Market Competition and Political Influence: An Integrated Approach*

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Abstract

The operation of markets and of politics are in practice deeply intertwined. Political decisions set the rules of the game for market competition and, conversely, market competitors participate in and influence political decisions. We develop an integrated model to capture the circularity between the two domains. We show that a positive feedback loop emerges such that power begets more power, but that the feedback loop is bounded. With too much market power, the balance of power between politics and markets itself becomes lopsided and this drives a wedge between the interests of a policymaker and the dominant firm. Although such a wedge would seem pro-competitive, we show that it typically exacerbates the static and dynamic inefficiency of market outcomes. More generally, our model demonstrates that intuitions about market competition can be upended when competition is intermediated by a strategic policymaker.

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1 Introduction

The operation of markets and of politics are in practice deeply intertwined. Political decisions set the rules of the game for market competition and, conversely, market competitors participate in and influence political decisions. Since at least the time of Stigler (1971), the connection between the two domains has been formalized in economics, and the flourishing literature that emerged has deepened our understanding of how special interests can distort political outcomes and how political decisions shape market outcomes.

What has been less explored is the circularity of this connection. If political decisions affect market structure, and that market structure, in turn, determines the power of firms to participate in and influence political decisions, a circularity develops in which market and political outcomes are codetermined. The endogeneity of both market and political outcomes leads to sharp questions about the origins, persistence, and welfare effects of market power.

These questions have come to the forefront of debate in recent years in both academic writing and the public forum. Recent evidence establishes that market power has increased in the US in recent decades (De Loecker, Eeckhout & Unger 2020). An open question is why. Was the increase due to efficiency gains that were rewarded with market leadership—what Covarrubias, Gutierrez & Philippon (2020) refer to as "good concentration"—or is it "bad concentration" derived from anti-competitive practices and, in particular, the wielding of political power to handicap market rivals?

In this paper we develop a model to explore and analyze the circularity between markets and politics. Competition is between two firms in a Cournot market repeated without end. The essential element of the model is that firms can obtain market power from two distinct sources. Market power can come from a competitive advantage that firms invest in, be it through R&D and technological superiority, from higher managerial competence, greater experience, or some combination thereof. This *capability* based market power builds a competitive advantage that makes the market as a whole more efficient.

The second source of market power is political protection. We endow a self-interested policymaker with the ability to intervene in the market to advantage one firm over its competitors. For concreteness, we model this power via a quality floor, a regulatory tool common in practice. The policymaker can impose a floor to separate the firms, choosing a quality level that only the leader can meet. The protected firm benefits from the removal of competition and passes along a share of the surplus that is gained as payment to the policymaker.[1] This *politics* based market power enables a competitive advantage by disabling competition, which,

[1] This tool can only separate firms that otherwise already have a technological difference. The tool(s) available to the policymaker are fundamental to the outcome of market and political interaction. We return to this point at length later in the paper.

in contrast to capability-based market power, comes at the expense of efficiency.

We study this model dynamically. We show that a positive feedback loop emerges between the two sources of market power—that market power begets political power in a reinforcing cycle. In this way an initial capability advantage can be parlayed over time into a larger advantage and a dominant market position.

We show, however, that this feedback loop is bounded and conditional on market power itself. We identify a threshold in capability-based advantage beyond which the feedback loop turns negative. Beyond this threshold, therefore, greater capability-based market power leads to the removal of protection and less politically-based market power. This removal restores a degree of competition and bounds the ability of firms to dominate the market through political protection.

The core insight driving this result is that the interests of the market leading firm and the policymaker are aligned but not perfectly aligned. Within each period their interests are aligned on political protection. Monopoly power maximizes the surplus available to share between the market leader and the policymaker. Across periods, however, the degree of market power changes, and so too does the balance of power in their relationship. If the market leader gains a large capability advantage on its competitor, the value of political protection declines, and as this declines, the ability of the policymaker to extract rents from the market leader declines. Capability-based and politically-based market power are substitutes, in effect, such that the more the market leader has of one, the less it needs of the other.

This generates dynamic incentives for the policymaker that are very different from her static incentives. Dynamically, the policymaker seeks to "manage competition." She wants to protect the leader so that she can extract rents, but she doesn't want the leader to get so far ahead technologically that political protection becomes obsolete. It is her desire to remain relevant that causes her to stop protecting the leader and encourage competition, hoping that this allows the trailing firm to catch up and make her protection valuable once more.

At first blush, managed competition appears promising as it bounds political intervention in the market and restores a semblance of competition. We show, however, that this is not the case. In an otherwise standard model of duopolistic competition, we show that managed competition can lead to the worst of both worlds. We characterize the unique renegotiation-proof subgame perfect equilibrium and show that play eventually stabilizes at a configuration in which technology stagnates and the policymaker protects the leading firm. The stable configuration is inefficient because the leading firm is a protected monopolist and because investment stops at a low level. In fact, the level of technology at the stable configuration is never greater than, and typically lower, than if the policymaker never protected or always protected. Investment with political interventions is lower, therefore, than if competition or even monopoly were guaranteed.

This result shares a deep connection with Arrow's (1962) well-known "replacement effect" from markets. Arrow observed that investment in technology will be higher with competition than in monopoly. The reason is that a monopolist obtains only an efficiency gain from investment whereas a duopolist has the additional benefit of capturing additional market share. Aghion et al. (2005) formalize the idea more broadly and refer to it as the "escape competition effect."

The connection of Arrow to politics is that, by intervening in the market, the policymaker affects the degree of competition and, thus, the firms' incentive to invest in technology. We show that political intervention turns Arrow's logic on its head, creating what we refer to as a *reverse Arrow effect*. Precisely because the policymaker wants to manage competition—to remove protection should the leading firm's advantage exceed a threshold—the leading firm is incentivized to stop investing early. At the threshold, competition will not decrease with investment, as Arrow suggests, but rather it will increase as the policymaker removes protection. With Arrow's logic reversed, the leading firm chooses to not invest and the policymaker continues to protect, inducing a steady state with no competition and low investment.

A general lesson from this analysis is that the impact of political intervention on markets is a function of the structure of market competition itself. The insight from managed competition is that a self-interested policymaker seeks market competition not for its own sake, but so that the threat of even more competition makes protection more valuable to the leading firm. This implies that a standard market intuition—that competitive pressure translates into more efficient markets—need not hold. Rather, competitive pressure matters only to the extent that it produces more leverage for the policymaker to extract rents.

To explore this idea, we consider a market in which competitive pressure is reduced. Specifically, we suppose that the follower firm will give up and leave the market permanently if it has been excluded by political protection for some period of time. This change nominally reduces competitive pressure on the leading firm as exit by the follower will remove competition altogether. To understand the impact of this change on a market intermediated by a policymaker, however, we must understand how it changes the incentives of the policymaker.

We show that this reduction in competition pressure improves market outcomes. The reverse Arrow effect occurs but not permanently, and eventually underinvestment is overcome. In fact, we show that a distinct Arrow effect emerges—what we refer to as the politically enhanced Arrow effect—in which political protection serves as a reward to investment rather than punishment. This induces in the steady state more investment than monopoly and even duopoly, thereby going some way to correct the traditional market failure of underinvestment.

Our results do not prove one way or the other the efficiency of political intervention in markets. On one hand, we show how political intervention can be more destructive than previously thought, that it can limit investment to levels even below that of monopoly, all

while stopping competition. On the other hand, in a different market structure, we show that political intervention can reinforce market efficiency. What this tells us is that the interaction of markets and politics is rich, subtle, and complicated. It tells us that the outcome in the two domains is interdependent, a function of how firms compete in the market as well as the political tools available, and that studying this intersection is important for understanding each domain.

A more practical and immediate lesson from our model is for the current debates around market power and politics. One line of argument is that concentration must be "good" if a dominant firm has a capability advantage over competitors. What our results show is that the path to dominance matters. If the leading firm benefited from political protection along the path to dominance, the resulting market concentration need not be "good." Indeed, in a market with softer competitive pressure, we show that the steady state of the industry involves a monopolist with a high level of capability and no political protection. Yet that position was not earned fairly through market competition. Rather, the outcome was preordained from the moment the firm gained an initial capability advantage. In equilibrium, a firm parlays an initial advantage into lasting dominance through political protection in a reinforcing cycle. Our model provides a structure to understand the empirical and practical connection between market concentration and political power over time.

1.1 Connections to the Literature

Our model relates to work in both political economy and industrial organization. Our contribution is to connect these domains and show how they interact. To be sure, policy does appear in the industrial organization literature and firms in the political economy literature, but the core features of each literature have yet to meet in an extensive manner. For instance, policy appears regularly in models of industrial organization although it is taken as exogenous, such as in the literature on anti-trust (Segal & Whinston 2007, e.g.,). Similarly, firms and industries are often actors in political economy models, lobbying for favored policies, yet their interests and capabilities are taken as given without an accounting for how they coevolve dynamically with policy (Grossman & Helpman 1994, e.g.,). Our paper is a small step toward bringing these literatures closer together and exploring their interdependence.

This connection is of particular relevance to the literature on quality floors. Beginning with Leland (1979) and Shapiro (1983), a large literature has analyzed the impact quality floors have on markets, initially as a tool to address asymmetric information, but later as a policy lever to influence the degree of market competition (Ronnen 1991). We enrich this literature by demonstrating the political usefulness of quality floors, showing how a self-interested policymaker can use quality floors strategically to influence market dynamics and

extract rents.

Our model is closest in spirit to Coate & Morris (1999). They explicitly connect lobbying and political influence to private sector investment, showing how political choices influence private sector decisions that, in turn, influence politics. In their model there is a single firm that decides which of two sectors to operate in.[2] We differ in emphasizing competition between firms and the dynamics of competition within a single market, showing the importance to a policymaker of deciding when and not just whether to extract rents.

More broadly, our model relates to the literature on the role of commitment in political economy. Our result that investment stops at a level lower than monopoly is, at heart, a commitment problem. A higher capability level for the leader would increase the surplus available, but because the firm and the policymaker can't commit to a sharing of the surplus going forward, the policymaker attempts to manage competition and the reverse Arrow effect takes hold. Acemoglu (2003) views the lack of commitment through the lens of the Coase theorem and argues that a political version of the theorem does not hold. More proximately to our work, Acemoglu & Robinson (2000), and more thoroughly, Acemoglu (2006) and Acemoglu, Golosov & Tsyvinski (2008), build models in which economic outcomes impact political power, and the inability to commit over the sharing of future surplus—the inability to commit to future political power—distorts economic outcomes away from efficiency.[3]

Relative to this literature, our contribution is to enrich the private sector and study competition *within* the market. This allows us to see how private sector actors compete for political influence, and how a strategic policymaker can trade their interests off against each other to maximize her own gain. By building a market structure, our model provides a microfoundation for how and why political and market outcomes are codetermined. Indeed, in contrast to the literature, formal political power in our model is not contested—it is always held by the policymaker. What changes instead is the *value* of policy making power itself. As the conditions of market competition change, as the leading firm gains a capability-based advantage, the value of political power declines, and we show how the stakeholders wage a contest to manage that balance.

A benefit to modeling the market microstructure is that we can better identify where inefficiencies come from and how they can be corrected. Our result that weakening competition can improve market outcomes shows that the interplay of market and political outcomes need not be destructive. It shows a way in which the codetermination of market and political outcomes can be harnessed to address market failures and improve outcomes.

[2]Besley & Coate (1998) present a related idea in which private and public decisions are interrelated in the context of elections and public tax and investment decisions.

[3]Shleifer & Vishny (1994) develop a related model of state owned firms in which the government directly participates in the market.

The feedback loop between politics and markets has recently come into focus in the empirical literature, as most clearly and forcefully articulated in Zingales (2017).[4] He provides many examples from history of inefficient outcomes that derived from market participants' ability to capture political power. Zingales coins the phrase a "Medici vicious cycle" to describe a positive feedback loop and identifies six broad factors that drive this feedback.[5] We develop a formal model of market and political competition that complements Zingales and we identify a novel channel through which the feedback loop operates. By including the policymaker as a strategic self-interested player, we show that the feedback loop is bounded, and we show how and why it varies, and potentially be overcome, as the structure of market competition varies. At a more abstract level, the insights from our model reinforce and put structure to Zingales's (2017) argument that a 'goldilocks' balance is required between the power embedded in politics and in markets for the system to have any hope of efficient and fair progress.

2 The Model

The environment consists of two firms, indexed $i \in \{1, 2\}$, and a policymaker, P. In each period $t = 1, 2, ...$ the firms compete in the market and lobby the policymaker for protection.

The Market: Competition is Cournot in each period. Firm i in period t chooses quantity q_t^i, where $q_t^i = 0$ if the firm does not compete in the market. Total market quantity is then $Q_t = q_t^1 + q_t^2$. Market demand is constant across periods and the inverse demand function is given by:

$$p = a - b \cdot Q.$$

Each firm has a technology level τ that allows it to produce at constant marginal cost $mc(\tau)$.[6] We denote technology levels by l and f for the leading and following firms, respectively, where $l \geq f$. The state of the market in period t is then $(l_t, f_t) \in \mathbb{Z}_+ \times \mathbb{Z}_+$. Within-period Cournot profits are $\pi^L(l, f)$ and $\pi^F(l, f)$, respectively. A monopolist's profit at technology level l is denoted $\hat{\pi}^M(l)$.

The firms can improve their technology level through investment. Investment incurs a fixed cost $c(\tau) > 0$ that is increasing and convex with $c'(\tau) \to \infty$ as τ gets large. Technological advancement is deterministic and one-step per investment.[7] We assume the step sizes

[4] See also Philippon (2019) and Wu (2018) for book-length treatments.

[5] Zingales's (2017) six factors are: the main source of political power, the conditions of the media market, the independence of the prosecutorial and judiciary power, the campaign finance laws, and the dominant ideology.

[6] Technology levels affect only costs and not total market demand, although we can incorporate such an effect by assuming a increases in the technology levels. Doing so does not qualitatively alter our results.

[7] Step-by-step advancement is standard in the literature; see Aghion et al. (2005). In the appendix we prove

are technologically small.[8] We generally consider the situation in which both firms begin at technology level 0, although the analysis holds should the market begin at any state of technology. Indeed, one can view a different starting state as resulting from a disruptive innovation, after which the model describes incremental competition thereafter.

Political Influence: The policymaker can intervene in the market and impose a quality floor. The quality floor can be adjusted from period to period. It is outcome relevant only if it separates the firms.[9] When a quality floor is imposed, the trailing firm is excluded from the market, earning zero profit, and the leader obtains monopoly power.

The protected firm pays rents to the policymaker, which we assume to be a fixed share of the value of protection. The value is the difference between monopoly and duopoly profits, which for the policymaker's share $\rho \in [0, 1]$ and technology levels l and f, gives rents of:

$$\pi^P(l, f) = \rho\left[\hat{\pi}^M(l) - \pi^L(l, f)\right]. \tag{1}$$

The protected firm's profit is then monopoly profit less rents:

$$\pi^M(l, f) = \hat{\pi}^M(l) - \pi^P(l, f), \tag{2}$$

which, by construction, exceeds the duopoly profit. Note that the policymaker and leading firm cannot commit to a rent-sharing agreement beyond the present period. We return to this important assumption in the discussion.

Timing & Equilibrium: The timing of the play within each period is as follows. For $l_t > f_t$:

1. *Investment*. The leading firm invests ($i_t = 1$) or not ($i_t = 0$) and the state is $(l_t + i_t, f_t)$.
2. *Protection*. The policymaker imposes a quality floor ($a_t = 1$) or not ($a_t = 0$).
3. *Market*. The firms compete (if $a_t = 0$) or L is a monopolist (if $a_t = 1$).
4. *Transition*. The state in period $t + 1$ will begin at $(l_t + i_t, f_t + 1 - a_t)$.

The transition in stage 4 implies that the trailing firm moves up one technological step whenever it competes in the market. This captures the idea that catch-up growth is easier than frontier-expanding innovation. The follower firm can more easily imitate the leading firm than the leader can come up with new ideas. A version of this assumption appears in

that our results are robust to stochastic advance in capability.

[8] In the sense that the value of a capability step is less than having a competitor excluded from the market.

[9] It could, in principle, exclude both firms. As that delivers zero rents to the policymaker and is a dominated strategy, we set this possibility aside.

many other models of competition and innovation, such as in the influential work by Aghion et al. (2005) and Bessen & Maskin (2009). We assume this catch-up growth is dependent on market participation reflecting the fact that much innovation, and even imitation, comes from market interactions and experience, as documented in the literature on learning-by-doing. Our results not require this distinction to be so sharp, nor that catch-up growth is guaranteed. We require only that catch-up growth is more likely when a firm is in the market than outside. This is important as it implies political protection impacts the market in two ways: It removes competition *and* it restrains technological catch-up by the trailing firm. Both aspects will play a role in our analysis.

When the firms are equal technologically and $l_t = f_t$, nature selects in step 1 one of the firms to invest, and play proceeds identically otherwise. This is a simple tie-breaking rule that creates the opportunity for capability gaps to open up between the firms.[10]

Final Details: The incentives of firms to invest depend on market structure and political intervention. Through a pure market lens, Arrow (1962) argues that the incentive to invest is higher in duopoly than in a monopoly. This "replacement effect" is intuitive and holds empirically in the setting our market captures (Aghion et al. 2005).[11] It does not follow directly from Cournot competition, however, and so we impose the following simple condition on relative profits.

Assumption 1: $\frac{\partial}{\partial l}\hat{\pi}^M(l) \leq \frac{\partial}{\partial l}\pi^L(l, f)$.

Arrow's replacement effect is simply that, for a technology level l, the marginal gain from stepping up a level is higher for the duopolist than the monopolist. The duopolist improves efficiency *and* gains market share from its competitor. This implies that the gap between profits in monopoly and duopoly is narrowing. That as the leader's technology level grows, competition restrains its profits to a lesser degree.

This property is important as it the gap between monopoly and duopoly that determines the rents paid to the policymaker. The policymaker receives a share of the value of protection, which is exactly the difference in profit between monopoly and duopoly. That this gap declines in the leader's technology level implies, therefore, that the policymaker's rents also decline in the technology level.

Assumption 1 is for a duopolist and a pure monopolist. The case of a protected monopolist—who shares rents with the policymaker—lies between these cases. The fixed proportion rent sharing rule we assume implies, immediately from Assumption 1, that the incentive to invest of a protected monopolist satisfies: $\frac{\partial}{\partial l}\hat{\pi}^M(l) \leq \frac{\partial}{\partial l}\pi^M(l, f) \leq \frac{\partial}{\partial l}\pi^L(l, f) \leq 0$ for each f.

[10] Alternatively, if success is stochastic we could allow both firms the opportunity to invest as this would permit a capability gap to open up.

[11] The "replacement effect" terminology is due to Tirole (1997).

The policymaker and the firms discount utility at rates, δ and β, respectively. Throughout our analysis the policymaker is far-sighted with $\delta \in (0, 1)$. For simplicity, we present the model when the firms are short-sighted ($\beta = 0$). In the appendix we establish the robustness of the results for any $\beta \in (0, 1)$. Note that the firms receive the benefit of investment within a period, so even when myopic, investment can have a positive return.

We identify a renegotiation proof equilibrium and fully characterize it. We prove that the equilibrium is unique within this class and that it has the structure of a Markov Perfect Equilibrium. We refer to it as the equilibrium throughout the paper.

3 Market Incentives

To illuminate the market incentives in the model we begin by shutting down the policymaker as a strategic actor. We consider two benchmarks. One in which the policymaker does not exist or, equivalently, never intervenes in the market, and a second in which the policymaker always intervenes to protect the leading firm.

The Policymaker Never Intervenes: Without political intervention, both firms compete in each period and the market is a duopoly. A firm invests if the improvement in capability increases profit enough to justify the cost. For firms with a single period horizon, investment is profitable if:

$$\pi^L(l+1,\ f) - c(l) > \pi^L(l,\ f).$$

The decision to invest depends on the capability level of the leader as well as the follower. This generates a threshold capability level beyond which further investment is not profitable.

Lemma 1 *The leader invests if* $f < \overline{g}(l)$*, where* $\frac{d}{dl}\overline{g}(l) < 0$.

The leading firm's willingness to invest is decreasing in its own capability level and also the capability of the trailing firm. The more capable is the leader itself, the cost of further advancement is higher and the increase in profit it produces is decreasing. The impact of the trailing firm's capability level is solely through the market effect. As the trailing firm catches up to the leader, competition is more intense and the leader is able to capture less of the value of its investment and, thus, is less willing to invest. The $\overline{g}(l)$ threshold is depicted in the left panel of Figure 1, where each point in the positive quadrant corresponds to a state $(l,\ f)$.

The figure also depicts the dynamic path of the market when starting at the origin. One firm invests in the first period, becoming the market leader. In every subsequent period that firm invests, advancing one level, and the following firm also advances while remaining one step behind. This continues until the state reaches the $\overline{g}(l)$ threshold, at which point the leader

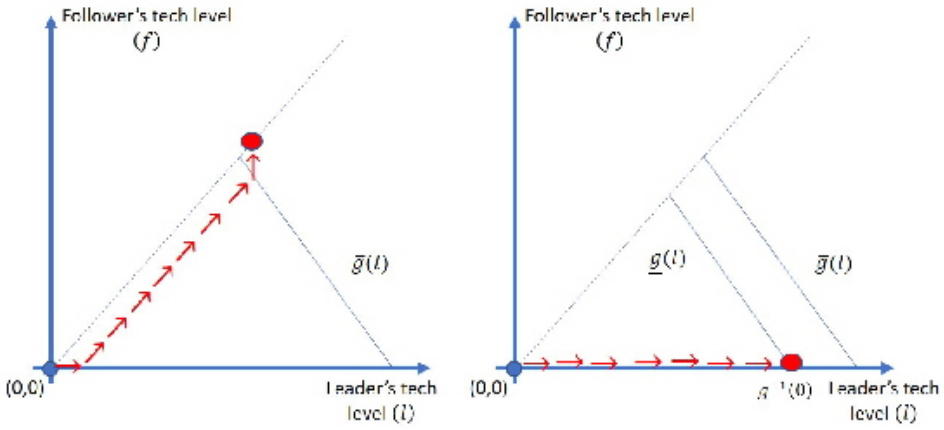


Figure 1: Market Incentives when the Policymaker (i) Never Intervenes, (ii) Always Intervenes

no longer finds it worthwhile to invest and stops. The follower catches up one final step and the market stabilizes at equal technology levels, as marked by the dot.

The Policymaker Always Intervenes: In this case the leading firm benefits from political protection in every period and operates as a monopolist. Investing at capability level l is profitable if:

$$\pi^M(l+1,\, f) - c(l) > \pi^M(l,\, f).$$

Although the leader is a monopolist whether it invests or not, the profitability of investment depends on the follower's capability level. This is because we are considering a protected monopolist. The leader pays rents to the policymaker proportional to the value of protection, and this depends on profitability should the leader have to compete. As in the duopoly case, this leads to a threshold in investment.

Lemma 2 *The leader invests if* $f < \underline{g}(l)$, *where* $\frac{d}{dl}\underline{g}(l) < 0$ *and* $\underline{g}(l) < \overline{g}(l)$.

This is depicted in the right-side panel of Figure 1. As above, the threshold is downward sloping. The leader is more willing to invest the further behind is the following firm as it then pays smaller rents to the policymaker and captures more of the efficiency gains of investment. The leader's willingness to invest is lower than in duopoly, as implied by Arrow's replacement effect, and the protected monopolist stops investing earlier than does the duopolist.[12]

The dynamic path of the market moves only horizontally (as the follower is never in the market and never catches up). Starting at the origin, the market moves along the horizontal axis and stabilizes upon intersecting with the $\underline{g}$ threshold at $\underline{g}^{-1}(0)$, marked by the dot.

[12] As explained in Section 2, the protected monopolist has a higher incentive to invest than the unconstrained monopolist as doing so improves profitability in the market and lowers the rents payable to the policymaker. This implies that investment by an unconstrained monopolist is weakly below that given in Lemma 2.

4 Market & Political Equilibrium

To market competition we now add the strategic policymaker. The policymaker will choose to protect only when it is in her interests. Protection delivers rents today, but it also excludes the trailing firm from the market and this gives the leading firm an opportunity to advance its capability advantage, which lowers the policymaker's rents in future periods. The policymaker's optimal strategy depends, therefore, on the investment decisions of the firms which, in turn, depend on the policymaker's decision to protect or not. The market and political equilibrium is the balance between these different incentives.

Our main result is that in equilibrium this balance leads to the worst of both worlds. The policymaker's effort to extract rents from the leading firm causes that firm to stop investing when it is at a low capability level, often at a level strictly lower than in duopoly and even monopoly. Moreover, the policymaker always protects the leader, and the market is never competitive on the equilibrium path. The equilibrium outcome is inefficient both within period and across periods.

Proposition 1 *Beginning at the origin, the long run steady state is* $(l^*, 0)$*, where* $l^* \leq \min\left\{\underline{g}^{-1}(0), \hat{l}\right\}$ *and* $\pi^P\left(\hat{l}, 0\right) = \delta\pi^P\left(\hat{l}, 1\right)$.

The dynamic equilibrium path starting at the origin is depicted in Figure 2. The steady state is given by the green dot. The proposition establishes that this steady state is at or to the left of the investment level under protected monopoly, given by the red dot at $\underline{g}^{-1}(0)$. As depicted, the steady state can be strictly to the left of the monopoly level and under investment due to political intervention severe.

The equilibrium path represents a positive feedback loop between markets and politics. One firm gains an initial capability advantage and uses that advantage to obtain political protection that is parlays into a larger capability advantage. The entire market outcome, including the steady state, is preordained once the identity of the firm with the initial advantage is realized.[13]

The positive feedback loop does raise the question of why investment stops at such a low capability level. If a monopolist invests at this capability level, why wouldn't a protected monopolist invest?

The reason why investment stops is because the feedback loop turns negative. A crucial feature of the equilibrium is that at state $(l^* + 1, 0)$ the equilibrium calls for the policymaker

[13]The path dependence of the equilibrium is particularly stark here and there is no overtaking in equilibrium. This strict determinancy can be relaxed with the addition of appropriate noise without upsetting the core intuition of the result.

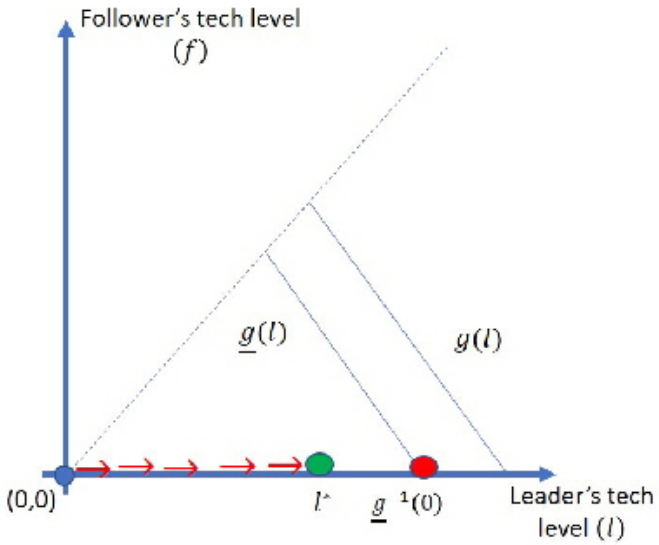


Figure 2: Market and Political Equilibrium

to not protect. Therefore, if the leader obtains one more step of capability-based market power, the feedback loop will reverse and the firm's political-based market power will be reduced.

It is at this state that the policymaker tries to "manage competition." At this state she decides that forgoing rents today is worth the benefit of allowing the trailing firm to stay in touch with the leader. By not protecting, the policymaker will ensure0 a higher degree of potential competition tomorrow and, therefore, enable her to extract higher rents. The policymaker manages competition not for competition's sake but to ensure her own relevance.

Managed competition undermines investment as it generates a reverse Arrow effect. Because the policymaker will remove protection at state $(l^* + 1, 0)$, the leading firm anticipates that investment will cause it to lose protection and switch from a protected monopolist to a duopolist. Flipping Arrow's logic on its head, investment not only fails to reduce competition—allows the firm to "escape competition" in the language of Aghion et al. (2005)—it increases competition. This pro-competition effect suppresses investment and induces market stagnation at a low level of firm capability.

To this point we have explained why the steady state exists given the equilibrium behavior at higher states, but we haven't yet explained why that equilibrium behavior is what it is. If the leader instead invested at state $(l^*, 0)$, won't the policymaker be tempted to take the rents on offer? Why is her threat to not protect credible? Why does the simple condition in Proposition 1 reflect a one-period trade-off for the policymaker when she is far-sighted?

The answers to these questions depend on the full structure of the equilibrium. The policymaker is credible in her desire to manage competition because of what she anticipates in the future. To see what that is, we need to solve the model via backward induction. This

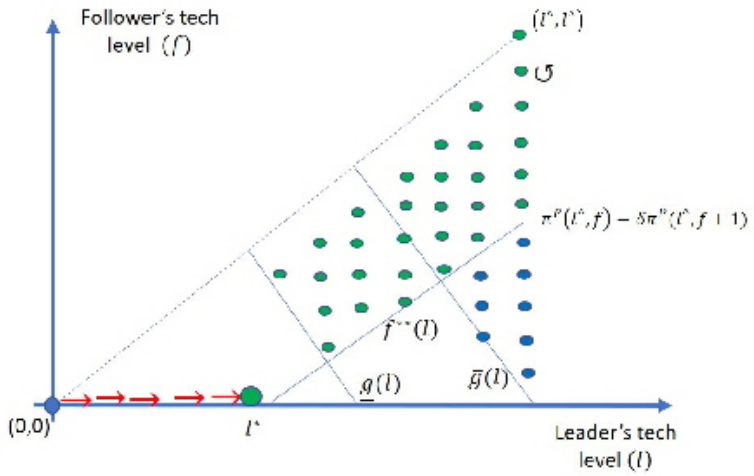


Figure 3: Equilibrium Behavior for High Capability States

produces the full characterization of equilibrium, allowing for an understanding of dynamic paths starting at any state. The details are provided in the appendix. We focus here on the intuition that generates the path in Proposition 1.

It is helpful to begin with the policymaker's incentives. The condition on π^P in Proposition 1 is the limit case of a general condition, given by the following:

$$\pi^P(l, f) = \delta\pi^P(l, f+1). \tag{3}$$

This defines, for each l, the level of f at which the policymaker is indifferent between the rents available today from protection and the higher rents available tomorrow should she not protect and the follower catches up one step. Denote this critical value by $f^{**}(l)$. It is straightforward to show that the threshold f^{**} is strictly increasing in l and that above the threshold the policymaker prefers to take rents today whereas below the threshold she is willing to be patient and prefers the higher discounted rents tomorrow. This threshold, along with the investment thresholds for the firms, are depicted in Figure 3.

A one period trade-off for the policymaker matters because of absorbing or stable states in equilibrium. At a high enough capability level, the leading firm will not invest regardless of the state of competition and political protection.[14] Denote this state by $l^{\wedge}$. It follows that state $(l^{\wedge}, l^{\wedge})$ is stable. Neither firm invests, the policymaker cannot protect, and there is no catch-up in capabilities. Given this, it is easy to see that state $(l^{\wedge}, l^{\wedge}-1)$ is also stable. If the policymaker protects she receives rents $\pi^P(l^{\wedge}, l^{\wedge}-1)$ today whereas if she doesn't protect, the follower catches up, the state transitions to $(l^{\wedge}, l^{\wedge})$ and the policymaker never obtains rents again. As the policymaker protects and the leader doesn't invest, state $(l^{\wedge}, l^{\wedge}-1)$ is stable.

[14] That such a state exists follows from our assumptions on the cost of investment in capability.

The one-period trade-off represented by the threshold $f^{**}(l)$ matters as we backward induct from this point. Consider state $\left(l^{\wedge}, l^{\wedge}-2\right)$. If the policymaker does not protect she receives no rents today, the state transitions to $\left(l^{\wedge}, l^{\wedge}-1\right)$, which is stable, and she receives rents $\pi^{R}\left(l^{\wedge}, l^{\wedge}-1\right)$ tomorrow and every period thereafter. If she protects, she receives rents $\pi^{P}\left(l^{\wedge}, l^{\wedge}-2\right)$ this period, and as this state is then stable, the same rents thereafter. Her choice reduces down to the simple one-period comparison of $\pi^{P}\left(l^{\wedge}, l^{\wedge}-2\right)$ and $\delta\pi^{P}\left(l^{\wedge}, l^{\wedge}-1\right)$.[15]

This trade-off recurs as we backward induct for lower values of f and the leader at $l^{\wedge}$. This leads to a unique transition point in equilibrium behavior, as depicted in Figure 3. Above the value of $f^{**}\left(l^{\wedge}\right)$, the policymaker protects, takes rents today, and each state is stable. For lower levels of f, the policymaker is more patient, does not protect, forgoes rents, and allows the follower to catch up one step. These states are not stable, therefore, and the state transitions until it reaches the first state above the f^{**} threshold, at which it stabilizes.

Backward inducting from here is relatively straightforward for the upper regions of the state space. Equilibrium behavior is shown in Figure 3. For states above the f^{**} threshold and above the monopoly threshold $\underline{g}(l)$, the firm does not invest and the policymaker protects in equilibrium, and the state is stable as represented by green circles. Below the f^{**} threshold and above the duopoly threshold $\overline{g}(l)$, the firm doesn't invest and the policymaker does not protect in equilibrium; the state is not stable. These states are represented by blue circles.

Throughout this region the leader does not invest in stable states because it is protected if it does not and, because the state is above the $\underline{g}(l)$ threshold, investment as a monopolist is no longer profitable.[16] The leader likewise does not invest when it isn't protected because doing so will only transition to another unprotected state and, above the $\overline{g}(l)$ threshold, investment as a duopolist is not profitable. This behavior by the firms generates for the policymaker the same trade-off as at boundary level of $l^{\wedge}$. Either protect and take rents today and thereafter, or forgo rents today to receive a higher stream of rents beginning tomorrow. The single-period trade-off in the threshold $f^{**}(l)$, therefore, demarcates behavior throughout this region.

We are now in a position to explain the genesis of the reverse Arrow effect. Consider the stable state $(l,\ f+1)$ immediately above the $\underline{g}(l)$ and $f^{**}(l)$ thresholds, as marked in Figure 4. Now consider state $(l,\ f)$ that is below both thresholds. The policymaker will not protect at this state because she prefers to defer rents today, allow the state to transition to $(l,\ f+1)$, and receive $\pi^{P}(l,\ f+1)$ in every period thereafter.

This is important not for what the leading firm will do at state $(l,\ f)$, rather it is important for what the firm can expect if it invests when at state $(l-1,\ f)$. If the firm invests

[15] Protection delivers the stream of rents $\sum\delta^{t}\pi^{P}\left(l^{\wedge}, l^{\wedge}-2\right) = \frac{1}{1-\delta}\pi^{P}\left(l^{\wedge}, l^{\wedge}-2\right)$, whereas not protecting delivers rents $\sum\delta^{t+1}\pi^{P}\left(l^{\wedge}, l^{\wedge}-1\right) = \frac{\delta}{1-\delta}\pi^{P}\left(l^{\wedge}, l^{\wedge}-1\right)$.

[16] This holds even though there are reachable states that we have yet to characterize equilibrium behavior for; i.e., states just below $\overline{g}(l)$ and $f^{**}(l)$. As the state is above $\underline{g}(l)$ and the policymaker protects, it follows that the leader does not invest regardless of the policymaker's behavior should the leader not invest.

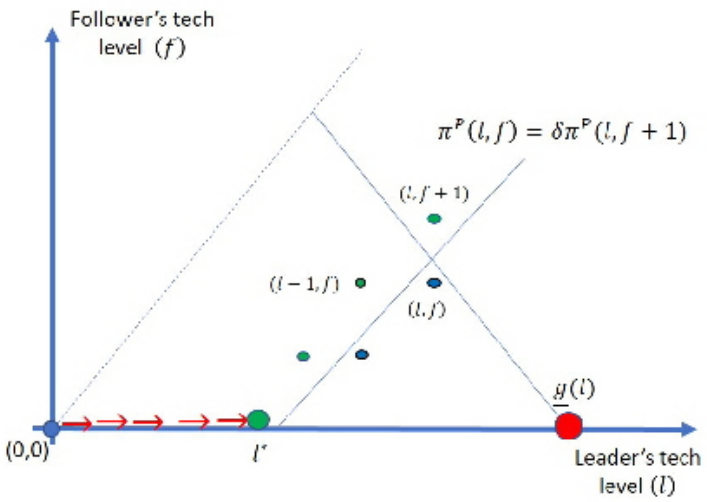


Figure 4: Market and Political Equilibrium – Backward Induction

at $(l-1,\ f)$ it knows it will not be protected. The state is below the monopoly, and thus the duopoly, threshold, and investment without protection remains profitable. This choice, however, must be compared to what happens should the leader not invest at $(l-1,\ f)$.

If it does not invest, the leader anticipates that the policymaker will protect. She will protect as the state is above the f^{**} threshold and her trade-off is the same as for higher states. Not protecting will transition to the stable state $(l-1,\ f+1)$ and a higher stream of rents beginning tomorrow, whereas protecting will earn rents today and cause the present state, $(l-1,\ f)$, to be stable.[17]

This simple calculus creates the reverse Arrow effect. The leading firm would invest at state $(l-1,\ f)$ if it were sure of being a monopoly or duopoly regardless of its investment. But its investment causes the level of competition to change by changing whether the policymaker imposes protection or not. If the leader invests protection is removed and competition is high, whereas if it doesn't invest protection is applied and the firm has monopoly power. As the value of monopoly outweighs the benefit of a higher capability level, the firm doesn't invest. This is the reverse of Arrow's classic argument and reveals the distortion to market outcomes from political intervention.

The behavior at state $(l-1,\ f)$ is interesting but by itself of marginal impact. Its true importance is in how, by backward induction, it affects behavior at preceding states. The logic of the reverse Arrow effect recurs. Because state $(l-1,\ f)$ is stable, the policymaker will not protect at state $(l-1,\ f-1)$ and, in turn, this induces the leader to not invest and for

[17]This argument does not depend on the particular arrangement of states relative to the thresholds depicted in the figure. The policyumaker protects today if the leader invests at state $(l-1,\ f+1)$ as forgoing rents today does not cause the follower to close the capability gap with the lader and increase rents tomorrow; we make this argument precise in the appendix.

the policymaker to protect at state $(l-2,\ f-1)$.

We establish in the proof that this unraveling continues all the way to the horizontal axis and zero capability for the follower firm. The unraveling argument is more subtle when the slopes of thresholds $\underline{g}(l)$ and $f^{**}(l)$ are not as neatly arranged as they are in Figure 4, but nevertheless complete unraveling always occurs.

The stable state in Proposition 1 depends on where the $f^{**}(l)$ and $\underline{g}(l)$ thresholds intersect the horizontal axes and involves the same or a lower level of investment than the minimum of these two values. In the case in which $f^{**}(l)$ intersects at a lower level, as is depicted in Figure 4, the level of investment can be substantially below that for a protected monopolist.[18]

4.1 Relaxing Competitive Pressure

The insight of "managed competition" is that the policymaker seeks market competition purely for the threat. She allows competition only to the extent that it enables the follower firm to catch up and increase the threat of further competition. In this sense, competitive pressure translates not into more efficient markets, but into leverage for the policymaker to extract rents. This induces a response from the firms—the reverse Arrow effect—that undermines market efficiency.

The lesson from this is that standard intuitions about market competition need not hold when markets and politics are intertwined. Counterintuitively, therefore, it may be that outcomes are improved if the degree of competition is relaxed. We explore this possibility in this section.

One dimension of competitive pressure is the willingness of the trailing firm to enter into the market and compete if political protection is removed. It is a striking feature of the equilibrium in Proposition 1 that the trailing firm never competes in the market yet nevertheless stands ever ready to do so. Although this is a reasonable description of some markets (e.g., foreign competitors and trade barriers), it is less appropriate in other markets, and one might think that the trailing firm will, at some point, give up and abandon the market altogether.

To formalize this idea, we amend the model as follows. We suppose that a firm that has been *excluded* from the market for κ consecutive periods will permanently *exit* the market. That is to say, if a firm has not been allowed to compete for κ periods it gives up and pursues opportunities elsewhere.

This assumption captures competitive pressure in a way that is simple and realistic and that resonates with the interdependence of politics and markets that is the focus of our paper. A firm exits the market if political intervention is excessive, but if it does so, the value of

[18] Investment at the stable state may be strictly lower than both thresholds depending on the nature of unraveling in equilibrium.

political protection disappears, costing the policymaker her leverage over the remaining firm. Although this is a simple variant, it complicates the analysis considerably. The state space is now the technology levels of the firms plus the number of periods of consecutive protection. We characterize the stable states of market competition but do not provide a full description of the equilibrium path. Unlike the previous section, it is now possible for the firms to remain at technology levels for multiple periods before advancing. We continue to reserve stability to refer to permanent stability of the firms' technology levels.

A market with potential exit changes the incentives of the policymaker. The policymaker must now remove protection at least once every κ periods else it loses its leverage. The wisdom of doing this is clear when the difference in capability levels of the firms is more than a single step. In this case, after protecting for $(\kappa - 1)$ periods, the policymaker faces a simple trade-off: Protect and receive rents for a final period or forgo rents today, allow competition, and renew a fresh stream of rents for κ periods. Indeed, if the leader doesn't invest while protection is off, tomorrow's rents are certain to be higher. For κ not too small, the benefit of waiting is clear. This implies, therefore, that the market cannot stabilize unless the firms' capability levels are close.

Lemma 3 *For κ sufficiently large, firm capability levels $(l,\ f)$ cannot be stable if $f\ < l - 1$.*

The need for the policymaker to refresh competition also changes the incentives of the firms. Because in some periods the leading firm knows that protection will be removed *regardless* of whether it invests, the reverse Arrow effect is relaxed in those periods. In those periods, the leader invests knowing it will compete and, therefore, the relevant threshold is that of duopoly, $\overline{g}\,(l)$. This is not to say the reverse Arrow effect does not bind in other periods when protection is a choice for the policymaker, only that in some periods it is relaxed, and that is enough to ensure that eventually market investment advances to the duopoly level.

Lemma 4 *Firm capability levels $(l,\ f)$ cannot be stable if $f\ < \overline{g}\,(l)$.*

Combining the two lemmas provides a broader picture of equilibrium behavior. Lemma 3 shows that a stable state must be either on or adjacent to the 45 degree line in the figures where firm capabilities are equal. One step away from the 45 degree line, the logic of Lemma 3 falters. If the leader doesn't invest when protection is removed, the state transitions to the 45 degree line and the quality floor has no bite. Lemma 4 establishes that this is not a concern below the duopoly threshold. In this range the leading firm invests when protection is removed and the state advances along a path adjacent to the 45 degree line.

Above the duopoly threshold, however, equilibrium behavior is not so clear. A reasonable conjecture may be that investment stops as soon as the duopoly threshold is passed. We show

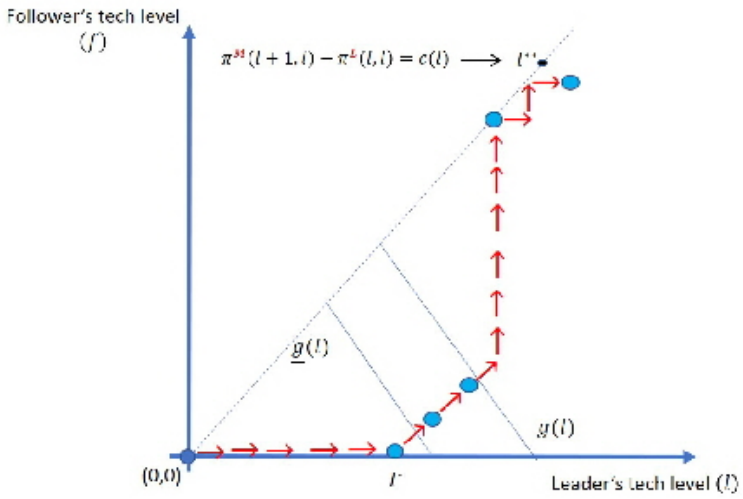


Figure 5: Relaxed Competitive Pressure: Equilibrium Path with Enhanced Arrow Effect

that this is not the case. As expected, the leader does stop investing beyond the duopoly threshold when its capability advantage is only one step. It stops investing because it will be a duopolist regardless of its decision and, in this range, investment is no longer profitable.

What is less expected is that the firms do invest when on the 45 diagonal line and their capabilities are equal. The reason for this again comes from Arrow. In this case the logic of Arrow is not reversed, but rather it is enhanced. The firms, if given the chance, are willing to invest on the 45 degree line because investment is the only way they can obtain protection.

To see this, observe that the policymaker can't protect when capabilities are equal as the firms cannot be separated by a quality floor. Should one firm invest and attain an advantage, however, protection is possible. This means that a firm will benefit from protection if—and only if—it invests. This enhances the standard Arrow effect as not only is competition reduced by investment, it is entirely eliminated and the investing firm becomes a monopolist. We refer to this as the *politically enhanced Arrow effect*. This effect drives investment above that in either monopoly or duopoly.

Proposition 2 *In every stable state, the capability levels of the firms are given by some* $(l, l-1)$ *for* $l > l^{**}$ *where* $\pi^M(l^{**}+1, l^{**}) - \pi^L(l^{**}, l^{**}) = c(l^{**})$*, and the follower firm exits the market.*

The threshold l^{**} derives from an expression similar to those in the duopoly and monopoly thresholds of Lemmas 1 and 2, respectively. The difference is that the firm receives the monopoly payoff when it invests and not when it doesn't. The l^{**} threshold applies only on the 45 degree line when capability levels are equal, and is depicted in Figure 5.

The figure also depicts a potential dynamic path for the equilibrium in which investment passes the duopoly threshold with the leading firm holding a large capability advantage. After the duopoly threshold, the equilibrium behavior becomes clear. The leader no longer finds it profitable to invest while it holds an advantage and the equilibrium involves stretches of protection punctuated by single periods of competition that ensure the trailing firm does not exit and the policymaker remains relevant. As this path intersects the 45 degree line below the threshold l^{**}, the policymaker is happy to let the trailing firm to fully catch up as she knows, through the enhanced Arrow effect, that the firms will invest when given the opportunity. This creates a ratchet effect as the state moves off the 45 degree line and back to it repeatedly, with investment increasing along the path. This sequence finally ends once the l^{**} threshold is passed. The stable state is off the diagonal and the follower firm permanently exits the market. The policymaker protects the leader for a full κ periods and accepts the exit of the following firm as she knows that, should she remove protection and let the follower catch up, neither firm will invest any more and the quality floor will not have any bite.

The stable state is striking for what it implies about competition and protection. In contrast to Proposition 1, the leading firm is not protected in the stable state. Moreover, it faces no competition—as the trailing firm exits the market—and it has attained a high level of capability. To an observer, this outcome would suggest a firm that has earned market dominance through a large capability advantage. However, the full equilibrium path belies this interpretation. Political intervention is a mainstay along the equilibrium path and the final outcome is predetermined once the initial advantage is obtained even when, as in our model, it is determined by luck.[19] This is not to deny the efficiency of the final stable state, but it does imply that fairness had little to do with it.

5 Discussion

Although comparison of Propositions 1 and 2 depicts a negative relationship between competition and market outcomes, the lesson is not general. The comparison is important in that it shows the relationship is not necessarily positive. The general lesson is that when a policymaker intervenes in markets, standard market intuitions are upended. The exact market outcome this produces depends on the particulars of the market structure (as well as the polit-

[19] With myopic firms this conclusion depends on the tie-breaking when the state returns to the 45 degree line. If tie-breaking is random then the crucial stroke of luck for the firms is the final random selection of a firm to invest rather than the first. Our preferred tie-breaking rule is that the firm that was leading previously is given the opportunity to invest. This ensures the importance of the stroke of luck at the origins of the market which is important as it is the property that carries over to forward-looking firms. If the tie-breaking rule at the 45 degree line were random, a leading firm that is forward-looking would invest preemptively to always maintain its lead and avoid being subject to that randomization.

ical tools available, as we'll discuss below).

To see this point, we can consider other forms of competitive pressure. To focus again on the trailing firm, we have assumed that it catches up to the leading firm automatically when it participates in the market. This may hold in some industries, where imitation is easier and more prevalent, but is less descriptive in other industries. A cost of investment makes it more difficult for the follower firm to challenge the leader and represents a decrease in competitive pressure. We show formally in the appendix that this reduction in pressure leads to worse market outcomes, in accordance with standard intuition. The reason for this is, once again, the policymaker's desire to manage competition. The trailing firm correctly anticipates that the policymaker would like it to close the gap on the leading firm but not actually catch up. Being reluctant to play the foil perennially, the trailing firm's incentive to invest is dampened, weakening, in turn, the policymaker's leverage over the leading firm.

This conclusion accords with the dominant theme in industrial organization that the details matter. In looking for applications of our model, therefore, we must pay attention to the nature of competition and the potential threat of additional competition that a policymaker holds over a firm or industry.

International competition and trade protection offers perhaps the cleanest example of a market in which the threat of competition is unwavering. The historical example of the East India Company illustrates this structure, with competitors eager to begin trade but blocked by the grant of monopoly to the East India Company (Erikson 2016, Zingales 2017). A striking feature of this history is that the grant of monopoly was repeatedly threatened but consistently renewed, and each time it was renewed following the extraction of surplus by those with political power. This cycle repeated up until the time that the Company's interests clashed directly with those of the Crown. The history of the East India Company resonates with the equilibrium in Proposition 1 and the policymaker's need to retain relevance in the bargaining relationship with the market leader.

Other examples of markets in which competitive pressure is high are those with neighboring industries that employ similar technology. A firm with a profitable home market remains a threat to neighboring markets even when excluded for lengthy periods of time. A similar threat emerges for industries that are geographically separated. A striking example of this is the modular home industry (Schmitz 2020). In this case the quality floor was applied at an industry level rather than to individual firms and the relevant actors the industry trade associations. The stick-built housing sector (homes constructed on-site), through their trade association, the National Association of Home Builders (NAHB), has successfully won political protection for over a century from competition from the factory-built housing industry, with regulations imposing minimum standards on housing quality that effectively block factory-built housing other than in specially designated areas (e.g., trailer parks). Interestingly, and in

accordance with our model, the ability of the factory-built industry to operate at the margins of the industry and in some isolated locations, ensured that it remained as a competitive threat to the stick-built industry for all of this time.

The connection between market dominance and political protection is evident also at the aggregate level. Faccio & McConnell (2020) provide evidence from 75 countries showing that when an incumbent dominates a market for an extended period of time, it is most frequently due to political protection. This resonates with our equilibrium prediction of industry lock-in, that an early advantage is a strong predictor of long-term dominance. This resonates with evidence from the trade literature that the frequency and intensity of lobbying depends on market structure and the degree of product market competition (Bombardini & Trebbi 2012, Kim 2017).

Our model predicts that political intervention into markets affects investment and technological progress in addition to the degree of competition. Evidence of real distortions in resource allocation in firms is more difficult to identify, although it has begun to accumulate. Huneeus & Kim (2020) show that politically connected firms in the U.S. attract capital and grow larger. From a different angle, Aghion, Bergeaud & Reenen (2021) begin with a specific labor regulation in France and show how it distorts the development of firms at both the intensive and extensive margin of innovation. This evidence from developed countries adds to the macro level evidence of Parente & Prescott (1999) that concentration of market power restrains the economic development of poor countries.

Our results connect directly to antitrust policy. That political power and monopoly power are intertwined has a long history in the practice of antitrust. Franklin Roosevelt's head of the Antitrust Division in the Department of Justice, Thurman Arnold wrote in 1943 that:[20]

> "Monopolies enter into politics using money and economic coercion to maintain themselves in power, making alliances with other powerful groups against the interests of consumers and independent producers."

This connection has fallen out of focus over the years, and only recently has it that it has returned to the forefront of economists' and policymakers' minds. Wu (2018) and Philippon (2019) argue that lobbying and lax anti-trust enforcement are a causal factor in the increased market concentration of recent decades (see also Gutierrez & Philippon (2019)).

In practice, antitrust policy represents a tricky identification problem. Is concentration good because of investment and technological breakthrough? Or is concentration bad because of lobbying and other anti-competitive behavior? In allowing for both sources of market power, our model provides a theoretical structure to inform that decision. A core insight of

[20] Arnold (1943); quoted in Schmitz (2020).

our model is that standard market analyses may not hold up when political intervention is allowed for. Pointing to smaller players in a market to support a merger is less compelling once it is understood that that competitive fringe may serve the interests of policymakers rather than consumers. Antitrust policy implicitly presumes that it is the only policy choice. In practice, other policymakers have the ability to intervene in markets. Our analysis emphasizes, therefore, that when antitrust policy is set, even if it is evaluated through the lens of welfare maximization, it must account for the intervention of other, potentially less socially minded, policymakers in the market.

Another implication of our model for antitrust policy is that a static analysis is insufficient to understand the degree to which market concentration is good or bad. As noted in the previous section, the stable state in Proposition 2 describes a leading firm that has attained a high capability and faces no market competition. It does not benefit from political protection at the stable state, but only because it doesn't need it, but it did benefit from protection along the equilibrium path. Thus, for instance, even though the political patronage that, say, Google receives today does not seem to matter so much to its market performance and its lobbying expenditures are relatively small, it does not follow that political power was not instrumental to its rise, helping critically when the technology gap was smaller and the competitive threat greater.

An intriguing corollary to this observation is that it may provide a rationale for the long-standing puzzle as to why there is so little money in politics (Ansolabehere, de Figueiredo & Snyder 2003). Although large amounts are spent, the absolute levels are small given what is at stake. Proposition 2 describes a case in which, at the steady state, there is no money spent on politics, not because the firms wouldn't spend it and political intervention couldn't be important, but because the market has reached a state of asymmetry in capability-based market power that political intervention has simply lost its relevance. The equilibrium is stark, to be sure, although in aggregate it resonates with practice. This suggests that insight into lobbying, as well as market competition, may come from more closely matching political spending to the state of market competition and the threats policymakers hold over markets.[21]

Our model is built on one particular tool that is available to the policymaker—the quality floor. In practice, other tools are available, and the predictions of the model will depend on the structure of the political market, and not just the market for goods. One need only see the focused attention Washington got from the tech industry once the prospect was raised of directly regulating or breaking up the largest firms.

A general lesson from the literature on regulatory capture is that very different outcomes

[21]This is consistent with cited above. Anecdotal evidence in the U.S. is that among the biggest spenders on political activity are UPS and FedEx, and the airlines, all of which have similar business models in high capital expenditure industries, where competition is fierce and political advantage most valuable.

result from the different tools. Stigler's (1971) original view was of an industry cartel that made demands of policymakers and extracted the benefit of political protection. McChesney (1987) shows that if instead the policymakers were proactive and could make demands of the firms, then they would extract all of the surplus. Reality lies somewhere between these extremes. We have sought to thread the gap with a policy tool that is relevant to practice.[22] An advantage of fixing the policy tool is that we see how the value of that tool—and the balance of power between the policymaker and firms—ebbs and flows depending on the degree of market competition.

The tool we work with reflects quality floor (minimum standards) regulations common in practice, yet it also shares properties with patents. Although motivated very differently, a quality floor is, in effect, an award of monopoly power to the higher capability firm. The enhanced Arrow effect of Proposition 2 reflects the logic of patents clearly: If a firm invests and attains a capability advantage, it is rewarded with monopoly power, and this incentive helps solve the market failure of under-investment. However, as is evident from the reverse Arrow effect that undergirds Proposition 1, the tool needn't always be used productively in this way. These results show how the logic of patents is, in fact, widespread throughout policymaking, even if it is not framed that way. This reinforces the conclusion that policy intervention should be seen more generally as an award or retraction of market power, and all that implies for incentives, and not merely a battle over rents.[23]

6 Conclusion

The focus of political economy is on the choice of a policy, with political power varying in the design of the institutions and the identity of those who make the decisions. We have shown in this paper that the value of political power—the power of politics itself—varies when the market environment varies. For a fixed set of political tools, the command of policymakers over the economy and society can itself vary. This, in turn, changes the power of business in society. Thurman Arnold (1943), FDR's antitrust chief, argued that the power of business had grown to such an extent that it subsumed part of the functions of the state:

> "In short, they will become a sort of independent state within a state, making treaties and alliances, expanding their power by waging industrial war, dealing on equal terms with the executive and legislative branches of the government

[22] This tool is not the only way to balance the power of the policymaker and the firms and, as we've seen, the outcome is not a weighted average of that at either extreme.

[23] This connection also suggests that constructing patents with more flexibility to overcome well-known problems itself leads to difficulties if the policymaker is self-interested (Bloom, Van Reenen & Williams 2019).

and defying governmental authority if necessary with the self-righteousness of an independent sovereign."

This point has been picked up recently by Zingales (2017) from the perspective of the firm and Wu (2018) in critiquing the application of antitrust policy.[24] Our paper builds a formal structure that allows more detailed analysis of the problem and potential remedies.

The model we present is only a step toward a full analysis of this problem. Many questions present themselves. We have analyzed duopolistic competition with a single policy tool. Many enrichments are possible. In practice there is more than a single policymaker who compete for rents, and the hierarchy of authority—from legislator down to regulator—creates an agency problem and opens the question of where firms lobby and transfer rents. It is also possible to enrich the legislative tools. Stigler's (1971) classic example of oil industry designing legislation that would not only transfer them government largesse but protect them from entrants suggests a broader array of issues that could be incorporated into the modeling approach we propose here. A particularly intriguing possibility is to explore a balance between political and economic goals. In our model political power is the means to the ends of market power. Some important political goals stand aside from economic outcomes, and market power may be the means toward those ends. Exploring the interdependence of politics and markets in this setting is of considerable importance.

References

Acemoglu, Daron. 2003. "Why Not a Political Coase Theorem? Social Conflict, Commitment, and Politics." *Journal of Comparative Economics*, 31(4): 620–652.

Acemoglu, Daron. 2006. "A Simple Model of Inefficient Institutions." *Scandinavian Journal of Economics*, 108(4): 515–546.

Acemoglu, Daron, and James A. Robinson. 2000. "Political Losers as a Barrier to Economic Development." *American Economic Review Papers and Proceedings*, 90(2): 126–130.

Acemoglu, Daron, Michael Golosov, and Aleh Tsyvinski. 2008. "Political Economy of Mechanisms." *Econometrica*, 76(3): 619–641.

Aghion, Philippe, Antonin Bergeaud, and John Van Reenen. 2021. "The Impact of Regulation on Innovation." Working paper.

[24] Zingales (2017, p.117) argues that economics has erred in focusing on the technological rather than the power dimension of firms. Wu (2018), channeling Thurman Arnold and Louis Brandeis, argues for a return to an antitrust policy in which political concerns are dominant.

Aghion, Philippe, Nick Bloom, Richard Blundell, Rachel Griffith, and Peter Howitt. 2005. "Competition and Innovation: An Inverted-U Relationship." *Quarterly Journal of Economics*, 120(2): 701–728.

Ansolabehere, Stephen, John M. de Figueiredo, and James M. Snyder. 2003. "Why is There so Little Money in American Politics?" *Journal Economic Perspectives*, 17(1): 105–130.

Arnold, Thurman. 1943. *Labor Against Itself.* Cosmopolitan Magazine.

Arrow, Kenneth J. 1962. "Economic Welfare and the Allocation of Resources for Invention." In *The Rate and Direction of Inventive Activity: Economic and Social Factors*. 609–626. Princeton, NJ:Princeton University Press.

Besley, Timothy, and Stephen Coate. 1998. "Sources of Inefficiency in a Representative Democracy: A Dynamic Analysis." *American Economic Review*, 88(1): 139–156.

Bessen, James, and Eric Maskin. 2009. "Sequential Innovation, Patents, and Imitation." *RAND Journal of Economics*, 40(4): 611–635.

Bloom, Nicholas, John Van Reenen, and Heidi Williams. 2019. "A Toolkit of Policies to Promote Innovation." *Journal Economic Perspectives*, 33(3): 163–184.

Bombardini, Matilde, and Francesco Trebbi. 2012. "Competition and Political Organization: Together or Alone in Lobbying for Trade Policy?" *Journal of International Economics*, 87(1): 18–26.

Coate, Stephen, and Stephen Morris. 1999. "Policy Persistence." *American Economic Review*, 89(5): 1327–1336.

Covarrubias, Matias, German Gutierrez, and Thomas Philippon. 2020. "From Good to Bad Concentration? U.S. Industries over the past 30 years." In *NBER Macroeconomics Annual 2019*. 155–173. NBER.

De Loecker, Jan, Jan Eeckhout, and Gabriel Unger. 2020. "The Rise of Market Power and the Macroeconomic Implications." *Quarterly Journal of Economics*, 135(2): 561–644.

Erikson, Emily. 2016. *Between Monopoly and Free Trade: The English East India Company 1600-1757.* Princeton University Press.

Faccio, Mara, and John J. McConnell. 2020. "Impediments to the Schumeterian Process in the Replacement of Firms." Working paper.

Grossman, Gene M., and Elhanan Helpman. 1994. "Protection for Sale." *American Economic Review*, 84(4): 833–850.

Gutierrez, German, and Thomas Philippon. 2019. "Declining Competition and Investment in the U.S." Working paper.

Huneeus, Federico, and In Song Kim. 2020. "The Effects of Firms' Lobbying on Resource Misallocation." Working paper.

Kim, In Song. 2017. "Political Cleavages within Industry: Firm-Level Lobbying for Trade Liberalization." *American Political Science Review*, 111(1): 1–20.

Leland, Hayne E. 1979. "Quacks, Lemons, and Licensing: A Theory of Minimum Quality Standards." *Journal of Political Economy*, 87(6): 1328–1346.

McChesney, Fred S. 1987. "Rent Extraction and Rent Creation in the Economic Theory of Regulation." *Journal of Legal Studies*, 16(1): 101–118.

Parente, Stephen L., and Edward C. Prescott. 1999. "Monopoly Rights: A Barrier to Riches." *American Economic Review*, 89(5): 1216–1233.

Philippon, Thomas. 2019. *The Great Reversal: How America Gave up on Free Markets.* Harvard University Press.

Ronnen, Uri. 1991. "Minimum Quality Standards, Fixed Costs, and Competition." *RAND Journal of Economics*, 22(4): 490–504.

Schmitz, James A. Jr. 2020. *Monopolies Inflict Great Harm on Low- and Middle-Income Americans.* Federal Reserve Bank of Minneapolis.

Segal, Ilya, and Michael D. Whinston. 2007. "Antitrust in Innovative Industries." *American Economic Review*, 97(5): 1703–1730.

Shapiro, Carl. 1983. "Premiums for High Quality Products as Returns to Reputations." *Quarterly Journal of Economics*, 98(4): 659–679.

Shleifer, Andrei, and Robert W. Vishny. 1994. "Politicians and Firms." *Quarterly Journal of Economics*, 109(4): 995–1025.

Stigler, George J. 1971. "The Theory of Economic Regulation." *Bell Journal of Economics and Management Science*, 2(1): 3–21.

Tirole, Jean. 1997. *The Theory of Industrial Organization.* MIT Press.

Wu, Tim. 2018. *The Curse of Bigness: Antitrust in the New Gilded Age.* Columbia Global Reports.

Zingales, Luigi. 2017. "Towards a Political Theory of the Firm." *Journal of Economic Perspectives*, 31(3): 113–130.