the consumers made a purchase) are common knowledge. We model settlement negotiations using simple Nash bargaining.

Suppose that $k_p < \theta(p - c)$, so the plaintiffs have a credible threat to go to trial.[19] The least the plaintiffs would be willing to accept to settle the case is $\underline{s}(p) = \theta(p-c)-k_p$, and the most the defendants would be willing to pay is $\overline{s}(p) = \theta(p-c)+k_d$. Letting $\alpha \in [0, 1]$ represent the defendants' bargaining power, the case will settle for $\alpha\underline{s}(p) + (1 - \alpha)\overline{s}(p)$, or

$$s(p) = \theta(p - c) + k_d - \alpha(k_p + k_d). \tag{9}$$

Given that the case will settle for $s(p)$, the effective price paid by the forward-looking plaintiffs is $x(p) = p - s(p)$ and the firms' expected profit margin is $p - s(p) - c = x(p) - c$.

The following Proposition shows that with forward-looking consumers, by choosing $p$ so that the effective price is $x(p) = p^m(c)$, the firms can achieve the unconstrained monopoly profit. When the consumers are myopic, on the other hand, they do not anticipate the future settlement, and the firms will not be able to realize the unconstrained monopoly profit.

[19] If $k_p \geq \theta(p - c)$, consumers do not have a credible threat to litigate. No lawsuits are brought, aggregate firm profits are $\Pi(p, c)$, and social welfare is $W(p, c)$.

**Proposition 6.** *Suppose the consumers and the firms engage in Nash settlement bargaining under symmetric information with $\alpha \in [0,1]$ representing the firms' bargaining power. If $k_p \geq \theta(p^m(c) - c)$ then the firms charge $p^m(c)$ and no lawsuits are brought.*

1. *Suppose the consumers are forward-looking. If $k_p < \theta(p^m(c) - c)$, then the effective price is $p^m(c)$ and all cases settle. Aggregate firm profits are $\Pi(p^m(c), c)$ and social welfare is $W(p^m(c), c)$.*

2. *Suppose the consumers are myopic. There exists a threshold $k_p' \in (0, \theta(p^m(c) - c))$ with the following properties.*

   (a) *If $k_p < k_p'$, then the effective price is $p^m(c')$ where $c' = c + \frac{(1-\alpha)k_d - \alpha k_p}{1-\theta}$ and all cases settle for $s(p^m(c')) > 0$. Aggregate firm profits are $(1-\theta)\Pi(p^m(c'), c')$ and social welfare is $W(p^m(c'), c)$.*

   (b) *If $k_p \in [k_p', \theta(p^m(c) - c))$, then the firms charge $c + k_p/\theta$ and no lawsuits are brought. Aggregate firm profits are $\Pi(c + k_p/\theta, c)$ and social welfare is $W(c + k_p/\theta, c)$.*

*Proof of Proposition 6.* If $k_p \geq \theta(p^m(c) - c)$, then the firms can charge $p^m(c)$ without any threat of litigation. If $k_p < \theta(p^m(c) - c)$, then consumers would bring suit if the firms charge $p^m(c)$.

Suppose the consumers are forward-looking, and that the firms charge $p > c + k_p/\theta$, so that the consumers have a credible threat to go to trial. The case settles for $s(p) > 0$ as defined in (9) above. Ex ante, the effective price paid by the plaintiffs is $x(p) = p - s(p)$ and the firms' expected profit margin is $p - s(p) - c = x(p) - c$. Suppose the firms choose $p = \frac{1}{1-\theta}(p^m(c) - \theta c + k_d - \alpha(k_p + k_d))$. Simple algebra shows that $x(p) = p^m(c)$. Note also that since $x(p) = p - s(p)$ we have $p = x(p) + s(p) = p^m(c) + s(p) > p^m(c)$. Since $p > c + k_p/\theta$, consumers have a credible litigation threat. The firms charge $p^m(c)$ earn aggregate profits $\Pi(p^m(c), c)$.

Now suppose the consumers are myopic and that the price is sufficiently high (i.e., $p > c + k_p/\theta$), so that the consumers have a credible threat to go to trial. Just as in the case with forward-looking consumers, the cases will settle for $s(p)$ defined in (9). Using the definition of $c'$ in the proposition, one can show that $p - s(p) - c = (1 - \theta)(p - c')$. Since consumers are myopic and do not anticipate receiving $s(p)$, the aggregate demand is $D(p)$. This implies that, ex ante, firms will choose the price $p$ to maximize $(1 - \theta)D(p)(p - c')$. Since $c' > c$, the profit-maximizing price is $p^m(c') > p^m(c) > c + k_p/\theta$, so the threat to litigate is credible. The aggregate

firm profits are $(1-\theta)\Pi\left(p^m(c'),c'\right)$. Since litigation is avoided in equilibrium, social welfare is $W(p^m(c'),c)$.

Alternatively, by setting $p=c+k_p/\theta$, the firms can deter lawsuits and earn profits of $\Pi\left(c+k_p/\theta,c\right)$. Define $k_p'$ to be such that

$$\Pi\left(c+k_p'/\theta,c\right)=(1-\theta)\Pi\left(p^m\left(c+\tfrac{(1-\alpha)k_d-\alpha k_p'}{1-\theta}\right),c+\tfrac{(1-\alpha)k_d-\alpha k_p'}{1-\theta}\right).$$

The rest of the proposition follows. □

Given that all cases settle under symmetric information, the parties do not incur any litigation cost in equilibrium. When the consumers are forward-looking, the firms can raise the price to take into account the "settlement rebate," $s(p)$, the consumers expect to receive. With no litigation cost in equilibrium, this allows the firms to realize the unconstrained monopoly profit. Furthermore, with forward-looking consumers, because the consumers fully understand the implications of signing a class action waiver (i.e., that they will face a higher litigation cost ex post) and take that into consideration when making the purchase decision, firms will be indifferent as to whether to impose a class action waiver. Either way, the firms will be able to realize the full monopoly profit.

When the consumers are myopic, on the other hand, because the consumers do not take into account the future settlement rebate into consideration when making the purchase decision, the demand will be determined by the posted price $p$: the consumers will simply compare $v$ with $p$. Given that each consumer will take back $(1-\theta)(p-c)$ ex post and the firms cannot raise the price based on this rebate, the firms' profits are lower. The firms' effective marginal cost (given by $c'=c+\frac{(1-\alpha)k_d-\alpha k_p}{1-\theta}$) is also affected by the expected settlement. When $\alpha\leq\frac{k_d}{k_d+k_p}$, firms will face a higher marginal cost and their aggregate profit will be strictly lower compared to the case with forward-looking consumers. On the other hand, when the firms' bargaining leverage is sufficiently strong, i.e., $\alpha$ close to 1, the firms will actually have a lower marginal cost than without litigation: $c'=c+\frac{(1-\alpha)k_d-\alpha k_p}{1-\theta}<c$ when $\alpha$ is close to 1. When $\theta$ is also sufficiently small, the firms' aggregate profit can actually be higher with myopic consumers.

The firms' incentives to impose class action waivers and their effect on social welfare also change with myopic consumers. First, conditional on $k_p\leq k_p'$ and $\alpha>0$, an increase in $k_p$ reduces $c'$ and increases firm profits. Since an increase in $k_p$ reduces the equilibrium price, $p^m(c')$, social welfare increases too. So, in this case, the private and social incentives to adopt class action waivers are aligned. Second, when $k_p>k_p'$,

the firms push litigation off the equilibrium path and set $p = c + k_p/\theta$. Given that all cases settle under symmetric information in equilibrium, although there is no welfare loss from litigation, because the firms get to collude on a higher price with a higher $k_p$, social welfare will decrease with class action waivers. This is in contrast to the case when the consumers are forward-looking, where both the firm profits and social welfare are invariant with respect to class action waivers.

### 3.1.2 Settlement under Asymmetric Information

In this extension, we relax the assumption that the parties are symmetrically informed at the time of settlement bargaining and allow the plaintiff-consumers to be privately informed about the merits of their claims.[20] More specifically, suppose there are two types of claims (plaintiffs): meritorious and frivolous. The frivolous plaintiffs were not harmed (e.g., they did not purchase the product due to low $v$),[21] and will not collect damages at trial (but would pay $k_p$). Let $\lambda(p) \in (0, 1)$ represent the equilibrium fraction of consumers with frivolous claims. We will assume that $\lambda(p)$ is equal to the mass of consumers who do not purchase the product, and is determined in equilibrium.[22]

With asymmetric information, the simple Nash bargaining protocol is no longer feasible. So, we consider a bargaining protocol where the defendant-firms make a take-it-or-leave-it settlement offer to the privately informed plaintiff-consumers. The plaintiffs then decide individually whether to accept the offer or reject it. Plaintiffs who reject the offer can decide to either drop the case or go to court.

In equilibrium, the defendants will either offer $s = 0$ (refuse to settle) and let only the meritorious cases to go to trial, or offer $s = \theta(p - c) - k_p$ and settle with everyone. If they do the former, we have the initial results (with no settlement) back. If they do the latter, although there will be no litigation in equilibrium, unlike the symmetric information case, the firms will not be able to realize the unconstrained monopoly profit (unless the plaintiffs' litigation cost is sufficiently high). The reason is two-fold. First, the total amount of settlement payment is higher since the firms are settling both meritorious and frivolous claims. Second, with forward-looking

[20] We can alternatively allow the defendant firms to be privately informed over the production cost, so that the plaintiffs would be initially unaware whether collusion has taken place. Besanko and Spulber (1980), for instance, adopts such a setting in examining the effects of damage multipliers.

[21] For instance, we can assume that the settlement payment cannot be easily conditioned on the proof of purchase while the court, through its discovery power, can more easily verify whether the consumer made a purchase.

[22] We could relax this assumption, and assume instead that a fraction of consumers who do not purchase bring frivolous cases.

consumers, because they know that they will be able to collect $\theta(p-c)-k_p$ even when they do not make the purchase, this leads them to behave like myopic consumers, which, in turn, reduces the overall demand.

**Proposition 7.** *Suppose only the consumers know whether they have a meritorious claim and, in case there is a lawsuit, the firms make a take-it-or-leave-it settlement offer. After rejecting the offer, a plaintiff-consumer can either proceed to trial or drop the case. If $k_p \geq \theta(p^m(c)-c)$, then the price is $p^m(c)$ and no lawsuits are brought. Aggregate firm profits are $\Pi(p^m(c),c)$ and social welfare is $W(p^m(c),c)$. If $k_p < \theta(p^m(c)-c)$, then the firms cannot realize the unconstrained monopoly profit with either forward-looking or myopic consumers.*

*Proof of Proposition 7.* Foremost, just as in the case without settlement, firms can avoid litigation by setting $p = c + k_p/\theta$. In case any consumer brings suit, the firms know that the claim is frivolous and can refuse to settle (offer to settle at $s = 0$). The amount of profits the firms realize is the same as the case without settlement.

Suppose the firms charge $p > c + k_p/\theta$, so that there is lawsuit in equilibrium. The firms have two choices in terms of settlement: either offer to settle at $s = 0$ or offer to settle at $s = \theta(p-c)-k_p$. If the the firms offer to settle at $s = 0$, only the consumers with meritorious claims will proceed to trial, and the equilibrium is the same as in the case without settlement. With forward-looking consumers, firms will realize the aggregate profits of $D(x(p))(p-c)-D(x(p))(\theta(p-c)+k_d$; and with myopic consumers, the aggregate profits are $D(p)(p-c)-D(p)(\theta(p-c)+k_d$.

Suppose, instead, the firms offer to settle at $s = \theta(p-c)-k_p$. Consider the case of forward-looking consumers. Since the forward-looking consumers know that they will be able to receive $\theta(p-c)-k_p$ for certain even when they do not purchase the product, they will purchase only if $v-p+\theta(p-c)-k_p \geq \theta(p-c)-k_p$, which simplifies to $v \geq p$. Hence, $\lambda(p) = 1-D(p)$. When the firms settle with all consumers at $s = \theta(p-c)-k_p$, their expected profit becomes $D(p)(p-c)-(\theta(p-c)-k_p)$. Note that the aggregate profits are the same even if the consumers are myopic. Compared to the case where consumers have no right to bring suit, i.e., when the firms can earn unconstrained monopoly profit, the expected profit is lower by $(\theta(p-c)-k_p)$. The optimal price $(p^*)$ is determined from the first order condition of $D'(p^*)(p^*-c)+D(p^*)-\theta = 0$. This implies that $p^* < p^m(c)$ and $D(p^*)(p^*-c)-(\theta(p^*-c)-k_p) < \Pi(p^m(c),c))$.

Combining both results, firms have three choices. First, they can set $p = c+k_p/\theta$ and avoid litigation in equilibrium. If $k_p \geq \theta(p^m(c)-c)$, firms can realize the unconstrained monopoly profit without having to worry about facing any lawsuits in equilibrium. If $k_p < \theta(p^m(c)-c)$, firms will earn less than full monopoly profit. Second, when

$k_p < \theta(p^m(c) - c)$, they can set $p > c + k_p/\theta$ and refuse to settle (offer $s = 0$) in case lawsuit is brought. In this case, the firms will earn the same profit as in the case without settlement: $\Pi(p^m(c + k), c + k)$ with forward-looking consumers and $(1 - \theta)\Pi(p^m(c + \frac{k_d}{1-\theta}, c + \frac{k_d}{1-\theta})$ with myopic consumers. The social welfare is given by $W(p^m(c + k), c + k)$ and $W(c + \frac{k_p}{\theta}, c)$, respectively. Third, they can set $p > c + k_p/\theta$, settle with all consumers at $s = \theta(p - c) - k_p$, and realize (weakly) less than the unconstrained monopoly profit of $D(p^*)(p^* - c) - (\theta(p^* - c) - k_p)$ with either forward-looking or myopic consumers.[23] The social welfare is equal to $W(p^*, c)$. Between the second and the third options, the second option will be chosen when $\lambda(p^*) = 1 - D(p^*)$ is sufficiently high. Unless $k_p \geq \theta(p^m(c) - c)$, firms earn strictly less than unconstrained monopoly profit. □

From the proof of Proposition 7, when $k_p < \theta(p^m(c) - c)$, there are three possible equilibria: (1) firms set $p = c+k_p/\theta$ and avoid litigation; (2) firms set $p = p^m(c+k) > c + k_p/\theta$ while refusing to settle (i.e., offer to settle at $s = 0$); and (3) firms set $p = p^* > c + k_p/\theta$, where $p^* < p^m(c)$, and settle with everyone at $s = \theta(p^* - c) - k_p$. With respect to the first two types of equilibrium, firms' incentive in imposing class action waivers and the effect on social welfare are the same as the case without the possibility of settlement. In case we are in the third type of equilibrium, because the amount of settlement payment directly depends on $k_p$, firms will have an incentive to impose class action waivers. When the plaintiffs' litigation cost increases from $\Delta k_p$ to $k_p$, assuming that we stay in the same type of equilibrium, firms' aggregate profit increases by $(1 - \Delta)k_p$. At the same time, because all cases settle and the firms' optimal price ($p^*$) is unaffected by changes in $k_p$, there is no change in social welfare: class action waiver functions as a pure transfer from the consumers to the firms.

Finally, if we assumed instead that the plaintiffs make a take-it-or-leave-it settlement offer, there will not be a fully-separating (revealing) equilibrium. This is because the frivolous plaintiffs would not reveal themselves to be such. When plaintiffs with meritorious claims make a certain (positive) settlement offer, frivolous plaintiffs have nothing to lose by mimicking the meritorious type. In case their settlement offer is rejected by the firms, they can simply drop the suit. On the other hand, there could be a pooling equilibrium, depending on $\lambda(p)$, where all plaintiffs make a settlement offer equal to the expected loss for the defendants, i.e., $\lambda(p)(\theta(p - c) + k_d)$.[24]

[23]The profit expression can be rewritten as: $D(p^*)((1-\theta)(p^*-c)+k_p)-\lambda(p^*)(\theta(p^*-c)-k_p)$. From the first expression, compared to the case without asymmetric information and without settlement, the aggregate demand is lower but the profit margin is higher. The second term strictly lowers the firms' aggregate profits.

[24]For the pooling equilibrium to occur, among others, we need $\theta(p-c)-k_p \leq \lambda(p)(\theta(p-c)+k_d)$, since, otherwise, it is better for the plaintiffs with meritorious claims to proceed to litigation rather

## 3.2 Contingent Fee Attorneys and the Market for Legal Services

In the main analysis, we assumed that the consumers directly paid for the litigation cost ($k_p$), but in many antitrust lawsuits, lawyers are hired and paid on a contingency basis. Suppose the consumer-plaintiffs hire lawyers under a contingent fee of $\beta \in (0,1)$, which represents the lawyer's share of the recovery in case the plaintiff-consumers prevail. If the plaintiffs prevail at trial and receive a recovery of $d$, the lawyers receive a compensation of $\beta d$, whereas if they lose, the lawyers get nothing. In this context, we can think of $\theta$ as representing the probability that the plaintiffs prevail in the lawsuit. We can assume that the lawyers personally bear the cost $k_p$ of prosecuting the case. While the main results from the previous section remain to be true, slight differences emerge depending on whether the market for legal services is perfectly competitive.

Suppose, initially, that lawyers come from a competitive market: they bid for the right to represent clients and clients choose lawyers who offer the lowest contingent fee.[25] When the firms set a price of $p > c$ and a lawyer brings the case to trial, the lawyer would receive $\beta\theta(p-c) - k_p$ in expectation. When the market for legal representation is perfectly competitive, the lawyers will bid the contingent percentage down to $\beta(p) = k_p/(\theta(p-c))$. The plaintiff's payoff from pursuing the case is $\theta(p-c) - \beta\theta(p-c) = \theta(p-c) - k_p$. Thus, the plaintiff will pursue the case if an only if $k_p < \theta(p-c)$, just as before. When this inequality holds, the effective price paid by the consumers is $x(p) = (1-\theta)p + \theta c + k_p$, and all of the same results are obtained.

If the legal services market is not perfectly competitive,[26] such that the lawyers capture some rent in equilibrium, this can create a distortion. If we assume that the lawyers and the plaintiff-consumers are symmetrically informed about the litigation parameters, their decision to bring lawsuit will not be affected by the additional rent captured by the lawyers.[27] This implies that the firms can keep litigation off the

than settle. Also, when class action is allowed, there could also be issues on class action formation and opt-out, as shown in Che (1996).

[25] For the moment, we are assuming away the problems of moral hazard.

[26] For instance, as is well known, if the plaintiffs need to provide incentive to the lawyers and the amount of payment cannot go below zero, because they may need to provide a large upside gain, the lawyers will, in equilibrium, earn a positive rent.

[27] Suppose the lawyer's compensation is given by $\beta(p)\theta(p-c) = \beta_0(p)\theta(p-c) + \beta_1(p)(\theta(p-c)-k_p)$, where $\beta_0(p)\theta(p-c) = k_p$ and $\beta_1(p) \in [0,1]$. The first component allows the lawyer to recoup the litigation expenses, while the second component gives the lawyer a share of the litigation surplus. When the lawyer has the monopoly power, we would have $\beta_1(p) = 1$, whereas with a perfectly competitive legal services market, we would have $\beta_1(p) = 0$. With this formulation, the plaintiff-consumers' litigation decision will not be distorted. In the following Proposition, we focus on these

equilibrium path by setting $p = c + k_p/\theta$. On the other hand, in case the firms allow litigation in equilibrium, the effective price paid by the forward-looking consumers ($x(p)$) is higher compared to the case with perfectly competitive legal services market. This is because a portion of the rebate is being captured by the lawyers. With a higher effective price, both the aggregate demand and the firms' profits will be lower. When the consumers are myopic, on the other hand, since their purchase decision does not depend on the rebate, firms' profits remain the same.

**Proposition 8.** *Suppose the lawyers bear the litigation cost of $k_p$ and receive a fraction $\beta \in (0,1)$ of the plaintiffs' recovery.*

1. *Suppose the legal services market is perfectly competitive. If lawsuits arise in equilibrium, $\beta(p) \in (0,1)$ satisfies $\beta(p)\theta(p-c) = k_p$. The results in Propositions 1 and 3 apply to forward-looking and myopic consumers, respectively.*

2. *Suppose the lawyers have monopoly power. If lawsuits arise in equilibrium, $\beta(p) = 1$. The results in Proposition 3 apply to both forward-looking and myopic consumers.*

*Proof of Proposition 8.* Suppose the legal services market is perfectly competitive. If $k_p < \theta(p-c)$, then the lawyers and plaintiffs have a joint incentive to bring suit. The contingent percentage $\beta(p)$ satisfies $\beta(p)\theta(p-c) = k_p$. The plaintiffs will pursue the case if and only if $k_p < \theta(p-c)$ as before. The firms can keep the litigation off the equilibrium path by setting $p = c + \frac{k_p}{\theta}$ or allow litigation in equilibrium by setting $p > c + \frac{k_p}{\theta}$. Hence, the firms' and the consumers' decisions remain the same as in Propositions 1 and 3.

Now suppose that lawyers have monopoly power. If $k_p < \theta(p-c)$, then the lawyers and plaintiffs have a joint incentive to bring suit. The lawyer will charge a contingent fee of $\beta(p) = 1$ and extract all of the surplus. The consumer is indifferent between bringing suit and not. At the time of purchase, the effective price paid by the consumer is $p$, and the analysis is identical to the analysis of myopic consumers. □

With respect to class action waivers, allowing for contingency fees does not change the qualitative results from Part 2. When the market for legal services is perfectly competitive, all the results remain the same as in Propositions 1 and 3. When lawyers enjoy monopoly power, then the lawyers will extract the full value of litigation and the consumers do not receive any rebates. So, whether consumers are forward-looking or myopic, the effective price paid by consumers is simply $p$ and the analysis is analogous to the analysis of myopic consumers in Proposition 3. As shown earlier,

two polar cases of $\beta_1(p) = 1$ and $\beta_1(p) = 0$.

the firm's private incentive to block class actions through class action waivers may be socially excessive or socially insufficient. When the lawyers have the monopoly power, as shown in Proposition 4, firms will, at least weakly, prefer imposing class action waivers.

## 3.3 Fee Shifting

In the main analysis, the plaintiff and the defendant each paid their own litigation costs regardless of the outcome at trial. This is the rule typically used in the United States (the American Rule). Suppose instead that the loser in litigation must reimburses the winner for the litigation costs (the English Rule). If we were to let $\theta \in (0,1)$ represent the plaintiff's probability of winning at trial, with fee-shifting, the plaintiff's and defendant's expected litigation costs become $(1-\theta)(k_p+k_d)$ and $\theta(k_p+k_d)$, respectively. A change from the American Rule to the English Rule may increase or decrease prices, profits, and social welfare depending on whether $\theta$ is smaller than or greater than $\frac{k_d}{k_p+k_d}$. If $\theta > \frac{k_d}{k_p+k_d}$, the plaintiff is likely to win at trial and the plaintiff's expected litigation costs are lower under the English Rule than the American Rule. If $\theta < \frac{k_d}{k_p+k_d}$, the plaintiff is likely to lose at trial and the plaintiff's expected litigation costs are higher under the English Rule.

To incorporate fee-shifting, we need to make a few adjustments to the initial model. With the English Rule, consumers will bring lawsuit when $p > c + \frac{1-\theta}{\theta}(k_p + k_d)$. Conditional on consumers having a credible lawsuit, the effective price that the consumers pay is equal to $x(p) = (1-\theta)p + \theta c + (1-\theta)(k_p+k_d)$ and the firm's effective profit margin is equal to $x(p) - c - k$. To derive the new $\widehat{k}_p$, the firms can either charge $p = c + \frac{1-\theta}{\theta}(k_p+k_d)$ and disallow litigation or maximize profit conditional on litigation, i.e., maximize $\Pi(x(p), c+k) = D(x(p))(x(p)-c-k)$. This generates the equation comparable to (6), where the new $\widehat{k}_p$ implicitly solves the following equation:

$$\Pi\left(c + \tfrac{1-\theta}{\theta}(k_p+k_d), c\right) = \Pi\left(p^m(c+k), c+k\right) \tag{10}$$

Note that the right hand side is the same as before. In comparing the left hand side, if $k_p < \frac{1-\theta}{\theta}k_d$, we get $c + \frac{1}{\theta}k_p < c + \frac{1-\theta}{\theta}(k_p+k_d)$, and the firms will be able to charge a higher price under the English Rule. The opposite will be true when $k_p > \frac{1-\theta}{\theta}k_d$. In short, the left hand side will be larger under the English Rule for small $k_p$ but smaller for large $k_p$. This makes it uncertain whether the $\widehat{k}_p$ for the English Rule will be larger or smaller than the $\widehat{k}_p$ for the American Rule. Nevertheless, a unique $\widehat{k}_p$ for the English Rule will exist and the rest of the analysis will follow, including whether or not the firms would want to block class actions by imposing class action waivers.

Before we proceed, one unique aspect about private antitrust lawsuits in the US is that it utilizes one-way fee-shifting for the benefit of the plaintiffs. Under Clayton Act §4(a), when the plaintiffs prevail, they are entitled to recover "the cost of suit, including a reasonable attorneys fee" from the defendants. The defendants, on the other hand, do not recover their expenses from the plaintiffs when they prevail and are subject to the American rule. With plaintiff-friendly, one-way fee-shifting, the plaintiff's and defendant's expected litigation costs become $(1-\theta)k_p$ and $k_d + \theta k_p$, respectively. Now the consumers will bring suit when $p > c + \frac{1-\theta}{\theta}k_p$, and the new $\widehat{k}_p$ will be determined by:

$$\Pi\left(c + \tfrac{1-\theta}{\theta}k_p, c\right) = \Pi\left(p^m(c+k), c+k\right) \tag{11}$$

Compared to either the no fee-shifting or the symmetric (two-way) fee-shifting regime, $\widehat{k}_p$ will be higher. With lower plaintiff litigation cost, keeping litigation off the equilibrium path becomes less attractive for the firms and they become more likely to allow litigation in equilibrium.

## 3.4 Damage Multipliers

In private antitrust suits, plaintiffs are sometimes entitled to recover multiple times the actual harm suffered (e.g., treble damages under Clayton Act §4(a)). While multiple damages provide a stronger ex post incentive to the consumers to bring suit, previous literature has cast doubt on whether it works as deterrence (Easterbrook (1985), Salant (1987), and Baker (1988)). The basic story, similar to ours with forward-looking consumers, is that, with higher damages, consumers would become willing to pay more for the product and the firms can charge a higher price ex ante, so that, in the end, firms realize the same expected monopoly profit and the consumers obtain the same expected surplus. What is important in the analysis, however, are the assumptions that (1) the ex post private litigation is costless and (2) there is less than full deterrence. This is similar to the variation where all cases settle and the parties do not incur any litigation cost in equilibrium.

In the main model, $\theta$ was the expected fraction of the overcharge $(p-c)$ awarded to the plaintiffs in litigation. We can reflect a damages multiplier by adjusting $\theta$. For example, if there is a 25% chance of winning the cases, and only compensatory damages are awarded (100% of the overcharge), then $\theta = .25 \times 1 = .25$. If, on the other hand, treble damages are awarded (300% of the overcharge), then $\theta = .25 \times 3 = .75$. The bigger the damages multiplier, the higher the $\theta$. With a sufficiently generous damages multiplier, we may even have $\theta \geq 1$. As the following proposition shows, with costly litigation ($k_i > 0$), the neutrality result no longer holds when $\theta \leq 1$, and

the firms can realize a positive profit even when $\theta > 1$. Finally, whether the firms will impose a class action waiver will depend crucially on $\theta$.

**Proposition 9.** *When $\theta < 1$, as $\theta$ rises, while $\widehat{k}_p$ increases, the effect on $\widetilde{k}_p$ is ambiguous. With forward-looking consumers, firms become more likely to allow litigation in equilibrium, but with myopic consumers, firms may or may not allow litigation more in equilibrium. When $\theta \geq 1$, for both forward-looking and myopic consumers, firms will set $p = \min\{p^m(c), c + k_p/\theta\}$, avoid litigation in equilibrium, and realize a strictly positive profit $\forall k_p > 0$.*

*Proof of Proposition 9.* Suppose $\theta < 1$ and consider the equation (6). When we differentiate the right hand side with respect to $\theta$, with the envelope theorem, we get: $\frac{\partial}{\partial \theta}\Pi(p^m(c+k), c+k) = 0$. When we differentiate the left hand side with respect to $\theta$, we get: $\frac{\partial}{\partial \theta}\Pi(c + k_p/\theta, c) < 0$. Hence, as $\theta$ rises, $\widehat{k}_p$ increases, and the firms are more likely to allow litigation in equilibrium.

Now consider the equation (8). The effect of marginal increase of $\theta$ on the right hand side is the same: $\frac{\partial}{\partial \theta}\Pi(c + k_p/\theta, c) < 0$. When we differentiate the left hand side with respect to $\theta$, we get: $\frac{\partial}{\partial \theta}(1-\theta)\Pi(p^m(c+k_d/(1-\theta)), c+k_d/(1-\theta)) = -D(p)(p-c) < 0$. Hence, as $\theta$ rises, the effect on $\widetilde{k}_p$ is ambiguous.

Now suppose $\theta \geq 1$. If $p^m(c) \leq c + k_p/\theta$ then the firms can charge $p^m(c)$ without the threat of litigation. So the case of interest is $p^m(c) > c + k_p/\theta$. We get $\Pi(x(p), c+k) = D(x(p))((1-\theta)(p-c) - k_d) < 0$ and $(1-\theta)\Pi(p, c + k_d/(1-\theta)) = D(p)((1-\theta)(p-c) - k_d) < 0 \ \forall p > c$. It is no longer profitable to allow litigation in equilibrium for either type of consumers. The optimal strategy for the firms is to set $p = c + k_p/\theta$, avoid litigation in equilibrium, and realize a positive profit. □

From the proof for Proposition 9, we see that when $\theta < 1$, because there is under-deterrence, with forward-looking consumers, when the firms allow litigation in equilibrium, the neutrality result holds: as $\theta$ rises, firms increase the price to offset the more generous rebate and earn the same aggregate profit. At the same time, pushing litigation off the equilibrium path becomes less attractive, since as $\theta$ rises, the profit margin $(k_p/\theta)$ decreases. Hence, with $\theta < 1$, as $\theta$ rises, firms become more likely to allow litigation in equilibrium ($\widehat{k}_p$ rises). This also implies that, with respect to class action waivers, in a broader parameter space (or $k_p$ space), firms will have an incentive to reduce the consumers' litigation cost ($k_p$) which will also increase welfare.

For myopic consumers, however, when the firms allow litigation in equilibrium, neutrality result no longer holds. As $\theta$ rises, because the myopic consumers' purchase decision is unaffected by the change in $\theta$ but the firms' expected litigation payment

$(\theta(p-c)+k_d)$ rises, firms' aggregate profit falls. At the same time, pushing litigation off the equilibrium path also becomes unattractive, for the same reason as with forward-looking consumers. This makes the effect of change in $\theta$ on $\widetilde{k}_p$ ambiguous. For instance, when $\theta$ is relatively small, a small increase can have a big effect on the profits the firms can earn by pushing litigation off the equilibrium path but a relatively small effect on the profits in case they allow litigation. The effects can be reversed when $\theta$ is relatively large. Changes to the firms' incentive on imposing class action waivers (and blocking class actions) are similarly ambiguous.

When $\theta \geq 1$, it is no longer in the firms' interest to allow litigation in equilibrium for either forward-looking or myopic consumers. If they do so and set $p > c + k_p/\theta$, they realize a negative profit: we get complete (or over) deterrence. However, with $k_p > 0$, firms can still set $p = c + k_p/\theta$, push litigation off the equilibrium path, and earn a positive profit (with the profit margin of $k_p/\theta$). Given that the size of consumers' litigation cost directly translates to the size of profit margin, firms will have a strong incentive to increase $k_p$ as much as they can. With $\theta \geq 1$, therefore, firms will surely impose class action waivers on consumers and block class actions. This is socially inefficient since it allows the firms to charge a higher price and generate a larger deadweight loss.

# 4 Concluding Remarks

The paper has examined the effect of class actions and class action waivers in the context of private antitrust lawsuits, in particular, lawsuits against collusion among competitors. Class action waivers, often through mandatory individual arbitration clauses, have received much attention especially since the US Supreme Court has endorsed such private ordering mechanism. The paper has shown that whether the firms will require the consumers to waive their right to bring a class action depends on the consumers' individual litigation cost. Furthermore, depending on the circumstances, firms' incentive in seeking class action waivers can be aligned with the social objective. This is the case, for instance, when the consumers' litigation costs are relatively low so that the firms treat litigation in equilibrium as just another cost of doing business. The paper has also shown that the core results remain robust to possible settlements, contingent fee attorneys, fee shifting, and damages multiplier.

While the current focus of the paper was on price fixing and private antitrust lawsuits, the analysis is applicable to other settings where the firms' pre-sale behavior can affect the terms of trade. Examples include product design (product liability and consumer financial contracts (CFPB)), false advertising (*Concepcion*), employment

(*Epic Systems*), and unlawful monopolization (*Italian Colors*). In the products liability setting, for instance, firms may fundamentally lack sufficient ex ante incentives to design safer products.[28] The class action can be an effective mechanism for aligning the firm's private incentives with those of society. If firms can block consumers from using the class action mechanism, forcing them to pursue individual actions, then product safety is clearly compromised. Firms also have a strong incentive to minimize or eliminate product liability lawsuits ex post.[29] We plan to broaden our analysis to other settings where pre- and post-sale behavior of the firm could play an important role in choosing the litigation regime (e.g., asking for a class action waiver).

[28]In Choi and Spier (2014), competitive firms reduce safety levels in order to cream-skim the low risk consumers. In Hua and Spier (2018), firms tailor the product to suit the needs of the marginal consumer instead of the average consumer. Safety is suboptimal if the marginal consumer has a lower willingness to pay for safety than the average consumer. In Hamada (1975), consumers systematically underestimate product risks. In these and other settings, products liability induces firms to design safer products.

[29]The ex post incentive to minimize or eliminate product liability lawsuits for the firm that has produced a (likely) defective product is clear. Even for the firm that has produced a (likely) non-defective product, to the extent that there could be frivolous litigation, the firm would want to minimize or eliminate product liability lawsuit ex post.

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