Market Power *Is* Power

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Abstract

We argue that in market democracies firms can wield political power through a mechanism that does not rely on lobbying, campaign contributions, or persuasion. When voters cannot commit to future regulation, firms can use irreversible technological investments to reshape ex-post political incentives. We call this mechanism the political hold-up problem. We show that, in equilibrium, a firm's de facto power to avoid regulation coincides with standard measures of market power. This form of power is robust to a wide range of regulatory instruments, including bans, taxes, self-regulation, and delegation to technocrats, and limits the effectiveness of reforms targeting political influence. The political hold-up problem distorts the direction of technological progress and may increase political demand for populism and nationalization. Institutional remedies instead require commitment: supermajoritarian institutions and independent oversight of industry standards.

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> *When politicians tried to stop us or slow us down, we co-opted democracy itself by leveraging consumers' political power. . . We weaponized our customers. They were ours to use in the service of the mission.*
>
> —Mark MacGann, Uber's former head of public policy

A central concern in political economy is that market power yields political power, distorting democratic policymaking in favor of large firms (Brandeis, 1914; Zingales, 2017). Economists have emphasized that large firms with market power can afford the resources to buy influence and avoid regulation (Becker, 1983; Faccio, 2006; Grossman and Helpman, 1994; Peltzman, 1976; Stigler, 1971). This concern is increasingly salient in markets for goods or services that generate large negative externalities. On this basis, many advocate for tighter campaign finance laws, limits on lobbying, and greater transparency. Yet, many contend that large firms also have "structural power" beyond their spending in lobbying and media, enabling them to "change the range of choices open to others" (Strange, 1988).

In this paper we argue that, in market democracies, market power yields political power even in the absence of lobbying or persuasion. It allows firms to redirect technological progress from economic to political goals. This implies that reforms targeting lobbying and campaign finance may miss the central margin of influence. Instead, effective institutional remedies require political commitment, through instruments such as supermajoritarian rules and independent oversight.

The mechanism connecting market power to political power is a *political hold-up problem*. When voters cannot commit to future regulation and firms make irreversible technological investments, firms can reshape voters' ex-post regulatory preferences through their choice of technology. The hold-up is political because voters can revise regulation after the firm has sunk its investment. The firm's response is to make irreversible (and potentially inefficient) investments that induce a more profitable political outcome.[1] Our central result is that, in a market democracy, a firm's de facto power over regulation is determined by the same elements that define its equilibrium *market power*: pass-through, market penetration, and markups. Under common assumptions on market demand, these reduce to two statistics: the Lerner index and market share.

To fix ideas, consider a firm developing a new technology for a new product. The firm considers different options. Some technologies allow for more efficient production, but only if they cause a significant negative externality. Regulations banning this externality would greatly reduce their efficiency. Other technologies are less efficient but rely less on causing the externality, so that regulation affects their efficiency less.

[1] As we discuss below, the logic behind the firm's investment is similar to that behind entry deterrence investments in Dixit (1980).

Voters—many of whom are the firm's potential consumers—may wish to regulate the new technology if their externality gain is larger than their efficiency loss. In a standard regulatory approach, voters choose to implement a regulation and the firm makes profit-maximizing technological and market choices for the given regulation. Majority voting implements a *democratic first best* benchmark of regulatory, technological, and market outcomes. In this standard approach, firms can deviate from the democratic first best only if they can buy influence over the regulatory process.

In contrast to this standard approach, regulation is often approved or repealed *after* firms have developed new products and technologies, with voters unable to commit to future regulation (see, e.g., Acemoglu, 2003; Levy and Spiller, 1994; Mehlum et al., 2024). For example, modern AI regulation has largely been reactive—arriving after major technological breakthroughs made new risks salient—rather than anticipatory. In contrast, technological development often entails costly and slow *R&D* commitments. We argue that this feature of the timing of regulation grants to the firm a form of *political hold-up power*: their choice of technological development can influence future regulation. Even when the democratic first best entails regulations, and even if a firm is unable to buy influence, the firm can deviate from the democratic first best and avoid unwanted regulation if it has sufficient political hold-up power. The firm can do so if it can strategically develop a technology that heavily relies on the externality and pass onto to consumers the cost of regulation. This way, the firm induces consumers to vote against the regulation.

Our central result is that *a firm's political hold-up power is measured by its equilibrium market power*. The key intuition is both simple and general. For a firm to be able to strategically choose politically effective technologies, it needs to be able to adopt technologies that are not the most profitable but that induce better political outcomes and affect sufficiently many consumers. Hence, the firm's competitive position must be sufficiently slack and its brand penetration sufficiently large. We pin down precisely the power to affect the voters' choice to three measurable equilibrium properties. *Pass-through* determines whether regulation would harm consumers enough to make them oppose it ex post. *Market share or brand penetration*[2] determines how many voters are exposed to that harm. *Markup* determines whether the firm can profitably choose a politically effective technology rather than the most profitable one. Under constant-elasticity demand, these three equilibrium features reduce to two simple market statistics: the firm's *Lerner index* and *market share*.

[2]Our benchmark model focuses on the market for an essential good, so that market share equals brand penetration. I.e., the share of potential households in the polity that buy the firm's good. In turn, market penetration equals the product of the firm's market share and the size of the market. What is essential for the firm to extract a political hold-up rent is the ability to affect sufficiently many consumers. For a given market, then the firm's power is increasing in its market share. For a given market share, it is increasing in the size of the market.

Our central result fits well with anecdotal and theoretical descriptions of large firms' direct political influence. For example, Big Tech is sometimes described as able to "*quietly* shape the menu of policy options" (Kausche and Weiss, 2025) and enjoy a form of "deference from policymakers" (Culpepper and Thelen, 2020). A vivid example is Uber's global expansion. Its strategy hinged on rapidly scaling its user base and then leveraging these consumers—who are also voters—to oppose restrictive regulation. As one observer put it, Uber's implicit logic was that "if we have enough people who care about Uber service, and they vote, then we can get these regulations changed" (Shahani, 2014). As our opening quote from a former Uber executive remarks, Uber purposefully used its large market share to "co-opt democracy" and its "consumers' political power" (Medina and Sadek, 2022).

The first salient policy implication of our theory is that reforms aimed at limiting the ability of firms to use economic resources to sway the political process have limited scope because they target the wrong margin of influence. Market power does not simply *buy* power; it *is* power.

A second—and perhaps more important—implication is that, in market democracies, market power not only distorts political and market outcomes, but also the direction of technological progress, a central concern in recent work on technology and power (Acemoglu and Johnson, 2023). We establish that the political hold-up problem induces an additional inefficiency by distorting the direction of technological progress. When the firm has sufficient market power, the equilibrium market surplus resulting from politically-motivated technologies can be strictly lower than both the surplus in the democratic first best benchmark and the surplus of an unregulated market economy in which voters do not have any power to regulate.

These results are remarkably robust. Market power affords firms de facto power even if preemptive regulation is possible and voters and regulators have complete information about future technological possibilities. While our benchmark model focuses on simple regulations that "ban" externalities, our results are robust to a rich set of regulatory instruments, including delegation to technocratic authorities, taxes, and self-regulation. Furthermore, all our results extend beyond our specific market microfoundations: the firm's market power yields it power regardless of whether the externality is a fixed cost of production or varies with the quantity produced, and whether technological development affects marginal costs of production or the quality of the good produced.

We identify a number of possible solutions to the political hold-up problem. The core insight from our analysis is that institutional remedies require commitment. Supermajoritarian democratic processes—such as those required for constitutional amendments

or the ratification of international treaties—can sometimes restore democratic power.[3] In particular, constitutions that allow for a richer set of supermajoritarian instruments are better suited to implement the democratic first best even in the presence of substantial political hold-up power. Furthermore, even when such instruments cannot fully implement the democratic first best, they may guarantee a lower bound on the power of the majority and on total economic surplus.

Our analysis further yields implications for regulatory design as well as for democratic politics more broadly. Because political hold-up power only requires that those who control technological development have sufficient market power, it can also arise at the level of industry associations or standard-setting bodies. While antitrust authorities have struck down industry standards aimed at restricting entry or pricing, our mechanism operates through the political appeal of regulation and therefore falls largely outside the scope of existing interventions. We argue that independent authorities (such as antitrust and courts) can help restricting the political power of market power, but only if voters establish them with supermajoritarian legal instruments and grant them the power to oversee regulation and industry standards over a large bundle of industry sectors. More broadly, our framework offers a new link between increases in market concentration and demand for "populist" or "ideological" leaders and shows that technological transparency may be a double-edged sword: greater information about the technological frontier may reduce firms' ability to extract political hold-up rents, but may also exacerbate technological distortions and inefficiencies.

Related literature. The core premise for our political hold-up problem is that democratic institutions lack commitment power (Acemoglu, 2003; Mehlum et al., 2024). This premise is closely related to the regulatory hold-up assumption that governments may ex-post renegotiate policies after firms make sunk investments (Levy and Spiller, 1994).[4] We add that, because firms anticipate democratic non-commitment, they can direct technological progress to affect voters' future preferences and future regulation. Therefore, we are able to connect market power with firms' political power. Furthermore, we identify in supermajoritarian institutions a possible solution.

Our logic connecting market power to political power has roots in classic capture models emphasizing the role of market concentration in political capture (e.g., Becker, 1983; Grossman and Helpman, 1994, 2001; Peltzman, 1976; Stigler, 1971; Zingales, 2017). These theories emphasize that market concentration facilitates firms' activities aimed at

[3]Our result echoes other theoretical work that emphasizes that supermajority amendment rules expand the set of self-stable constitutions preventing majorities from enacting opportunistic rule changes (Barberà and Jackson, 2004). See also Aghion et al. (2004), Messner and Polborn (2012) and Dal Bo (2006).

[4]See Spiller and Vogelsang (1997) and Stern and Holder (1999) for related discussions of regulatory commitment and institutional design, and Glazer and McMillan (1992) for strategic firm behavior under regulatory threat. A connected literature focuses on the resulting problem of assets that become stranded because of regulation (see, e.g., Caldecott et al., 2021; Van der Ploeg and Rezai, 2020).

buying influence[5] and exploiting informational asymmetries (Laffont and Tirole, 1991, 1993). Instead, in our theory market power *directly* influences democratic policymaking, and hence limiting its influence requires structural solutions.

Our results suggest a reinterpretation of the observed association between market concentration and lobbying. In a pure resource channel, political activity should track market power; in our structural channel, political activity can both substitute and complement it, depending on whether lobbying is a favor exchange or a means to inform policymakers about a firm's technological choice (see, e.g., Bertrand et al., 2014; Hall and Deardorff, 2006). This complementarity is consistent with integrated models of market competition and influence (Callander et al., 2022) and with empirical patterns that show political activity rising with market consolidation (Cowgill et al., 2024).

While we focus on markets for good and services, our mechanism is likely to be useful to interpret the political aspects of the labor market. On the supply side—where unions' market power generates political power (McDonald and Solow, 1981; Olson, 1965)—as well as on the demand-side—where firms' monopsony power (Bassier et al., 2022; Dube et al., 2020) may shape the political feasibility of labor regulation.

Part I A model of market democracy

We study a model of market democracy: firms have de jure power to choose what technology or product to develop and set market prices competitively; citizens act as consumers of the firms' product and as voters who collectively hold de jure power over production regulation. For simplicity, we refer to citizens as "consumers." In our market, one firm may have market power if it develops a new product that employs a new, yet to be developed, technology.[6] Our model begins at a time in which it is common knowledge that a technology to produce the new good may be developed and that production will entail social costs—an *externality*—if unregulated.

[5]Market concentration reduces *collective-action costs*—when fewer firms internalize a larger share of industry benefits, the free-rider problem in political spending is weaker—and raises the *stakes*—higher markups increase the willingness to pay for policy distortions (for recent evidence of these effects, see Basihos, 2025; Cowgill et al., 2024; Montag, 2025; Moshary and Slattery, 2024). A connected argument is that market concentration in the media sector worsens political accountability and voters' information (see, e.g., Anderson and McLaren, 2012; Besley and Prat, 2006).

[6]The new product may be distinct because of the geographic location of the production, because of new characteristics of the good, or because the technology to produce the good is new and cannot yet be replicated by other firms.

I.1 Setup

Market. A continuum of consumers, indexed by $i \in [0, 1]$, has unit demand for a good. The good is produced in two partial substitute varieties: a *market* variety supplied in a competitive market at price p^M,[7] and a new variety that can be developed by a *firm*. Each consumer i values the market variety good at $v^M > p^M$ and values the new variety good at $v_i \geq 0$, distributed according to the cumulative distribution F.

The firm irreversibly chooses whether to develop a technology t incurring a fixed *R&D* cost $\gamma \geq 0$. A production technology is a pair, $t = (c_t, c'_t) \in T \subset \mathbb{R}^2_+$, where $c_t > 0$ is the marginal cost of production if production is unregulated, and $c'_t > c_t$ is the marginal cost of production if it is regulated. The set of feasible production technologies T—i.e., the technological frontier—is commonly known. For ease of exposition, we assume that no two technologies in T have the same marginal cost of production when regulated or unregulated. Unregulated production induces a fixed cost externality, $e > 0$, to each consumer.

Democracy. Consumers can choose whether to regulate production. They can choose to do so *preemptively*, i.e., before the firm chooses a technology $t \in T$, if any; or *ex-post*, i.e., after the firm has chosen a technology. Importantly, consumers can also choose whether to repeal preemptive regulation so as to avoid ex-post regulation. Our benchmark model of democracy allows voters to make changes of regulation by simple majority vote.

Timing. First, consumers choose whether to regulate preemptively. Second, the firm observes the consumers' choice and chooses whether to develop a technology $t \in T$ and incur the cost γ. Third, consumers observe the choice of technology (if any) and choose whether to regulate ex-post—whether to confirm preemptive regulation or introduce new regulation. Finally, the firm optimally sets prices and production, transactions, and consumption occur according to the ex-post regulatory outcome. Figure B.1 in Appendix B summarizes the timing of the model.

Payoffs. Let $R = 1$ if production is ex-post regulated and $R = 0$ otherwise. Consumer i's payoff equals $v_i - p - e(1 - R)$ if she buys the firm's good and $s^M - e(1 - R)$ if she buys the market good, where p is the price of the firm's good and $s^M \equiv v^M - p^M$ is the consumer's surplus if she buys the market good. If the firm develops a technology t, then the firm's profits are given by

$$\Pi(p, t, R) \equiv \mathcal{D}(p) \left[p - c_t(1 - R) - c'_t R\right] - \gamma, \tag{1}$$

[7] E.g., the market variety is supplied in a perfectly competitive market with constant marginal cost $c^M = p^M$.

where the firm's *demand*, $\mathcal{D}(p)$, is the share of consumers buying the firm's good at price p. If the firm does not develop any technology, the firm's profits equal 0.

Plan of analysis. Section I.2 characterizes the market equilibrium and establishes a democratic first best benchmark. Assumption 1 in Appendix A imposes standard regularities on the distribution of preferences, F, that ensure that the firm's profit maximization problem has interior solutions throughout. In Section I.3, we solve for the political-economic equilibrium by backward induction. To avoid knife-edge equilibrium multiplicity, we impose tie-breaking rules favorable to no regulation; none of the substantive results depend on these conventions (see Appendix A for formal details). In Section I.4, we explain why our results can readily be interpreted as meaning that market power *is* power. Section I.5 extend our results to other regulatory frameworks and market microfoundations.

I.2 Market equilibrium and the democratic first best

I.2.1 Market equilibrium

We begin with a preliminary analysis of the market and derive market prices and quantities for a given pair of technology, $t \in T$, and ex-post regulation, $R \in \{0, 1\}$. If the firm develops no technology, then all consumers buy a unit of the market good. Total surplus is $s^M \geq 0$, entirely accrued by consumers. If instead the firm develops a technology $t \in T$, consumer i purchases the firm's good if and only if her surplus from the firm's good is greater than her surplus from the market good: $v_i - p > s^M$. Therefore, the firm's demand function is given by $\mathcal{D}(p) = 1 - F\left(p + s^M\right)$ and profit maximization yields optimal price, p^*, satisfying the first-order condition[8]

$$\left.\frac{\partial \mathcal{D}(p)\,(p-c)}{\partial p}\right|_{p^*(c)} \equiv 1 - F\left(p^*(c) + s^M\right) - f\left(p^*(c) + s^M\right)\left(p^*(c) - c\right) = 0 \tag{2}$$

where $f(v) \equiv \frac{\partial F(v)}{\partial v}$ and $c = c_t$ if production is not regulated and $c = c'_t$ if it is. This immediately yields the following lemma.

Lemma 1 (Regulation increases prices and reduces profits.) *For any technology $t \in T$ and regulation $R \in \{0, 1\}$, the firm's equilibrium price, p^*, satisfies (2). For any technology t, the firm's equilibrium price is greater and profits are lower with regulation: $p^*(c'_t) > p^*(c_t)$ and $\Pi(p^*, t, 1) < \Pi(p^*, t, 0)$.*

The market equilibrium immediately implies that, holding regulation constant, if the firm optimally chooses to develop some technology, then they develop the most

[8]The first-order condition is sufficient by Assumption 1.

profitable technology under that regulatory regime.[9] It will be useful to label such technologies:

Definition 1 (Most profitable regulated and unregulated technologies) *Let $t^*(0)$ and $t^*(1)$ be, respectively, the most profitable unregulated and regulated technologies. I.e.,*

$$t^*(0) \equiv \arg\min_{t \in T} c_t \tag{3}$$

$$t^*(1) \equiv \arg\min_{t \in T} c'_t. \tag{4}$$

Notice that not all technologies are actually profitable, since some may not recoup the fixed *R&D* cost, γ. For the remainder of the analysis, we assume that there exists at least one (strictly) profitable technology.[10]

Assumption 2 (Profitability.) *The most profitable unregulated technology is profitable:*

$$\Pi(p^*, t^*(0), 0) > \gamma.$$

I.2.2 A democratic first best

We now analyze a democratic first best benchmark. In contrast with our model, we assume that consumers have full commitment power. Lemma 2 summarizes the incentive-compatibility constraint for the democratic first best.

Lemma 2 (Optimal *R&D*.) *Fix regulation $R \in \{0, 1\}$. The firm optimally develops the most profitable (and efficient) technology under R, $t^*(R)$, if $\Pi(p^*, t^*(R), R) > \gamma$, or no technology at all.*

We now turn to consumers' preferences over regulatory environments in this first-best scenario. Without regulation ($R = 0$), the firm optimally develops $t^*(0)$ and consumer i's utility is

$$\max\left\{v_i - p^*(c_{t^*(0)}), s^M\right\} - e. \tag{5}$$

With regulation ($R = 1$), the firm only develops $t^*(1)$ if profitable. Otherwise, the firm develops no technology. Accordingly, consumer i's utility is

$$\begin{cases} \max\left\{v_i - p^*(c'_{t^*(1)}), s^M\right\} & \text{if } \Pi(p^*, t^*(1), 1) > \gamma, \\ s^M & \text{if } \Pi(p^*, t^*(1), 1) \leq \gamma. \end{cases} \tag{6}$$

[9] In our benchmark model, the most profitable technology under a given regulatory framework coincides withthe most efficient (lowest cost of production) technology under that framework. See Section I.5.2 and Part II for microfoundations of the political hold-up problem for which profitability and efficiency do not coincide.

[10] Otherwise, all equilibria are outcome equivalent and the firm never develops the new product.

Therefore, under the incentive-compatibility constraint of Lemma 2, consumer i prefers regulation over no regulation if and only if (6) exceeds (5). We refer to the consumer majority's preference over these first-best outcomes as the democratic first best.

Definition 2 (Democratic first best.) *The democratic first best entails regulation if and only if a (strict) majority of consumers prefers regulation subject to the incentive-compatibility constraint of Lemma 2. I.e., for a (strict) majority of consumers, (6) exceeds (5).*

When the democratic first best entails no regulation, then there is no conflict between the majoritarian will of the consumers and the firm's profits. In equilibrium, consumers do not regulate and the firm develops the most profitable and efficient unregulated technology. I.e., the democratic first best is achieved. On the contrary, when the democratic first best entails regulation, there exists a potential power struggle between the majority of consumers and the firms. For the remainder of the paper we focus on this case.[11]

Assumption 3 (The democratic first best entails regulation.) *The democratic first best entails regulation.*

I.3 Political-economic equilibrium

I.3.1 Ex-post regulation

We now analyze when—given the firm's choice of technology $t \in T$—democracy fails to deliver regulation (by not adopting ex-post regulation or, equivalently, repealing existing preemptive regulation). We begin by establishing that, for a given technology t, there exists a share of consumers $\mathcal{P}(t) \in [0,1]$ who prefer not to adopt ex-post regulation. This share is non-zero whenever the (technology-specific) pass through induced by regulation is sufficiently large. In such case, it equals the share of consumers who, with technology t, would demand the unregulated good even if its price internalized the per-capita cost of the externality.

Lemma 3 (Voters' ex-post regulatory preferences.) *For any technology $t \in T$, if the firm develops t, then a share of consumers $\mathcal{P}(t) \in [0,1]$ prefer not to adopt ex-post regulation (and repeal any preemptive regulation). The share $\mathcal{P}(t)$:*

(i) *equals 0 if the pass through induced by regulation of technology t is smaller than the per-capita externality e: $p^*(c'_t) - p^*(c_t) < e$;*

[11] While Assumption 3 is not stated on the primitives of the model, Lemma A.1 in Appendix A gives precise necessary and sufficient conditions on the distribution of consumers preferences, F, for Assumption 3 to hold.

(ii) *otherwise equals the share of consumers who value the firm's good enough that they would, when produced with unregulated technology t, demand it even if the price internalized the per-capita value of the externality:* $\mathcal{P}(t) = 1 - F(p^*(c_t) + s^M + e)$.

Intuitively, whenever the (technology-specific) pass through is smaller than the per-capita externality, every consumer prefers ex-post regulation: the price increase that each consumer is possibly exposed to is trumped by the benefit of avoiding the externality. Hence, the share of consumers who prefer not to adopt ex-post regulation is zero (Part (i)). Otherwise, consumers who have a sufficiently high valuation for the firm's good—in particular, those who would purchase the good with unregulated technology t even if the price internalized the externality—are harmed by ex-post regulation. Hence, the mass of consumers given in Part (ii) prefer not to adopt ex-post regulation.

Consumers have the ability to pass regulation not only ex-post (i.e., after the firm's choice of technology) but also preemptively (i.e., before the firm's choice). Lemma 4 says that, in a majoritarian democracy, preemptive regulation is ineffective regulation. Given the firm's chosen technology t—and regardless of any preemptive regulation—ex-post regulation will not be adopted if a majority of consumers prefer not to adopt ex-post regulation.

Lemma 4 (De jure regulation.) *For any technology $t \in T$, if the firm develops t, then consumers do not adopt ex-post regulation and repeal any preemptive regulation if and only if* $\mathcal{P}(t) \geq 1/2$.

Intuitively, preemptive regulation is irrelevant for equilibrium outcomes because, in a majoritarian democracy, consumers cannot commit to not repealing preemptive regulation. We will return to the role of preemptive regulation when analyzing different regulatory frameworks (Section I.5) and, most importantly, supermajoritarian institutions (Section II.2).

I.3.2 Political hold-up power

We now turn to the question of when, in equilibrium, the firm chooses to develop a technology that induces a majority of consumers to avoid ex-post regulation. Because the democratic first best entails regulation (Assumption 3), if in equilibrium the firm develops such a technology then: (i) the firm must benefit from this choice compared to the democratic first best and (ii) the equilibrium policy is the one favored by the firm rather than by the holders of de jure power over regulation. Hence, we say that in this case the firm has de facto power over regulation. In particular, we notice that this form of de facto power takes the shape of a *political hold-up power*: the firm's irreversible *R&D* choice allows it to control a share of votes over regulation.

From Lemma 4, the firm's power to deter regulation is measured by the share of consumers who the firm can profitably induce to vote against regulation. I.e., the firm can in fact deter regulation if there exists a technology t with $\mathcal{P}(t) \geq 1/2$. Yet this does not imply that the firm would indeed want to use this power, as it may well be the case that such a technology would not be profitable for the firm, or at least that it may be less profitable than the democratic first best. Therefore, a measure of the firm's political hold-up power is the greatest power $\mathcal{P}(t)$ the firm can achieve with a technology that, if unregulated, induces profits greater than in the democratic first best.

Definition 3 (Political hold-up power.) *The firm's political hold-up power is given by*

$$\begin{aligned} \mathcal{P}^* \equiv & \max_{t \in T} \mathcal{P}(t) \\ & s.t.\ \Pi(p^*, t, 0) - \gamma > \max\{0, \Pi(p^*, t^*(1), 1)) - \gamma\} \end{aligned} \tag{7}$$

Proposition 1 characterizes when (majoritarian) democracy fails to achieve the democratic first best and delivers the core insight of our analysis: if the firm has sufficient political hold-up power, then it has de facto power.

Proposition 1 (Political hold-up power is de facto power.) *The political-economic equilibrium features no ex-post regulation if the firm's political hold-up power is greater than $1/2$: $\mathcal{P}^* \geq 1/2$. Otherwise, either the equilibrium features ex-post regulation or the firm chooses to develop no technology.*

In Section I.4, we spell out what market conditions guarantee de facto power to the firm. Before that, we fully characterize the political-economic equilibrium of our model and compare its outcome to two important benchmarks. Namely, the democratic first best and the output generated by granting de jure regulatory power to the firm itself.

Proposition 2 summarizes our results so far and characterizes the political-economic equilibrium. Naturally, when the firm's political hold-up power $\mathcal{P}^*$ exceeds $1/2$, the firm is able to avoid regulation by developing a technology t such that $\mathcal{P}(t) \geq 1/2$ and, furthermore, there exist such technologies that deliver greater profits than the democratic first best. In equilibrium, the firm optimally chooses the most profitable (and, therefore, efficient) technology such that $\mathcal{P}(t) \geq 1/2$. When it exists, we denote this technology by t^*_{maj}.

Proposition 2 (Political-economic equilibrium.) *If the firm's political hold-up power $\mathcal{P}^*$ is greater than $1/2$, then in equilibrium the firm develops t^*_{maj}—the most profitable technology such that $\mathcal{P}(t) \geq 1/2$—and the equilibrium features no ex-post regulation. Otherwise, the equilibrium achieves the democratic first best and it either features ex-post regulation or the firm does not develop any technology.*

I.3.3 Economic welfare

We now turn to the welfare implications of the political hold-up problem. Proposition 2 says that when the firm has de facto regulatory power, the democratic first best is not achieved.[12] This means that a majority of the consumers obtain a payoff lower than in an ideal world in which consumers could commit to preemptive regulation. However, we note that this outcome may not be inefficient in terms of total surplus: while a majority of voters prefer regulation, it *may* be that the extra equilibrium surplus accrued to the firm and the minority of consumers who prefer no regulation is greater than the majority's loss.

The possible superiority (in terms of total surplus) of the political-economic equilibrium over the democratic first best does *not* imply that the political-economic equilibrium is efficient. In fact, we now show that the political hold-up problem may distort the direction of technological progress by inducing the firm to develop an inefficient technology. This distortion materializes whenever the firm has sufficient political hold-up power ($\mathcal{P}^* > 1/2$) and the most profitable unregulated technology does not induce a majority of the voters to strictly prefer regulation ($\mathcal{P}(t^*(0)) < 1/2$). Under these conditions, all the consumers *and* the firm would prefer an alternative laissez-faire institutional design whereby the firm has de jure power over both technological development and regulation.

Proposition 3 (Political hold-up power distorts technological progress.) *Suppose that the firm's political hold-up power $\mathcal{P}^*$ is greater than $1/2$ and the most profitable unregulated technology, $t^*(0)$, yields $\mathcal{P}(t^*(0)) < 1/2$. The political-economic equilibrium induces strictly lower consumers' surplus and firm's profits and is Pareto inferior to an alternative scenario in which the firm has de jure regulatory power (and, hence, chooses not to regulate and develops the most profitable and efficient unregulated technology, $t^*(0)$).*

An interesting implication of this last result is that the distortion of technological progress is the result of a "misallocation" of de jure and de facto power: it arises whenever the owners of de jure power do not have de facto power.

We conclude this section with a remark. In the politica-economic equilibrium the firm only needs to induce a majority of voters to dislike regulation—perhaps by choosing a technology that is quite bad for consumers (and the firm) if unregulated. Yet, this does not mean that the firm needs to choose a technology that is particularly inefficient or unprofitable if unregulated. To the contrary, the firm must choose a

[12] We note that, in this specific model of market democracy, for the firm to have de facto power and the democratic first best to entail regulation, then, when choosing the most efficient unregulated technology, the firm must be able to generate value exceeding the externality for at least a majority of consumer. If this were not satisfied, then a majority of consumers would prefer that the firm cease production altogether than operate with the most efficient unregulated technology. This means that Part (i) of Lemma A.1 holds and Part (ii) of Lemma A.1 does not hold.

technology that is particularly inefficient *if regulated*.[13] In fact, the equilibrium price may achieve its minimum and the firm's equilibrium profits may well be the firm's first best, $\max_{(t,R)} \Pi(p^*, t, R)$.[14]

I.4 Market power *is* power

We established that in a market democracy the firm has de facto power over regulation if its political hold-up power, $\mathcal{P}^*$, is greater than $1/2$. We now turn to understand the determinants of political hold-up power. Whether a firm induces a majority of consumers to vote against regulation depends on three factors:

(i) The firm's equilibrium *pass-through* is sufficiently large: the equilibrium technology t^*_{maj} induces $p^*(c'_{t^*_{\text{maj}}}) - p^*(c_{t^*_{\text{maj}}}) \geq e$. That is, the increase in marginal production costs for the firm (keeping constant the production cost of competitors) is passed through as a sufficiently large price increase to consumers—as opposed to a loss in the firm's profits.

(ii) The firm's *market share* (brand penetration) is sufficiently large:

$$\mathcal{D}(p^*(c_{t^*_{\text{maj}}}) + e) = \mathcal{D}(p^*(c_{t^*_{\text{maj}}})) - \left[F(p^*(c_{t^*_{\text{maj}}}) + s^M + e) - F(p^*(c_{t^*_{\text{maj}}}) + s^M)\right] \geq 1/2$$

where $\mathcal{D}(p^*(c_{t^*_{\text{maj}}}))$ is the firm's equilibrium market share. A slightly different way to think of this is that the equilibrium share of consumers whose net benefit from the firm's new product is greater than the per-capita value of the externality, e, is sufficiently large. Or, equivalently, that the firm's market share if the good's price were to internalize the per-capita value of the externality is sufficiently large.

(iii) The firm's equilibrium profits—*markup* times market share—are sufficiently large:

$$\Pi(p^*, t^*_{\text{maj}}, 0) = \mathcal{D}(p^*(c_{t^*_{\text{maj}}})) \left[p^*(c_{t^*_{\text{maj}}}) - c_{t^*_{\text{maj}}}\right] > \Pi(p^*, t^*(1), 1).$$

The result can be read as a political interpretation of standard market-power statistics. Pass-through measures whether regulation hurts consumers enough to make them oppose it. Market share measures how many voters can be leveraged by the firm. Markup/profits measure whether the firm can afford to choose a politically useful

[13] In particular, a necessary condition for a technology $t \in T$ to deter regulation, $\mathcal{P}(t) \geq 1/2$, is that it is less efficient than the most efficient regulated technology: $c'_t > c'_{t^*(1)}$.

[14] This is the case whenever the distribution of consumers' preferences, F, and technological frontier, T, are such that the firm's political hold-up power $\mathcal{P}^*$ is greater than $1/2$ and the most efficient unregulated technology, $t^*(0)$, yields $\mathcal{P}(t^*(0)) \geq 1/2$.

technology rather than the most profitable one. Proposition 1 can be read as "the firm has de facto power over regulation if and only if the firm has sufficient market power."

Nevertheless, we note that, in practical contexts, market power is measured through the (equilibrium) Lerner Index

$$L(p^*(c), c) \equiv \frac{p^*(c) - c}{p^*(c)} = \frac{1}{|\varepsilon(p^*(c))|}$$

where $\varepsilon(p^*(c))$ is the monopolistic firm's demand elasticity evaluated at the equilibrium price $p^*(c)$. In fact, a rather standard normalization of our model yields even clearer results. Suppose that the impact of regulation on marginal costs is not too large, so that demand elasticity at $p^*(c_{t^*_{\text{maj}}})$ and $p^*(c'_{t^*_{\text{maj}}})$ is not too different. Then we can reasonably approximate the effects of regulation ignoring second-order effects through changes in the demand elasticity.[15] Alternatively, acting on the primitives of our model, this is equivalent to assuming that F follows, at least in the interval between $p^*(c_{t^*_{\text{maj}}})$ and $p^*(c'_{t^*_{\text{maj}}})$, a Pareto distribution with shape parameter $-\varepsilon > 0$ and scale parameter $\underline{v} > 0$:

$$F(v_i) = 1 - \left(\frac{\underline{v}}{v_i}\right)^{-\varepsilon},$$

(see, e.g., Weyl and Fabinger, 2013). Here $\varepsilon < 0$ is the (constant) demand elasticity and, by Assumption 1, $|\varepsilon| > 1$. Notice that this also induces a constant Lerner index, $\mathcal{L} \equiv 1/|\varepsilon|$.[16]

Corollary 1 says that, when the demand for its good can be approximated to have constant elasticity, then the firm's power to avoid regulation is exactly its market power: its Lerner index (markup) and market share. Hence, market power *is* power.

Corollary 1 (Market power *is* power.) *Suppose F follows a Pareto distribution so that the demand for the firm's good exhibits constant elasticity. The political-economic equilibrium features the firm developing t^*_{maj} and no regulation if and only if*

(i) *the firm's equilibrium Lerner index, $\mathcal{L}$, is sufficiently large;*

(ii) *the firm's equilibrium market share, $\mathcal{D}\left(\frac{c_{t^*_{maj}}}{1-\mathcal{L}}\right)$, is sufficiently large;*

(iii) *the firm's equilibrium profits, $\mathcal{D}\left(\frac{c_{t^*_{maj}}}{1-\mathcal{L}}\right)\frac{c_{t^*_{maj}}}{1-\mathcal{L}}\mathcal{L}$, are sufficiently large.*

Otherwise, the equilibrium achieves the democratic first best.

[15] In practice, this also corresponds to common procedures to empirically measure demand elasticity and market power.

[16] Empirically, we commonly observe the equilibrium value of measures of market power. In a neighborhood of the equilibrium price and quantity, the Lerner index equals inverse elasticity.

I.5 Extensions

I.5.1 Other regulatory frameworks

So far we have analyzed a model in which consumers could only use a rather coarse type of regulation: banning the externality. In practice, market democracies can adopt a variety of market regulations. We now briefly discuss how our core insights do not depend on the specific regulatory framework.

Self-regulation and delegation to technocrats. One type of regulation we touched upon in the previous section is "self-regulation." In our context, this amounts to consumers preemptively choosing to allocate to the firm the right to decide whether to ban the externality. Consumers may choose to do so as to avoid the inefficiencies inherent to the distortion in technological progress. However, it is easy to show that this is ineffective. Were the voters to introduce self-regulation and in fact induce the firm to choose any technology different than what induced when the voters can only ban externalities, then they would ex-post repeal self-regulation and introduce a ban.[17]

Remark 1 (Self-regulation is ineffective.) *If consumers have access to legislation enacting self-regulation, then both technological and regulatory outcomes are as in Proposition 2.*

Another common regulatory framework entails the establishment of an authority or agency of technocrats tasked with maximizing a social welfare criterion. In our context, the authority may be tasked to implement regulation equal to the democratic first best or, following Gratton and Edenhofer (2025), maximize social surplus. In both cases, delegation to technocrats is, in a majoritarian democracy, not different from blunter regulatory instruments. The firm can choose a technology that induces a majority of voters to prefer to repeal the mandate to the authority ex-post, thus inducing the same outcome as in Proposition 2.

Remark 2 (Delegation to technocrats is ineffective.) *If consumers have access to legislation establishing technocratic authorities over regulation, then both technological and regulatory outcomes are as in Proposition 2.*

Taxes and subsidies. Another type of regulation that is often employed to limit production externalities is the introduction of taxes and subsidies. Of particular interest in the literature, Pigouvian taxes force producers to internalize the social cost of production externalities with the aim of dissuading the externality or compensating consumers for its cost, if more efficient. In our context, because the externality is associated with fixed costs of production (rather than per-unit), a Pigouvian-like tax is a lump-sum levy

[17] In Figure B.2, we formalize the timing of the game.

$\ell = e$ on the firm if and only if it produces the externality—i.e., it *chooses* to produce at cost c_t instead of c'_t.[18] Since lump-sum levies do not generate price distortions, such Pigouvian-like levies are a natural benchmark that may garner greater political support than other (distortionary) regulation. In principle, consumers may agree on any such levy $\ell > 0$. For the sake of simplicity, we assume that the income from the levy is distributed in equal parts among all consumers.

In Appendix S.3, we extend our benchmark model to incorporate lump-sum levies that can fully compensate consumers for the firm's externality, $\ell \geq e$. In the first-best exercise, any such levy is weakly preferred by a majority of consumers over banning the externality, i.e., the democratic first-best outcome in the benchmark model. Intuitively, a Pigouvian-like or larger levy either induces the firm to produce without the externality and, hence, they develop the profit-maximizing regulated technology—achieving the same result as banning the externality. Otherwise, the firm produces with the externality and, hence, develops the profit-maximizing unregulated technology—delivering consumers with the lowest possible (incentive-compatible) price and, via the redistribution of the levy, *at least* fully compensates consumers for the externality.

Nevertheless, in the political-economic equilibrium, the firm's ability to irreversibly develop technologies continues to grant it (a weaker form of) political hold-up power, which—if sufficiently large—prevents the democratic first best from being achieved. In this setting, the firm garners sufficient political support to avoid the levy only if they can effectively turn this otherwise non-distortionary instrument into a distortionary instrument. The firm can credibly threaten consumers with price increases from the levy by developing a technology such that, if the levy were enacted, the firm would optimally choose to produce without the externality (so to avoid paying the levy) and, hence, imposes a price increase. Naturally, this additional constraint weakens the firm's political hold-up power; however, the core mechanism and insights remain.

I.5.2 Microfoundations

We now discuss how our core results are robust to different market microfoundations.

Per-unit-of-production externality. In our benchmark model, unregulated technologies produce a "lump sum" externality regardless of the quantity produced. More generally, the firm's negative externality may be an increasing function of the total quantity produced in equilibrium (e.g., a per-unit externality). In Supplementary Appendix,

[18] In Supplementary Appendix, we explore a variant of our benchmark model where production entails a per-unit externality. In this setting, the Pigouvian tax would take the more common form of a per-unit tax (and possibly also an output subsidy if the monopolist is inefficiently restricting supply) that equates the firm's marginal private cost with the marginal social cost (as in Barnett, 1980; Baumol and Oates, 1988; Buchanan, 1969). In the present setting, we focus on addressing only the externality via a lump-sum tax and redistribution of the tax revenue.

we study such an extension and show that our core insights from Section I.3 continue to hold. Importantly, as per Section I.4, the firm's de facto power over regulation corresponds precisely to standard measures of market power.

The main substantive difference between this extension and the benchmark model is that, in the absence of regulation, the firm's and consumers' preferences are no longer perfectly aligned. Accordingly, the firm's most profitable unregulated technology is not (necessarily) the most efficient: it delivers lower prices than any other technology but—because lower prices imply greater demand—also imposes a larger negative externality. Therefore, if the externality is sufficiently sensitive to firm's production, consumers may not benefit (and, in fact, may be harmed) by allocating *de jure* regulatory power to the firm, even when the firm has *de facto* power (i.e., Proposition 3 need not hold). We return to this detail in Part II when presenting a general framework for the political hold-up problem that abstracts away from market details and therefore encompasses both possibilities.

Quality v. marginal costs of production. In our benchmark model, regulation increases the firm's cost of production (in addition to removing the firm's negative externality). In some settings, regulation may instead affect the quality of the firm's good or service. In Supplementary Appendix, we study such an extension: consumers' valuations for the firm's good are technology dependent and regulation uniformly decreases all consumers' valuations of the good. As in Section I.4, we focus on the simple case where consumers' valuations are distributed according to a Pareto distribution and, hence, the demand curve features constant elasticity. We show that all our insights from Section I.3 continue to hold (Proposition 1–3). We also show that the firm's *de facto* power over regulation corresponds to its market power (as in Section I.4). The key difference, however, is that the firm's ability to pass through regulation-induced costs now takes the form of the firm having a sufficiently low "quality-" or "demand-" pass through: the firm's price must fall sufficiently slowly (or increase) with declines in their good's quality. Intuitively, this grants the firm power to mobilize consumers against regulation that degrades the quality of the firm's good.

The role of shareholders. So far, we have abstracted from the possibility that consumers benefit from the firm's profits. However, in practice, consumers can have stakes in the firm's profits—most naturally as shareholders, especially for very large firms like those most capable of wielding substantial political hold-up power. Our benchmark model can be extended to incorporate some, or even all, consumers receiving a share of the firm's profits in addition to their utility from (possibly) purchasing the good. Such an extension generates additional incentives for consumers to keep the firm more profitable and, hence, oppose regulation. In turn, the firm will have greater political hold-up power and is more likely to have *de facto* power over regulation. Therefore,

and so long as the democratic first best continues to entail regulation, the democratic first best will be less likely to be attained; however, the key forces underscoring the firm's power are similar.

Part II Implications and solutions

We now abstract from market and regulatory microfoundations to isolate, in reduced-form, the political mechanism that underpins the key results in Part I: the political hold-up problem. This allows us to study its broader policy implications and suggest institutional remedies.

II.1 The generalized political hold-up problem

Let $T \cup \emptyset \times \{0, 1\}$ define the set of political-economic outcomes. Each outcome (t, R) represents the firm producing the good with technology $t \in T$, including no technology at all ($t = \emptyset$), and the ex-post regulatory outcome R. Consumer i's utility from outcome (t, R) is given by $u_i(t, R)$. The firm's profits under optimal pricing and outcome (t, R) are denoted by $\Pi(t, R) - \gamma_t$, where γ_t is the technology-specific cost of development.[19] and $\Pi(\emptyset, R) - \gamma_\emptyset = 0$ for all R. For the sake of simplicity, we assume that the firm's and consumers' preferences over outcomes are strict. Generalizing Assumption 1, we assume that, under each regulatory environment R, there is a unique technology $t^*(R)$ that maximizes the firm's profits. Similarly, as in Assumption 2, we assume that, in the absence of regulation, there exists at least one profitable technology: $t^*(0) \neq \emptyset$.

Democratic first best and ex-ante support for regulation. For any technology t, there exists a share $\mathcal{S}(t) \in [0, 1]$ of consumers who prefer the outcome $(t^*(1), 1)$—the firm's most-profitable regulated technology *and* regulation—to $(t, 0)$. We call $\mathcal{S}(t)$ the ex-ante *support* for regulation relative to technology t. Assumption 3—that the democratic first best entails regulation—then amounts to a strict majority of consumers preferring $(t^*(1), 1)$ to $(t^*(0), 0)$: $\mathcal{S}(t^*(0)) > 1/2$.

Political hold-up power and political-economic equilibrium. For any technology $t \in T$, if the firm develops t, then a share of consumers $\mathcal{P}(t) \in [0, 1]$ prefers not to adopt ex-post regulation (and repeal any preemptive regulation). This is equal to the share of consumers who prefer outcome $(t, 0)$ to $(t, 1)$. Notice that, in this general framework, consumers may have preferences that are, in a sense, time-inconsistent. I.e., they may prefer regulation ex-ante ($\mathcal{S}(t^*(0)) > 1/2$) but, once the firm has indeed

[19] In this general reduced-form framework, we omit the optimal pricing strategy p^* from the profit function since it cannot be derived without microfounding demand.

developed the technology $t^*(1)$ that is optimal under regulation—not considering any strategic hold-up—consumers would repeal the regulation because $\mathcal{P}(t^*(1)) > 1/2$. This is a common insight from the literature that highlights that democratic politics lacks commitment power (see, e.g., Acemoglu, 2003). Nevertheless, to focus on the political hold-up problem and not on consumers' (collective) time-inconsistent preferences, we make a regularity assumption that prevents this.

Assumption 4 (The democratic first best is stable.) $\mathcal{P}(t^*(1)) \equiv 1 - \mathcal{S}(t^*(1)) < \frac{1}{2}$.

The firm's political hold-up power, $\mathcal{P}^*$, is defined, as in Definition 3, as the largest $\mathcal{P}(t)$ such that[20]

$$\Pi(t, 0) - \gamma_t > \Pi(t^*(1), 1) - \gamma_{t^*(1)}. \tag{8}$$

Remark 3 (Generalized political-economic equilibrium) *Under majority rule, Propositions 1 and 2 hold verbatim: $\mathcal{P}^* \geq 1/2$ yields to the firm the de facto power to avoid regulation. The firm does so by developing t^*_{maj}—the most profitable technology such that $\mathcal{P}(t) \geq 1/2$.*

In what follows we discuss what institutional changes in our democracy may implement the democratic first best $(t^*(1), 1)$ even when $\mathcal{P}^* \geq 1/2$. An important role will be played by the ex-ante support for regulation relative to t^*_{maj}, $\mathcal{S}(t^*_{\text{maj}})$.

Definition 4 (Ex-ante support for the democratic first best) *The ex-ante support for the democratic first best, $\mathcal{S}^*$, equals $S(t^*_{maj})$ if $\mathcal{P}^* \geq 1/2$, and otherwise it equals 1.*

When $\mathcal{P}^* \geq 1/2$, the ex-ante support for the democratic first best $\mathcal{S}^*$ captures the mass of consumers who prefer the democratic first best outcome $(t^*(1), 1)$ to the counterfactual outcome attained from simple majority voting. When $\mathcal{P}^* < 1/2$, this counterfactual outcome is itself the democratic first best outcome and, hence, we (trivially) have that all consumers prefer the democratic first best outcome $(t^*(1), 1)$.

II.2 Supermajoritarian instruments

In practice many constitutions and supranational arrangements allow for a multitude of legal instruments with which citizens in democracies can establish regulations. Majority voting on a law is typically only one of them. Citizens in democracies can pass legislation through parliaments that require stronger absolute majorities, majorities across multiple chambers representing different constituencies, or even supermajorities. In addition, citizens in some democracies can access constitutional amendments that

[20] Notice that, because $t^*(1)$ may equal $\emptyset$ and $\Pi(\emptyset, 1) - \gamma_\emptyset = 0$, the right-hand side of (8) is, in fact, equivalent to that in Definition 3.

may require large supermajorities, or sign and ratify international or supranational treaties that establish regulations and bans. Ratification processes—as well as supranational agreements—also typically require supermajorities. For the purpose of our analysis, the key insight about using legal instruments that require supermajoritarian approval is that these instruments also require similar supermajorities for their repeals. I.e., legal instruments that are harder to enact are also harder to repeal, allowing for greater commitment power. Accordingly, and unlike simple majority voting (see, e.g., Lemma 4), preemptive regulation may be effective in constraining the firm's political hold-up power.

To fix ideas, we define a *constitution* as a set $Q = \{q_0, q_1, q_2, \dots\}$ of legal instruments that can be accessed through different voting processes or rules. Instrument $q_j \in Q$ can be enacted (and repealed) if approved by a share of consumers equal to q_j, with $q_0 = 1/2$ being majority voting. Hence, the case of majoritarian democracy studied so far is the special case of $Q = \{q_0\}$. One example may be a constitution that allows for normal statute laws passed by simple majority and constitutional amendments that require a supermajority of $2/3$: $Q = \{1/2, 2/3\}$.

We now study an extension of our model in which consumers can use any instrument q in a constitution Q to impose preemptive regulation. In particular, for each instrument $q \in Q$, we study the (generically unique) equilibrium outcome induced by the following game. First, an instrument q is proposed to the consumers for preemptive regulation. If a share greater than q of consumers prefers to adopt it, then preemptive regulation is approved with instrument q and can be repealed ex-post only if a share of consumers greater than q prefers to do so. If preemptive regulation with instrument q is not adopted, then play continues as per our benchmark model with majority voting—that is, ex-post regulation is by default controlled by the simple majority.[21] Figure B.3 provides an illustration of the timing. We say that a constitution Q induces an outcome if there exists $q \in Q$ that induces it in equilibrium.

It is useful to compare the ex-ante support for the regulation relative to the firm's profit-maximizing technology under no regulation, $\mathcal{S}(t^*(0))$, to the firm's power $\mathcal{P}^*$: the largest majority that the firm is willing to ex-post mobilize against regulation. Our results so far can be summarized as: assume the democratic first best entails regulation (i.e., $\mathcal{S}(t^*(0)) > 1/2$), the firm can avoid regulation if and only if $\mathcal{P}^* \geq 1/2$. Hence, every constitution Q induces the democratic first best outcome if $\mathcal{P}^* < 1/2$—in particular, the simple majority instrument, $q_0 = 1/2$, induces this outcome.

More generally, Proposition 4 characterizes when a supermajoritarian instrument (and, hence, a constitution) induces the democratic first best. Crucially, even in cases

[21] In principle, the instrument q could also be proposed in this ex-post stage (i.e., after the instrument was not adopted preemptively). However, so long as a simple majority retains the final ex-post decision in the event of it not being adopted ex-post, then the equilibrium outcome is unchanged.

where the firm has sufficient political hold-up power to avoid regulation under simple majority voting (i.e., $\mathcal{P}^* \geq 1/2$), supermajoritarian instruments can sometimes achieve the democratic first best.

Proposition 4 (The power of supermajoritarian instruments.) *A constitution Q induces the democratic first best if and only if there exist $q_j \in Q$ such that $\mathcal{P}^* < q_j < \mathcal{S}^*$.*

Focusing on the interesting case, suppose the firm has sufficient power to deter regulation under simple majority voting: $\mathcal{P}^* \geq 1/2$.[22] Intuitively, if preemptive regulation is enacted with a supermajoritarian instrument q_j, the firm will be prevented from repealing the regulation if and only if the supermajoritarian threshold exceeds the firm's power: $q_j > \mathcal{P}^*$. In these cases, the firm optimally responds by developing the profit-maximizing technology under regulation, $t^*(1)$, and the democratic first best is achieved. Yet, for the supermajoritarian instrument to pass in the first place, there must be sufficient ex-ante support for the democratic first best over the outcome $(t^*_{\text{maj}}, 0)$ that would otherwise ensue if preemptive regulation does not pass. Therefore, a sufficient condition to achieve the democratic first best is that there exists a supermajoritarian instrument that is greater than the firm's political power but smaller than the ex-ante support for the democratic first best: $\mathcal{P}^* < q_j < \mathcal{S}^* = S(t^*_{\text{maj}})$. Thus, richer constitutions are more robust to the political hold-up problem.

In fact, supermajoritarian instruments can help even when they cannot achieve the democratic first best. Suppose the firm has sufficient political hold-up power to prevent regulation under simple majority voting (i.e., $\mathcal{P}^* \geq 1/2$). In the absence of supermajoritarian instruments, the firm develops the most profitable technology that deters regulation and the equilibrium features no ex-post regulation—delivering outcome $(t^*_{\text{maj}}, 0)$. Now consider a supermajoritarian instrument $q > 1/2$ such that the firm has *sufficient* power to repeal any preemptive regulation that uses this instrument: $\mathcal{P}^* \geq q$. If passed, the firm optimally responds by developing the most profitable technology, say t^*_q, that also repeals the regulation, i.e., $\mathcal{P}(t^*_q) \geq q > 1/2$. Hence, in equilibrium, the outcome $(t^*_q, 0)$ still does not feature ex-post regulation; however, the firm may be incentivized to develop a different—and necessarily less profitable—technology: $t^*_q \neq t^*_{\text{maj}}$. So long as the mass of consumers preferring $(t^*_q, 0)$ to $(t^*_{\text{maj}}, 0)$ is greater than the supermajority threshold q, the outcome $(t^*_q, 0)$ can be induced—to the benefit of a supermajority of consumers.[23] Therefore, supermajoritarian instruments

[22] If this were not the case, then $\mathcal{S}^* = 1$ and every constitution Q induces the democratic first best because $q_0 = \frac{1}{2} \in Q$.

[23] In some settings, it may be natural to think of consumers' preferences being misaligned with the firm's in the absence of regulation. So that, conditional on no regulation, whenever the firm makes less profit, every consumer is better off. If this is the case, every consumer will prefer outcome $(t^*_q, 0)$ over $(t^*_{\text{maj}}, 0)$. On the other hand, if consumers' preferences are aligned with the firm's conditional on there being no regulation (as in our model in Part I), no consumer prefers $(t^*_q, 0)$ over $(t^*_{\text{maj}}, 0)$. Indeed, the inefficiency identified in Proposition 3 becomes larger for preemptive regulation with such a supermajoritarian instrument.

may allow for a *democratic second best* to be achieved even when the democratic first best cannot be achieved. Remark 4 summarizes this implication (the formal statement is deferred to Appendix C.1).

Remark 4 (A supermajoritarian democratic second best.) *Suppose the democratic first best is not attainable (and, hence, $\mathcal{P}^* \geq 1/2$). A sufficiently rich constitution Q may induce a democratic second-best: an outcome $(t, 0)$ that does not feature ex-post regulation but is preferred by a supermajority of consumers over the simple majority outcome $(t^*_{maj}, 0)$.*

So far, we have focused on the role of supermajoritarian instruments when combined with preemptive *regulation*. We conclude this section by noting that supermajoritarian instruments may also be used in a similar way to preemptively *prevent* regulation. In some cases—and, in particular, when the democratic first best cannot be achieved—preemptive laws that prevent regulation can benefit consumers. Intuitively, if a preemptive law to prevent regulation passes with a supermajority $q > 1/2$, then the firm optimally develops the most profitable technology that deters voters from repealing the law and replacing it with ex-post regulation. However, to prevent the law from being repealed only requires that the firm mobilizes a minority, $1 - q$, of consumers against regulation. Therefore, the firm develops the most profitable technology such that $\mathcal{P}(t) \geq 1 - q$, which is a weaker constraint than that imposed by a preemptive regulation law for any supermajoritarian instrument (as well as if no preemptive law is passed). Thus, the firm has access to a broader set of technologies that prevent ex-post regulation and, accordingly, generates larger profits. Furthermore, if the mass of consumers preferring this outcome to the counterfactual outcome $(t^*_{\text{maj}}, 0)$ is greater than the supermajority threshold q, the preemptive law to prevent regulation will pass—benefitting a supermajority of consumers. When consumers' and the firm's preferences over technologies are aligned conditional on no regulation (recall Footnote 23), then every consumer benefits from preemptive deregulation over simple majority voting. In fact, the inefficient distortion of technological development highlighted in Proposition 3 can be completely removed via preemptive laws that prevent regulation with a supermajority threshold $q = 1$ (effectively allocating de jure regulatory power to the firm) and, furthermore, this preemptive law to prevent regulation would attain sufficient support to pass.

II.3 Other solutions and applications

II.3.1 Independent authorities

In Section I.5, we argued that delegation to technocrats alone is not a viable solution to the political hold-up problem. We now show that under certain conditions super-

majoritarian instruments can be used to establish independent authorities that allow technocrats to implement the democratic first best. Like for monetary policy, our theory highlights that the problem of market power's influence over politics is (at least in part) determined by voters' lack of commitment power. Hence, commitment to delegate to more independent authorities can be a solution to the problem if they are (i) established with supermajoritarian or constitutional legal instruments (see Section II.2) and (ii) mandated to follow a sufficiently hawkish policy against the firm (or, equivalently, staffed with sufficiently hawkish personnel—see Rogoff, 1985). If the first condition is not satisfied, then consumers can repeal the mandate ex-post. If the second condition is not satisfied, then the firm may have sufficient political hold-up power by choosing to develop a technology that, if regulated, induces a bad outcome for the technocrats in charge of the authority.

Importantly, the establishment of independent authorities may in some cases enable greater commitment than direct democratic choice. This is the case if there is sufficient ex-ante consensus to bundle a large number of different regulatory frameworks on many different technological sectors. In particular, suppose that, on any individual sector, ex-ante support for regulation is not large enough so that there exists no legal instrument q such that $\mathcal{P}^* < q < \mathcal{S}^*$. However, there may exist a sufficiently large coalition of consumers in favor of hawkish blanket regulation *across* a large range of sectors. Then, this coalition can vote to establish, with a supermajoritarian instrument greater than individual sectors $\mathcal{P}^*$, an authority staffed with personnel with utility function u_p such that $u_p(t^*(1), 1) > u_p(t, 0)$ for all t such that $\Pi(t, 0) - \gamma_t > \Pi(t^*(1), 1) - \gamma_{t^*(1)}$, in *all* sectors. This authority can then implement the democratic first best across all sectors.

II.3.2 Industry standards

As mentioned earlier, many countries have adopted a largely voluntary and decentralized system of industry standards.[24] In some cases (e.g., *Allied Tube & Conduit v. Indian Head*), antitrust regulators and courts have intervened against industry standards deemed anticompetitive. However, our theory says that industry associations with sufficient market power and penetration can use industry standards for political goals that—to our knowledge—are *not* currently considered by the courts. In particular, suppose that, in contrast to our model so far, the new variety of the product is produced by $n > 1$ firms each with too little political hold-up power to independently induce a majority of consumers to avoid regulation. Instead, assume that the n firms together hold just enough political hold-up power so that, if they all develop the technology t^*_{maj},

[24] In the United States, industry standards are largely based on voluntary decentralized processes, partly as a result of the National Technology Transfer and Advancement Act (NTTAA) (1996). See Katz and Shapiro (1994) and Lerner and Tirole (2006) for rationales for private standard-setting in the presence of network effects.

consumers then prefer to avoid ex-post regulation.

Without an industry standard allowing for *R&D* collusion among the firms, we cannot easily sustain a collusive equilibrium around t^*_{maj}. In fact, one of the n firms could deviate and develop the technology $t^*(1)$. If so, consumers would introduce regulation and the firm would seize the entirety of the market.[25] In contrast, by establishing an industry standard allowing only for t^*_{maj}, the association of firms establishes a "political cartel" that extracts the full political hold-up rent of its combined market power. Therefore, our theory suggests a need for greater oversight of industry standards by antitrust authorities. Yet, for this oversight to be effective it is essential that the antitrust authority is established with sufficient consensus (as in Section II.3.1) so that consumers cannot easily repeal the authority's rulings.

II.3.3 Barriers to entry

Although increased competition typically benefits consumers, it has long been observed that, when network effects are present, consumers may benefit from limiting entry (Economides and Flyer, 1997; Katz and Shapiro, 1994). Our theory, therefore, suggests that firms may be incentivized to make (possibly inefficient) investment and product design decisions that strengthen these network effects as a means to mobilize consumers against regulation that encourages entry.

Our theory also highlights how firms may be incentivized to design infrastructure in a manner that makes "opening up" their infrastructure to new entrants harmful for consumers. Take for example Apple's closed-platform approach to software development (sometimes referred to as a "walled garden"). When faced with the prospect of being forced by regulators to allow competing app stores on iPhones, Apple warned that such regulation would degrade security and hurt users (Truță, 2025). Whether Apple's claims are true or false is difficult to say. Nevertheless, it is plausible that a firm in such a position may benefit from intentionally designing their infrastructure in ways that credibly threatens to harm consumers if regulated or opened up to competition. A similar logic can be applied to foreign competition. A domestic firm may strategically structure their supply chains to be inefficiently reliant upon local suppliers or local labor as means to ensuring that any relaxation of protectionist measures would impose excessive harm on the local economy and, in turn, mobilize consumers against such free-trade policies.

[25] Consumers' incentive to regulate may be limited if regulation leads to a less competitive market, e.g., forcing the remaining $n-1$ firms to exit the market. Similarly, the incentive for one of the n firms to deviate (as well consumers' incentives to regulate) is limited if firm output is subject to capacity constraints.

II.3.4 Populism and nationalization

Supermajoritarian legal instruments alleviate the political hold-up problem because they afford to voters greater commitment power. An emerging literature emphasizes the "ideological" or "committed" aspect of populist policymaking: populist leaders implement promised policy platforms independently of future realizations of uncertain states, including the preferences of the majority of the voters.[26] In contrast, traditional democratic politicians respond to electoral incentives and implement policies that are favored by a majority of voters at the time of the next election.

The rise of populism in Europe and the United States coincided with an era of increasing market concentration. A large empirical literature documents rising concentration, markups, and profits across U.S. industries over the 1990–2020 period (see, e.g., Autor et al., 2020; Covarrubias et al., 2020; De Loecker et al., 2020; Grullon et al., 2019; Peltzman, 2014).[27]

Our theory offers a new explanation for why increasing market power fuels demand for populist leaders, and especially for populist leaders who exhibit authoritarian tendencies. Suppose that consumers have access to a populist leader who is committed to implement regulation independently of any future technological development and voters' preferences. Then, in our model, even a marginal ex-ante support $\mathcal{S}^*$ such that $1/2 < \mathcal{S}^* < \mathcal{P}^*$ can, by electing the populist leader, guarantee the implementation of the democratic first best. By Assumption 3, this is always satisfied.

Remark 5 (Market power and demand for populism.) *For any constitution Q, if there exists no $q_j \in Q$ such that $\mathcal{P}^* < q_j < \mathcal{S}^*$, then traditional democratic politics does not implement the democratic first best while electing a committed populist leader who promises regulation implements the democratic first best.*

Interpreting this last result raises the concern that a populist leader's ability to commit to future policymaking is only valuable to the voters if the leader is expected to remain in power for a long time. In fact, if his reelection is coming soon, then the firm may adopt technology t^*_{maj} so to induce a majority of consumers to vote the leader out. Thus, perhaps paradoxically, populist leaders are more valuable to the voters when they exhibit authoritarian tendencies that may make their equilibrium expected time in power longer (for example, they may manipulate information regarding the true nature

[26] Bellodi et al. (2023) define populism as a form of policy commitment and link its popularity to shocks that decrease voters' trust in politicians. Gratton and Lee (2025) point out that rational voters may prefer to commit to status-quo policies rather than adopt policies suggested by more informed experts. See also Ghosh and Tripathi (2012).

[27] This body of work helped establish a broad consensus that market power has increased over recent decades and has been widely cited in both academic and policy discussions (e.g., Akcigit and Ates, 2021; Philippon, 2019). However, Benkard et al. (2023) and Shapiro and Yurukoglu (2024) emphasize that these trends may depend on market definition and may not be uniform across sectors.

of technological development, so that even if the firm develops t^*_{maj}, a majority of voters may still believe that regulation is optimal, as in Gratton and Lee, 2024).

The literature on the classical hold-up problem in industrial organization (Grossman and Hart, 1986; Hart and Moore, 1990; Klein et al., 1978; Williamson, 1975) emphasizes vertical integration as a solution. In our context, vertical integration corresponds to nationalization so that the political hold-up power may fuel demand for nationalizing firms with large market power.[28] But nationalization is at best a second-best solution as it exposes technological progress to political failure.

II.3.5 Asymmetric information and transparency reforms

So far we assumed that the set of possible regulated and unregulated technologies T—the technological frontier—is common knowledge. In most realistic settings, the firm has private information over what technologies are available. Intuitively, the firm is therefore able to extract a further informational rent—suggesting that reforms that impose greater transparency may benefit consumers. However, in our setting, transparency is a double-edged sword for consumers: on the one hand, it may decrease the likelihood that the firm can extract a political hold-up power rent; on the other hand, it may increase the inefficiency induced by the political hold-up problem. Hence, reforms that increase technological transparency (e.g., by forcing firms to reveal what they know about the impact of regulation) have ambiguous effects on consumers' welfare.

To illustrate this idea, we extend our model as follows. In this model, after the firm chooses to develop a feasible technology t, it carries out demonstrations of t in its unregulated form. I.e., the consumers become aware of the unregulated features of t—such as unregulated marginal costs of production and unregulated product quality—but remain uncertain about the effects of regulation—for example, on marginal costs, product quality, or the externality.

To see why greater transparency may be a double-edged sword, consider this simple example. The set of feasible technologies T is drawn by nature from two possible technological states, T_0 and T_1. Both technological states feature (i) the same most profitable and most efficient unregulated technology t^* and (ii) the same most profitable and most efficient regulated technology. However, the two states differ by the effects of regulation on the most efficient unregulated technology. In T_0, the most profitable unregulated technology induces a larger increase in production costs (or a larger change in the quality of the product or the extent to which regulation reduces externalities) such that $\mathcal{P}(t^* \mid T_0) > 1/2 > \mathcal{P}(t^* \mid T_1)$. Hence, with full information, T_0 induces the

[28] Shotts (2016) analyzes a connected political hold-up problem that arises when firms are threatened by autocratic nationalization.

firm to adopt the most efficient unregulated technology and avoid ex-post regulation. On the contrary, if in T_1 the firm avoids regulation, then this is because in equilibrium it chooses to adopt a less efficient technology than t^*. That is, the full-information T_1 equilibrium technology is $t^*_{\text{maj}} \neq t^*$.

The positive edge of transparency is highlighted by the case in which, in T_1, there is no technology that can avoid ex-post regulation (i.e., $\mathcal{P}(t) < 1/2$ for all $t \in T_1$). Then, with full information, the democratic first best is achieved with probability $\Pr(T_1)$. Instead, if only the firm knows the technological state, then for $\Pr(T_1)$ sufficiently small, the democratic first best is never achieved. In equilibrium, the firm chooses to develop the most efficient unregulated technology t^* and the consumers, for fear that the reality is one in which regulation is too costly (T_0), avoid regulation. Hence, in this case transparency has the effect of reducing the power of market power.

The negative edge of transparency is highlighted by the case in which, in T_1, there exists a technology that avoids regulation, $t^*_{\text{maj}} \neq t^*$. Hence, with full information, the democratic first best is never achieved and, in addition, with probability $\Pr(T_1)$ production is undertaken with an inefficient technology. Instead, if only the firm knows the technological state, then for $\Pr(T_1)$ sufficiently small, production is always undertaken with the most efficient unregulated technology. In equilibrium, the firm chooses to develop the most efficient unregulated technology t^* and the consumers, for fear that the reality is one in which regulation is too costly (T_0), avoid regulation. This outcome is superior to the one with full information: every consumer's payoff is greater and total surplus is strictly greater (in fact, this is outcome-equivalent to an alternative scenario in which the firm has *de jure* regulatory power—see Proposition 3).

Remark 6 (The double-edged sword of transparency.) *Removing informational asymmetries on the technological frontier may induce the democratic first best but may also only induce greater political hold-up inefficiencies.*

We note that transparency may not only differ because of policy choices, but also because the firm's technological development is in more "new" sectors and industries, so that consumers and policymakers may be less informed about the possible space of technological development. In this sense, we may think of newer technologies, such as AI, as less transparent technologies. With these technologies, a firm with sufficient market power will find it easier to extract a political hold-up rent (e.g., avoid regulation) without imposing further political hold-up inefficiencies.

Part III Conclusions

We argued that, in market democracies, market power yields political power through a channel that is independent from lobbying and media campaigns. A key implication of our theory is that firms with marker power hold de facto power over regulation, even without spending vast resources on lobbying or media campaigns. Therefore, reforms aimed at limiting lobbying and political influence are limited in scope.

We speculate that our connection between market power and political power may be of greater salience in an economy characterized by large digital platforms, superstar firms, and AI firms. Superstar firms and AI innovation may be detrimental to labor and democratic institutions (Autor, 2022; Autor et al., 2020) and further increase market concentration (Babina et al., 2024). But as emphasized by Acemoglu and Johnson (2023), technology's social effects crucially depend on who controls its development and regulation.

Our theory contributes to this debate in two key ways. First, it provides a tight connection between market concentration and the ability to control *both* technological development and regulation, even when institutions allocate de jure power over regulation to the majority of citizens. Second—and perhaps most importantly—it emphasizes that the direction of technological progress may itself be driven by the struggle for political power. Superstar innovating firms, in our framework, do not merely redistribute away from labor and try to influence politics to favor their technology. They choose to shape technological progress in economically inefficient but politically powerful ways. Our central result is that this distortion of the role of markets in market democracies arises if and only if firms have market power and democratic institutions lack commitment power. As a consequence, the ability of market democracies to push the frontier of innovation, and democratic resilience itself, both depend on market institutions that limit market power and political institutions that allow for democratic commitment.

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Appendix

A Assumptions and solution concept

We solve for subgame perfect equilibria of the game induced by market clearing conditions as defined in Section I.2. In knife edge cases, multiple equilibria arise. To simplify exposition, we focus on equilibria in which: (i) the firm, whenever indifferent, chooses an action that does not produce the externality; (ii) the firm only develops a technology if it is strictly profitable given the equilibrium regulatory environment; (iii) consumers, whenever indifferent between the consequences of regulation and no regulation, vote for no regulation; (iv) the voting rule breaks ties in favor of the firm.

We impose the following regularity assumption on F to ensure interior market equilibria throughout. This assumption is satisfied by distributions commonly used in the literature and generate standard demand curves (e.g., Pareto distributions—generating constant elasticity demands; exponential distributions—generating log-linear demands).

Assumption 1 (Interior solution to the firm problem) *The distribution F of consumers' preferences has finite expectation, is twice-continuously differentiable, (strictly) regular,*[29] *and such that, for any technology $t \in T$ and regulation $R \in \{0, 1\}$, a non-zero share of consumers prefer to buy the firm's good instead of the market good if the firm sells at marginal cost: $F\left(\max_{t \in T} c'_t + s^M\right) < 1$.*

The following lemma fully characterizes when the democratic first best entails regulation, i.e., the conditions that must be satisfied for Assumption 3 to hold.

Lemma A.1 (When the democratic first best entails regulation.) *Let p^* satisfy (2). The democratic first best entails regulation if and only if either*

(i) *the profit-maximizing regulated technology is profitable and the pass through induced by regulation along the incentive-compatibility constraint of Lemma 2 is smaller than the per-capita externality e: $\Pi(p^*, t^*(1), 1) > \gamma$ and $p^*(c'_{t^*(1)}) - p^*(c_{t^*(0)}) < e$; or*

(ii) *less than half of consumers value the firm's good enough that they would, when produced with the profit-maximizing (and, hence, most efficient) unregulated technology, demand it even if the price internalized the per-capita value of the externality: $1 - F\left(p^*(c_{t^*(0)}) + s^M + e\right) < 1/2$.*

Proof of Lemma A.1. We begin by partitioning consumers into two categories.

[29] As standard in auction theory, F is (strictly) regular if its virtual value, $v - \frac{1-F(v)}{f(v)}$, where $f(v) \equiv \frac{\partial F(v)}{\partial v}$, is strictly increasing for all v.

Category 1: Consumers who would not purchase the good when unregulated if the price internalized the per-capita externality. Formally, i such that

$$v_i < p^*(c_{t^*(0)}) + s^M + e.$$

Any Category 1 consumer's utility from no regulation is

$$\max\{v_i - p^*(c_{t^*(0)}), s^M\} - e < s^M, \tag{A.1}$$

and her utility from regulation is

$$\left\{ \begin{array}{ll} \max\{v_i - p^*(c'_{t^*(1)}), s^M\} & \text{if } \Pi(p^*, t^*(1), 1) > \gamma, \\ s^M & \text{otherwise} \end{array} \right\} \geq s^M. \tag{A.2}$$

Category 2: Consumers who would purchase the good when unregulated even if the price internalized the per-capita externality. Formally, i such that

$$v_i > p^*(c_{t^*(0)}) + s^M + e.$$

Any Category 2 consumer's utility from no regulation is

$$\max\{v_i - p^*(c_{t^*(0)}), s^M\} - e = v_i - p^*(c_{t^*(0)}) - e > s^M, \tag{A.3}$$

and her utility from regulation is

$$\begin{cases} \max\{v_i - p^*(c'_{t^*(1)}), s^M\} & \text{if } \Pi(p^*, t^*(1), 1) > \gamma, \\ s^M & \text{otherwise.} \end{cases} \tag{A.4}$$

Notice that, without needing to invoke either part the lemma, **Category 1 consumers strictly prefer regulation**. This follows from (A.1) and (A.2) and regardless of whether $t^*(1)$ is profitable.

Sufficiency: We prove that if either Part (i) or Part (ii) of the Lemma hold, a majority of consumers strictly prefers regulation.

If Part (i) holds, all Category 2 consumers strictly prefer regulation. To see this, notice that, by substituting $p^*(c'_{t^*(1)}) - p^*(c_{t^*(0)}) < e$ into the middle expression of (A.3), any such consumer's utility from no regulation is bounded strictly above by

$$v_i + [e - p^*(c'_{t^*(1)})] - e = v_i - p^*(c'_{t^*(1)}),$$

and, hence, their utility from no regulation is strictly less than their utility from regulation, i.e., the first case in (A.4).

If Part (ii) holds, then Category 1 consumers are a majority.

Necessity: By contrapositive. Suppose neither Part (i) or Part (ii) hold: either

$$\Pi(p^*, t^*(1), 1) > \gamma \text{ and } p^*(c'_{t^*(1)}) - p^*(c_{t^*(0)}) \geq e \text{ and } 1 - F(p^*(c_{t^*(0)}) + s^M + e) \geq \frac{1}{2}$$

or

$$\Pi(p^*, t^*(1), 1) \leq \gamma \text{ and } 1 - F(p^*(c_{t^*(0)}) + s^M + e) \geq \frac{1}{2}.$$

It suffices to show that Category 2 consumers do *not* strictly prefer regulation. It then follows from $1 - F(p^*(c_{t^*(0)}) + s^M + e) \geq \frac{1}{2}$ that (at least) a majority of consumers prefers no regulation and, hence, the democratic first best entails no regulation.

We split this analysis into two cases:

Profitable $\mathbf{t^*(1)}$: Suppose $\Pi(p^*, t^*(1), 1) > \gamma$. Notice that, by substituting $p^*(c'_{t^*(1)}) - p^*(c_{t^*(0)}) \geq e$ into the middle expression of (A.3), any Category 2 consumer's utility from no regulation is bounded weakly below by

$$v_i + [e - p^*(c'_{t^*(1)})] - e = v_i - p^*(c'_{t^*(1)}),$$

and, using the inequality in (A.3), we conclude that their utility is also strictly above s^M. Therefore, their utility from no regulation must weakly exceed their utility from regulation, i.e., (A.4).

Unprofitable $\mathbf{t^*(1)}$: Suppose $\Pi(p^*, t^*(1), 1) \leq \gamma$. That Category 2 consumers do *not* prefer regulation follows immediately from (A.3) and the second case in (A.4). ■

B Timing figures

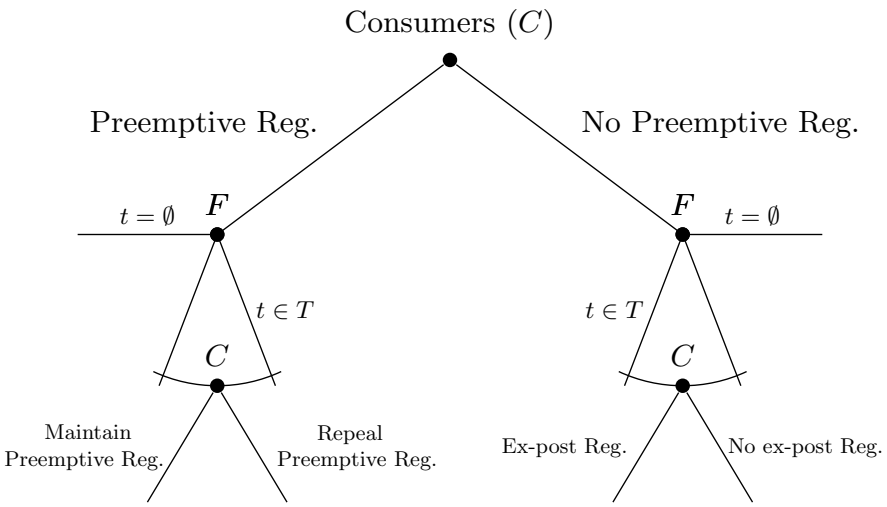

Figure B.1: Timing for benchmark model.

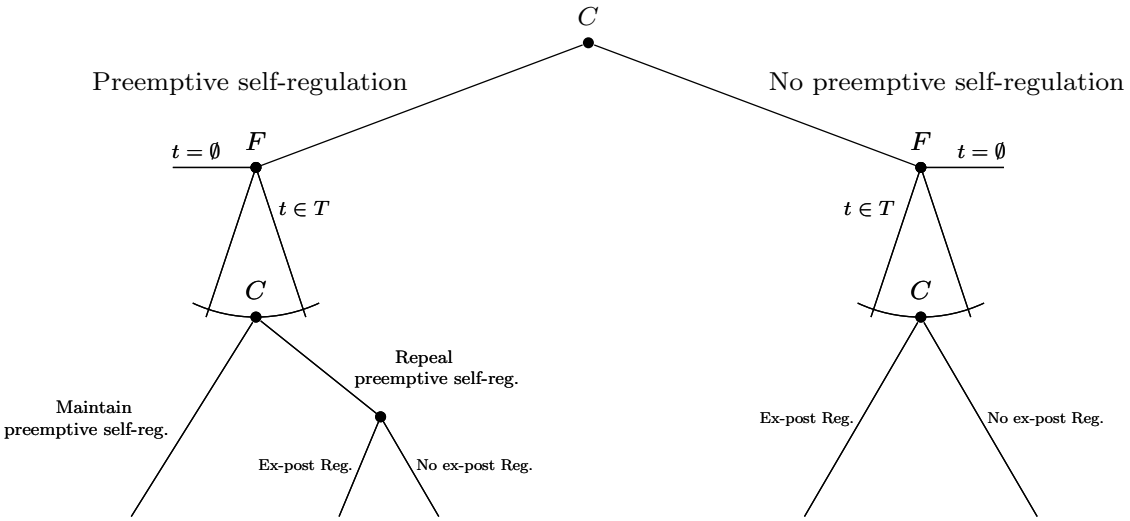

Figure B.2: Timing for benchmark model with preemptive self-regulation instrument.

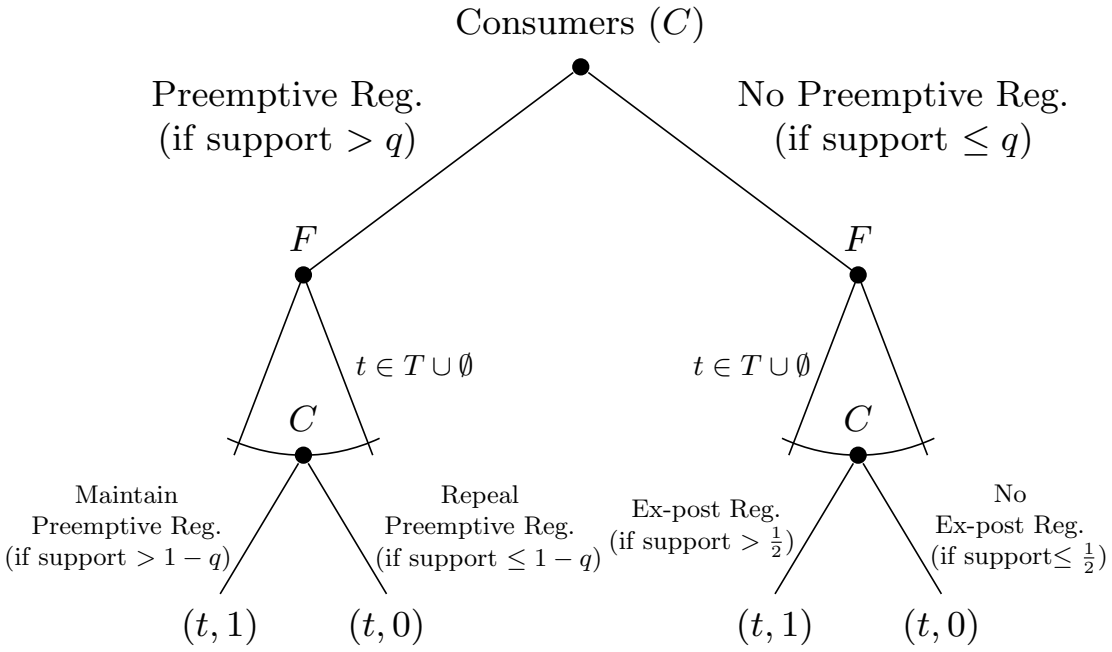

Figure B.3: Timing for generalized framework with supermajority instrument for preemptive regulation.

C Omitted proofs

Proof of Lemma 1. By Assumption 1, for any marginal cost $c > 0$ the firm's optimal price $p^*(c) \in (c, \infty)$ exists, is unique, and satisfies the first-order condition (2),[30] yielding

$$p^*(c) = c + \frac{1 - F\left(p^*(c) + s^M\right)}{f\left(p^*(c) + s^M\right)}.$$

Define $\sigma(v) := \frac{1-F(v)}{f(v)}$ as the inverse hazard rate. Taking the derivative with respect to c, applying the chain rule, and simplifying gives

$$\begin{aligned} & \frac{\partial p^*(c)}{\partial c} = 1 + \frac{\partial \sigma(v)}{\partial v}\frac{\partial p^*(c)}{\partial c} \\ \iff & \frac{\partial p^*(c)}{\partial c} = \frac{1}{1 - \frac{\partial \sigma(v)}{\partial v}}. \end{aligned} \tag{C.1}$$

The denominator of the right hand side of (C.1) is positive because,nby Assumption 1, strict regularity of F means that $\frac{\partial \sigma(v)}{\partial v} < 1$ (i.e., the second order condition holds). Hence, the equilibrium price is strictly increasing in the firm's marginal cost: $\frac{\partial p^*(c)}{\partial c} > 0$.

With slight abuse of notation, we express the gross profit function Π as a function of two variables: price, p, and marginal cost, c. Accordingly, we can express the derivative with respect to c as

$$\frac{d\Pi(p^*(c))}{dc} = \frac{\partial \Pi(p,c)}{\partial p}\Big|^{(p^*(c),c)} \times \frac{dp^*(c)}{dc} + \frac{\partial \Pi(p,c)}{\partial c}\Big|^{(p^*(c),c)} \times \frac{dc}{dc}.$$

By the Envelope theorem, this simplifies to

$$\frac{d\Pi(p^*(c))}{dc} = \frac{\partial \Pi(p,c)}{\partial c} = -(1 - F\left(p^*(c) + s^M\right)) < 0.$$

Thus, we conclude that the firm's equilibrium gross profits are strictly decreasing in the marginal cost. Since net profits differ from gross profits only by the constant cost γ, the same result applies to them.

Noting that regulation always induces a strictly higher marginal cost, $c'_t > c_t$, yields the comparative static results. ■

Proof of Lemma 2. Given regulation $R \in \{0, 1\}$, the firm can either choose to develop no technology (delivering payoff 0) or develop a technology $t \in T$ and obtain payoff $\Pi(p^*, t, R) - \gamma$. Clearly, if the firm develops some technology, then they will develop the profit-maximizing technology given the regulatory environment, $t^*(R)$, and they will do so if and only if it is profitable: $\Pi(p^*, t^*(R), R) - \gamma > 0$. ■

[30] We omit here the technical argument. The finite mean assumption rules out corner solutions; strict regularity ensures that the second-order condition is satisfied and uniqueness.

Proof of Lemma 3. Follows from the same arguments used in Proof of Lemma A.1, after replacing $c_{t^*(0)}$ with c_t and $c'_{t^*(1)}$ with c'_t. ■

Proof of Lemma 4. First notice that any possible preemptive regulation is irrelevant for our (forward-looking) players' incentives and their action sets and, hence, does not affect equilibrium play. The lemma then follows from Lemma 3. ■

Proof of Proposition 1. We begin with two observations.

Observation 1: As noted in Proof of Lemma 4, it suffices to consider the firm's decision of which technology to adopt (if any) independent of whether preemptive regulation was passed.

Observation 2: The firm's equilibrium payoff is bounded below by

$$\Pi(p^*, t^*(1), 1) - \gamma. \tag{C.2}$$

To see this, notice that Assumption 3, that the democratic first best entails regulation, yields $\mathcal{P}(t^*(1)) < 1/2$: By Lemma A.1, Assumption 3 is equivalent to either $p^*(c'_{t^*(1)}) - p^*(c_{t^*(0)}) < e$ or $1 - F\left(p^*(c_{t^*(0)}) + s^M + e\right) < 1/2$. If the former holds, then it must also be that

$$p^*(c'_{t^*(1)}) - p^*(c_{t^*(1)}) < e$$

because $p^*(c_{t^*(1)}) > p^*(c_{t^*(0)})$. By Lemma 3, we then have $\mathcal{P}(t^*(1)) = 0 < 1/2$. If, instead, the latter holds, then it must also be that $1 - F\left(p^*(c_{t^*(1)}) + s^M + e\right) < 1/2$ because $F(\cdot)$ is an increasing function and $p^*(c_{t^*(1)}) > p^*(c_{t^*(0)})$. By Lemma 3, we then have $\mathcal{P}(t^*(1)) < 1/2$. Applying Lemma 4 then shows that the firm can always at least attain (C.2).

These two observations imply that, among all technologies that do not prevent ex-post regulation (i.e., per Lemma 4, those with $\mathcal{P}(t) < 1/2$), the firm would optimally choose technology $t^*(1)$ and obtain payoff (C.2).

We now proceed with the core result in the proposition. Suppose $\mathcal{P}^* \geq 1/2$. That is, there exists $t \in T$ such that $\mathcal{P}(t) \geq 1/2$ and

$$\Pi(p^*, t, 0) - \gamma > \max\{0, \Pi(p^*, t^*(1), 1) - \gamma\}.$$

By Lemma 4, such a technology choice delivers payoff $\Pi(p^*, t, 0) - \gamma$, which is strictly higher than either outside options: (C.2) and developing no technology. Therefore, in equilibrium the firm optimally choose to develop a technology that avoids ex-post regulation (i.e., t such that $\mathcal{P}(t) \geq 1/2$) and consumers do not adopt ex-post regulation (and repeal any preemptive regulation).

Suppose $\mathcal{P}^* < 1/2$. That is, for any $t \in T$ such that $\mathcal{P}(t) \geq 1/2$ (if it exists), it must be that

$$\Pi(p^*, t, 0) - \gamma \leq \max\{0, \Pi(p^*, t^*(1), 1) - \gamma\}.$$

By Lemma 4, such a technology delivers payoff $\Pi(p^*, t, 0) - \gamma$, which is weakly lower than the outside options: (C.2) or the zero payoff from developing no technology. Therefore, and recalling our tie-breaking assumption on the firm's behavior, in equilibrium the firm does *not* choose to develop a technology that avoids ex-post regulation (i.e., does not develop t such that $\mathcal{P}(t) \geq 1/2$). In equilibrium, either the firm develops the most profitable regulated technology $t^*(1)$ and consumers adopt ex-post regulation or the firm develops no technology at all. ■

Proof of Proposition 2. Suppose $\mathcal{P}^* \geq 1/2$. By Proposition 1, the firm chooses some technology $t \in T$ such that $\mathcal{P}(t) \geq 1/2$ and the equilibrium features no ex-post regulation. Clearly, in equilibrium, the firm must choose the most profitable unregulated technology (i.e., smallest c_t) such that $\mathcal{P}(t) \geq 1/2$: t^*_{maj}.

Suppose instead that $\mathcal{P}^* < 1/2$. By Proposition 1, the firm either chooses some technology $t \in T$ such that $\mathcal{P}(t) < 1/2$ and the equilibrium features no ex-post regulation, or the firm develops no technology. In the former case, in equilibrium, the firm optimally chooses the most profitable regulated technology (i.e., smallest c'_t)—by definition, $t^*(1)$. Clearly, the firm chooses $t^*(1)$ over developing no technology if and only if $\Pi(p^*, t^*(1), 1) > \gamma$. By Assumption 3, in either case, we obtain the democratic first best. ■

Proof of Proposition 3. Because $\mathcal{P}^* \geq 1/2$, by Proposition 2, in equilibrium, the firm chooses t^*_{maj}. Because $t^*(0)$ satisfies $\mathcal{P}(t^*(0)) < 1/2$, $t^*_{\text{maj}} \neq t^*(0)$, and hence $c_{t^*_{\text{maj}}} > c_{t^*(0)}$. We want to show that consumer surplus and the firm's profits are strictly lower under the outcome $(p^*, t^*_{\text{maj}}, 0)$ than under $(p*, t^*(0), 0)$ and that all consumers are (weakly) worse off under $(p^*, t^*_{\text{maj}}, 0)$ than under $(p*, t^*(0), 0)$ (Pareto order).

By the argument in the Proof of Lemma 1, $p^*(c_{t^*_{\text{maj}}}) > p^*(c_{t^*(0)})$ and $\Pi(p*, t^*_{\text{maj}}, 0) < \Pi(p*, t^*(0), 0)$. Therefore, (i) it is immediate that every consumer's payoff under $(p^*, t^*_{\text{maj}}, 0)$ is weakly lower and (ii) strictly lower for at least those consumers who buy the firm's good under $(p^*, t^*_{\text{maj}}, 0)$, and (iii) the firm's profits are strictly lower. ■

Proof of Proposition 4. We first consider the case $\mathcal{P}^* < 1/2$. Then, by definition, $\mathcal{S}^* = 1$. Since all constitutions allow for $q = 1/2$, the proposition follows from Proposition 1. We now focus on the case $\mathcal{P}^* \geq 1/2$.

Sufficiency: Suppose there exists $q \in Q$ such that $\mathcal{P}^* < q < \mathcal{S}^*$ If preemptive regulation passes with a supermajority instrument q, then the firm optimally responds by developing technology $t^*(1)$ because $\mathcal{P}^*(t^*(1)) < 1/2 \leq q$ and $\mathcal{P}^* < q$. Therefore, the democratic first best is attained. If preemptive regulation does not pass, then ex-post regulation is decided by simple majority voting. Since $\mathcal{P}^* \geq 1/2$, then, by Proposition 2, the firm develops t^*_{maj}, ex-post regulation is avoided, and the democratic first best is not attained. Therefore, the democratic first best is attained if and only if preemptive regulation passes. Preemptive regulation passes if and only if a mass of strictly more

than q consumers prefer the democratic first best outcome $(t^*(1), 1)$ over the outcome when no preemptive regulation passes $(t^*_{\text{maj}}, 0)$. By definition, this mass of consumers is precisely $\mathcal{S}^*$ and, because $q < \mathcal{S}^*$, it is immediate that the preemptive regulation will pass and the democratic first best is attained.

Necessity: We prove the contrapositive: if there is no $q \in Q$ such that $\mathcal{P}^* < q < \mathcal{S}^*$, then the constitution Q does not induce the democratic first best. We split the proof into two cases.

Case 1: Suppose q is such that $q \leq \mathcal{P}^*$. If preemptive regulation passes with this supermajority instrument, then, because $\mathcal{P}^* \geq q$, the firm optimally responds by developing some technology t such that $\mathcal{P}(t) \geq q$, the preemptive regulation is repealed, and, in turn, the democratic first best is not attained. If preemptive regulation does not pass, then, by Proposition 2 and because $\mathcal{P}^* \geq 1/2$, the firm develops t^*_{maj}, ex-post regulation is avoided, and the democratic first best is not attained. Therefore, regardless of whether preemptive regulation passes, the democratic first best is never attained.

Case 2: Suppose q is such that $\mathcal{P}^* < q$. By supposition, it must be that $\mathcal{S}^* \leq q$. If preemptive regulation passes with a supermajority instrument q, then the firm optimally responds by developing technology $t^*(1)$ because $\mathcal{P}^*(t^*(1)) < 1/2 \leq q$ and $\mathcal{P}^* < q$. Therefore, the democratic first best is attained. If preemptive regulation does not pass, then ex-post regulation is decided by simple majority voting. Because $\mathcal{P}^* \geq 1/2$ and by Proposition 2, the firm develops t^*_{maj}, ex-post regulation is avoided, and the democratic first best is not attained. Therefore, the democratic first best is attained if and only if preemptive regulation passes. Preemptive regulation passes if and only if a mass of strictly more than q consumers prefer the democratic first best outcome $(t^*(1), 1)$ over the outcome when no preemptive regulation passes $(t^*_{\text{maj}}, 0)$. By definition, this mass of consumers is precisely $\mathcal{S}^*$ and, because $\mathcal{S}^* \leq q$, it is immediate that the preemptive regulation will not pass and the democratic first best is not attained.
■

C.1 Omitted results from main text

Proposition C.1 presents the formal result underlying Remark 4. Before presenting the formal statement, we introduce some notation. Given $q \geq 1/2$ and $\mathcal{P}^* \geq q$, let t^*_q denote the profit-maximizing technology t such that $\mathcal{P}(t) \geq q$. Notice that, in the subgame following preemptive regulation, the firm optimally develops t^*_q and induces outcome $(t^*_q, 0)$. In the special case of $q = 1/2$ and $\mathcal{P}^* \geq 1/2$, the technology t^*_q is simply t^*_{maj} (as per the benchmark model).

Proposition C.1 *Suppose democratic first best is not attainable (and, hence, $\mathcal{P}^* \geq 1/2$). If there exists $q \in Q$ such that $\mathcal{P}^* \geq q$ and the outcome $(t^*_q, 0)$ is preferred to $(t^*_{maj}, 0)$ by strictly more than q consumers, then a democratic second-best outcome $(t^*_q, 0)$ can be attained.*

Proof. Suppose democratic first best is not attainable (and, hence, $\mathcal{P}^* \geq 1/2$). Consider preemptive regulation with a supermajoritarian instrument q such that $\mathcal{P}^* \geq q$. By Remark 3, if preemptive regulation is not passed, then the ensuing outcome is $(t^*_{\text{maj}}, 0)$. If preemptive regulation is passed, then, because $\mathcal{P}^* \geq q$, the outcome is $(t^*_q, 0)$. This follows via a similar argument as that of Proposition 2 but modified to incorporate the supermajority requirement q to repeal regulation. Therefore, preemptive regulation with supermajority q will pass if and only if strictly more than q consumers prefer the outcome $(t^*_q, 0)$ to $(t^*_{\text{maj}}, 0)$. The proposition statement then follows. ■