Intellectual Property Rights, Competition and the Market For News

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Unlike other forms of media content, the facts at the heart of a given news story are not protected by any form of intellectual property (IP). While seemingly impractical and inadvisable to implement IP protection for facts, this analysis explores the implications of the absence of such protection. In doing so, it examines the relationship between IP protection, "R&D" uncertainty and product market competition. More specifically, firms are motivated to innovate by the hope of being a market's "exclusive" supplier. That exclusivity might have formal roots (*e.g.*, IP protection associated with the discovery of a new drug) or informal roots (*e.g.*, the first news outlet to break a story). The R&D uncertainty leads to suboptimal investment levels due to the inability of firms to fully recoup the value they create. It also leads to the possibility the successful innovators compete with one another in the product market. This analysis highlights how IP protection facilitates not just increased innovation, but competition as well. Specifically, long and, even, unlimited duration property rights are optimal if *investment* among potentially competing firms is sufficiently diffuse. The reason is that suboptimal investment levels pose a bigger problem than the monopoly distortions typically central to analyses of IP duration. This analysis also suggests that news organizations, despite operating in what appears to be a quite competitive marketplace, are woefully under-incentivized with respect to uncovering stories, as opposed to just conveying them.

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This paper is motivated by a sharp distinction associated with how intellectual property (IP) protection applies to various forms of media content. Copyright protection applies to many forms of media content (*e.g.*, movies, television shows, books, articles and music), but it does not cover newly discovered facts that, for example, lie at the heart of a given news story. While there are a host of reasons that make implementing IP protection for facts both impractical and inadvisable, the lack of such protection may, nonetheless, have meaningful economic consequences. Those consequences are the focus of this analysis.

Specifically, this analysis examines a straightforward question. What incentives do news producers have to uncover a given story or fact that is *ex ante* unknown when a successful pursuit will be rewarded with, at best, an informal period in which to market an "exclusive" story. News producers are assumed to face a choice of whether or not (or how many times) to investigate a "lead." If they do investigate, they incur a fixed cost and face uncertain outcome. If they are fortunate in their pursuit and uncover the story, they subsequently participate in the product market. Product market competition takes two basic forms. In the event that only one news producer successfully uncovers a story, that producer will enjoy a product market monopoly until competitors can "copy" the story and convey it themselves. If multiple news producers successfully uncover the story, competition will ensue during what would have been the "exclusive" period.

The findings are best understood in terms of optimal IP durations. What duration IP protection would be set if such protection were effective? The main result is that long and, even, infinite duration property rights are optimal given sufficient levels of competition to uncover the story at the *investment stage* of the process. The reason is that longer duration property rights can motivate investment that potentially spurs product market competition between successful "innovators" during the period before "imitators" enter the market. Thus, this analysis highlights how IP protection facilitates not just increased innovation, but competition as well.

Underlying this result is a trade-off between two types of market inefficiencies. The first, on that is well known and plays a central role in the existing research on IP duration, is that longer duration property rights extend monopolies and the associated deadweight loss. The second involves an investment inefficiency introduced here. Specifically, investment levels here are suboptimal because firms recover, at best, only a portion of the total value they create with a successful innovation. Longer duration IP protection addresses this investment shortfall. This analysis shows how IP duration can be thought of as a mechanism by which to appropriately balance these two inefficiencies.

The possibility that successful innovators face competition -- which is critical to the results of this paper and in distinguishing it from other research -- rests on two critical assumptions. Both are motivated by the market for news but apply to information goods more broadly. The first assumption involves the degree to which successful firms compete against one another. In technical terms, firms price compete for a homogenous good. As a consequence, competition among even a small number of firms is very effective at driving out deadweight loss. With respect to a news story or a fact, the idea is that consumers care, ultimately, about the information content of the story, so competing producers cannot differentiate their products.

The second assumption critical to this paper's results involves the timing of investment activities. News producers are assumed to investigate (and learn the results of those investigations) simultaneously. One implication of the timing assumption is the possibility that multiple "successful" firms will compete against one another on the product market. Another is that this is a a winner-take-all market where the winner is the *only* firm to realize success in the investment stage. Ultimately, the results depend on the dual possibilities of the investment-motivating monopoly outcome and the welfare-maximizing competitive outcome.

This analysis also highlights how competition alone is not sufficient for a "healthy market" diagnosis. The sheer number of news outlets suggests that competition in the market for news is thriving. However, the vast majority of news stories reported in the newspaper and on television are, effectively, a repackaging of known or existing facts.[2] This analysis highlights how competition to convey readily-available facts does not imply that news producers are efficiently incentivized to uncover unknown facts. Rather, this analysis suggests that news organizations, due to a lack of effective IP protection, are woefully under-incentivized with respect to uncovering stories. This analysis also suggests that the problem would get worse as news cycles shorten and news outlets have shorter "exclusive" periods in which to recoup investments, which is consistent with newsroom budget cuts that have taken place in recent years.[3] Thus, while IP protection

[2] A study examining in-depth stories that appeared in the Chicago Tribune, Philadelphia Enquire and the St. Louis Post-Dispatch in 1995 found that only 2.0 percent contained information first made public by the reporters [Bernt & Greenwold, 2000]. Similarly, a study of local television news content found that news producers considered only two percent, approximately, of their stories "investigative" and, of those, only half were initiated by the reporting station [Just, *et. al.,* 2002 CJR.].

[3] Project for Excellence in Journalism [2007], pp. 10, 15-16.

for facts is seemingly impractical, this impracticality may be associated with meaningful economic consequences.

The paper proceeds as follows. Related literature is discussed in Section I. The basic analytic framework is laid out in Section II. Optimal duration property rights are examined in Section III under the assumption that the timing of consumer demand is exogenously specified. Section IV evaluates optimal duration property rights under the assumption that the timing of consumer demand is endogenously specified. Summary remarks are provided in Section V.

I. OVERVIEW OF RELEVANT LITERATURE

Research on Intellectual Property Rights

Related literature includes research on intellectual property rights, as well as research on media markets. The optimal length of IP protection is a well-examined topic. IP rights are commonly thought in terms of a trade-off between 1) encouraging investment by protecting an inventor from imitators and 2) discouraging monopoly distortions. This well-known tradeoff is described in a review article by Varian [2005] addressing the duration, or term, of IP protection:

> If the term is increased [from T] to $T + \Delta T$, society loses the benefits from competition that would have accrued during the period ΔT. On the other hand, extending the term makes the production of intellectual property more profitable, increasing the supply of works. The optimal term balances out these two effects. In other words, at the optimal term, the marginal value of the incremental piece of intellectual property will equal the social cost of the delayed availability of the property that has already been created.[4]

[4] Varian, Hal, "Copyright and Copying," *Journal of Economic Perspectives*, Volume 19, Number 2, Spring 2005, p. 128. See also, Nordhaus [1969] on patents and Landes and Posner [2003] on copyrights.

As noted above, the analysis in this paper builds on the intuition described by Varian by further incorporating the notion that longer duration property can also motivate product market competition.

Loury [1979] introduces the notion of competition when examining optimal patent duration in the context of a patent race. The race is such that firms pursue uncertain investment opportunities and that the first to discover is awarded a patent that results in a product market monopoly.[5] Loury found that free entry, which he also refers to as "more competition," leads to an inefficiency due to investment redundancies. Competition among investors, however, does not lead to product market competition because the "first to invent" gets the IP rights that exclude follow-on inventors. Implicitly, Loury makes the assumption that the patent protection is rather broad. That is, he is effectively assuming that the product and the protected technology are equivalent. The analysis here is different in that independent inventors do not exclude one another from the market. This captures the idea that a patent does not imply a product market monopoly because there might be multiple technological approaches to satisfying a given consumer want. For example, there might be numerous distinct medicines the effectively treat a given ailment.

A number of researchers have examined the interplay between patent length and breadth. Gilbert and Shapiro [1990] highlight how, under a fairly broad set of reasonable assumptions, that patents are optimally infinite in length and just broad enough to

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The intuition that appears to have emerged beyond the economic literature into policy making arenas appears to be largely based on the reasoning described by Varian. For example, 17 well-known economists recently filed a brief [Akerloff, et. al., 2002] in opposition to the recent extension of U.S. Copyright terms by Congress. Their conclusions, while not undermined in any way by this analysis, appear to be based almost explicitly on the economic trade-offs described by Varian. The extent to which longer duration copyright terms motivate competition was neither mentioned nor alluded to.

5 See Reinganum [1989] for an extensive review of the literature on patent races.

motivate investment. Klemperer [1990] highlights situations in which broad, short-lived patents are optimal. Denicolò [1996] builds on these analyses and examines a number of different scenarios with varying assumptions regarding market structure and the nature of competition. He finds that the optimal mix of patent length and breadth depend on assumption involving demand, costs and the nature of competition. Generally speaking, he finds that broader, shorter patents are more likely to be optimal when product market competition is relatively less effective in reducing dead-weight loss. These analyses, however, constrain length and breadth choices such that the predetermined optimal investment level are realized. The analysis here raises the question of what level of investment is optimal, as well as whether that level can be achieved by varying property right duration.

Gallini [1992] introduces an investment market inefficiency in her analysis of patent length and breadth, but one different than is incorporated in this analysis. In her analysis, like here, independent inventions are valid infringement defenses. Entry by imitators is welfare enhancing because it reduces dead-weight loss in the product market, but it is inefficient because it leads to redundant investments. Based on her demand and market structure assumptions, broader patents are more efficient because they eliminate the more severe redundant investment redundancy. The critical difference between Gallini's analysis and that presented here is that Gallini does not incorporate an investment uncertainty. The investment uncertainty in this analysis highlights a difference between *ex ante* and *ex post* redundancies. Ultimately, multiple firms may successfully innovate. But this *ex post* redundancy doesn't necessarily mean that the successful investments were *ex ante* redundant or wasteful.

Adilov and Waldman [2005] focus solely on the optimal duration of copyright duration. In their analysis, the value of copyrighted material can change over time due to, for example, depreciation or *ex post* value enhancing investments. They find that infinitely lived copyright protection is optimal when the return on *ex post* investment is high relative to the return on the initial investment. Thus, while Adilov and Waldman and this paper both find that long property rights might be the appropriate prescription, the reasons are different. Here, long term property rights are effective because they facilitate possible competition upon the introduction of new products. Adilov and Waldman find that longer duration property rights motivate value enhancing product improvements in the future.[6]

Research on Media Market

Research on the market for news, versus research on media markets more generally, tends to address how information can be manipulated or affected by biased market participants. A number of papers examine how "supply-side biases" associated with, for example, biased media outlets or biased governments might distort the news (see, *e.g.*, Coase [1974], Besley and Burgess [2002], Besley and Prat [2002], Djankov et al. [2003], Stromberg [2001] and Dyck and Zingales [2002]). The general finding is that competition among diverse suppliers tends to drive out biased reporting. Other research explores "demand-side biases." Jensen [1979], for example, argues that overall consumer demand -- which reflects the demand for news, the demand for entertainment and certain

[6] See Gallini and Scotchmer [2001] and Menell and Scotchmer [2005] for broader reviews on the economics of intellectual property.

cognitive limitations -- limits the accuracy and complexity of the stories that are reported.[7]

Mullainathan and Shleifer [2005] formally analyze markets with biased news consumers and the suppliers that cater to them. They assume that some news consumers hold beliefs that they like to see confirmed and that newspapers can slant stories toward these beliefs. If consumers share common beliefs, firms compete to supply stories in line with those beliefs. This leads to slanted stories (at low prices), but no alternative views. If consumers hold divergent perspectives, firms will segment the market and provide diverse stories. Thus demand diversity leads to the availability, though not necessarily the consumption, of diverse viewpoints.

While markets for news might be especially prone to various types of biases associated with the information acquisition process, such biases do not enter into this analysis. Rather, as discussed above, this analysis focuses on another characteristic that distinguishes the market for news from other goods markets and, even, media markets: the lack of IP protection. None of the studies above appear to account for the lack of IP protection in news markets. A review of a recent survey of media market research (Waterman [2004]) reveals a similar finding. The papers covered there do not meaningfully distinguish between markets for news and markets for entertainment. As such, they don't account for differences in IP protection. Despite the widely observed importance of property rights in economics analysis, the lack of IP protection for news producers appears to be largely (if not uniformly) overlooked in economic research.[8]

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[7] See also, Menell and Scotchmer [2005], footnote 3.

[8] As alluded to above, Washington D.C. policy makers are among those that seemingly fail to make distinctions between news and entertainment. This is reflected in an often cited quote by a Reagan era FCC Chairman Mark Fowler pointing out that television was "just another appliance -- it's a toaster with

II. BASIC ANALYTIC FRAMEWORK

This analysis examines the outcome in a market where a single "high quality" story is *ex ante* unknown. The market consists of X consumers. The utility earned by consumer i from consuming the high quality story is $U_i=V_i-p_i$, the value consumer i places on the high quality story less the price paid. Consumer preferences are such that the value consumer i places on the high quality story is uniformly distributed between zero and V (*i.e.*, V_i~U[0,V]). Consuming an alternative story or no story at all is assumed to yield no utility. It follows that the market for the high quality story is characterized by a linear demand curve, one that starts at V on the price axis and slopes downward to X on the quantity axis.

Firm activity takes place in two stages. In the first stage, an unlimited number of firms face the option of investigating the high quality story. A single investigation costs k. The likelihood that an investigation results in the high quality story being successfully uncovered is σ (where $\sigma \varepsilon (0,1)$ and $\phi \equiv 1-\sigma$ denotes the probability of failure). Investigations occur simultaneously. Firms can undertake multiple investments, but their outcomes are assumed to be independent. The number of firms that ultimately do investigate the story is denoted m and the number of distinct investigations is denoted n.

In the second stage firms compete in price based on the outcomes of the stage 1 investigations. For now, a given firm is assumed to be able to sell a high quality story only if that firm successfully uncovered the story. Copying will be introduced in the

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pictures." He further maintained that "[w]e've got to look beyond the conventional wisdom that we must somehow regulate this box." [Rendall, 2005]. Inherent in this viewpoint is that neither news nor entertainment is any different from any other consumer product. Too many observers, Fowler's perspective is symbolic of subsequent media deregulation trends. See, e.g., Baker [2001], p. 3.

following section. Given that the story is successfully uncovered, firms face no additional costs in producing the story for individual customers. That is, consistent with how information goods are commonly characterized, the marginal cost of producing the story is negligible or, more specifically, zero. Consumers can tell if a firm has successfully uncovered a story before paying for the story. Firms are assumed to compete in price.[9]

Given that the story is successfully uncovered, there are effectively two second stage outcomes, a monopoly outcome and a competitive outcome. If only one firm successfully uncovers the story, it will charge a monopoly price of *V/2* to the *X/2* consumers willing to pay that much (see Exhibit 1). In doing so, it will earn second period profits of VX/4. If multiple firms uncover the story, they will compete in price for a non-differentiable good, drive the price down to costs (zero) and all *X* consumers will consume the story. In the event that no firms successfully uncover the story, no stage 2 market activity takes place.

[INSERT EXHIBIT 1]

The amount a given firm invests in the first stage depends on the second stage profits, the likelihood of earning those profits and the cost of investigating. More formally, the expected profits for a given firm *j* ($E[\pi_j]$) as a function of the number of attempts it makes (*n(j)*) to uncover the story, is denoted

(0.1) $$E[\pi_j(n(j))]=\left[1-\phi^{n(j)}\right]\phi^{n(-j)}\frac{VX}{4}-n(j)k$$

[9] While motivated by the market for news, this analysis makes certain simplifying assumptions. For example, neither the role of advertising nor a news gathering organization's reputation are incorporated into the analysis.

If firm *j* is the lone firm to successfully uncover a story, it earns profits of *VX/4*. That happens if at least one of firm *j*'s investigations is successful (which occurs with probability $1-\phi^{n(j)}$) and the other *n(-j)* investigations are not (which occurs with probability $\phi^{n(-j)}$). In this market, firms are effectively rolling the dice to be the "winner" in a "winner-take-all" market. The cost of each roll is *k*.

Equilibrium investment levels follow from the firms' incremental benefit of pursuing another investigation ($\Delta E[\pi_j(n)]$).

$$\begin{aligned} \Delta E[\pi_j(n)] &\equiv E[\pi_j|n(j)]-E[\pi_j|n(j)-1] \\ &= \left(\left[1-\phi^{n(j)}\right]\phi^{n(-j)}\frac{VX}{4}-n(j)k\right)-\left(\left[1-\phi^{n(j)-1}\right]\phi^{n(-j)}\frac{VX}{4}-\left(n(j)-1\right)k\right) \\ &= \sigma\phi^{n(j)+n(-j)-1}\frac{VX}{4}-k \end{aligned} \tag{0.2}$$

Equation (0.2) highlights that the incremental benefit to firm *j* of pursuing another investigation depends on the outcome of its own investigations and those being pursued by other firms. The *n(j)*th investigation is only valuable if it is successful and the other *n(j)+n(-j)-1* investigations are not. If another firm is successful, firm *j* will not earn any profits. If another of firm *j*'s investments was to result in a success, the success on the *n(j)*th investment would be redundant. As such, the marginal benefit to firm j of the *n(j)*th investigation is $\sigma\phi^{(n(j)+n(-j)-1)}VX/4$. Naturally, making the investment is worthwhile only if it outweighs the investment cost *k*.

Equation (0.2) also highlights that, in equilibrium, the total number of investigations that will be pursued is invariant to the number of firms that invest. Each of the $n=n(j)+n(-j)$ might be undertaken be a single firm or by n different firms (given the common assumption that the number of firms and, in this case, investigations is treated as a continuous variable). The reason is that the marginal, or n^{th}, investigation is worthwhile only in the event that the other n-1 investigations failed. It doesn't matter if the other investigations were conducted by a single firm or many firms.[11]

Total welfare, in contrast, does depend on the investment levels of individual firms. Consideration of two polar cases, along with Exhibit 2, helps illustrate this point. Consider first the "monopoly investor scenario" in which all n investigations are pursued by a single firm. The monopolist investor will be a monopolist in the product market as long as at least one of the n investigations turns out to be successful (the likelihood of which is $1-\phi^n$). If that happens, the monopolist will earn VX/4 in profits from the X/2 high value consumers (reflected by [B] in Exhibit 2). The X/2 high value consumers will also realize a total of VX/8 in consumer surplus (reflected by [A] in Exhibit 2). The only other possible outcome, the one in which no investigation are successful, generates no surplus. It follows, after taking investigation costs into account, that total welfare in the monopoly investor scenario ($TW^M(n)$) can be described as follows

(0.3)
$$TW^M(n) = \left(1-\phi^n\right)\frac{3}{8}VX - nK$$

[11] Underlying this result is the assumption that the outcome of each investigation is *iid*. While this assumption is made to simplify the analysis, arguments can be made that multiple investigations can be either positively or negatively correlated with success. The notion that firms learn by doing suggests it might be appropriate to incorporate a probability structure that reflects increasing returns (or a joint likelihood of success) to investments undertaken by a single firm. On the other hand, it also seems natural to think that different firms might bring fresh ideas to the pursuit. This suggests that decreasing returns in investigations might be appropriate. The impact of modifying the *iid* assumption left for future research.

Next consider the "competitive investor scenario" in which each of n investigations are pursued by different firms. As in the monopoly investor scenario, a monopoly in the product market will generate $\frac{3}{8}VX$ second stage surplus. The likelihood that this happens is $n\sigma\phi^{n-1}$. An additional VX/8 in second stage surplus will be created as long as at least two investigations turn out to be successful. If this is the case, the successful firms will compete the price down to zero and all X consumers will consumer the story. Consumption by $X/2$ high value consumers will, like in the monopoly investor scenario, generate $\frac{3}{8}VX$ in total surplus (though the monopoly profits will be shifted to consumer surplus). Further, the X/2 low value consumers will generate VX/8 in consumer surplus (reflected by [C] in Exhibit 2). Factoring in the likelihood of the monopoly outcome $\left(n\sigma\phi^{n-1}\right)$, the competitive outcome $\left(1-\phi^{n}-n\sigma\phi^{n-1}\right)$ and the investment costs leads to the following characterization of total welfare in the competitive investor scenario ($TW^{C}(n)$):

(0.4) $$TW^{C}(n)=\left(1-\phi^{n}\right)\frac{3}{8}VX+\left(1-\phi^{n}-n\sigma\phi^{n-1}\right)\frac{1}{8}VX-nK$$

Together, equations (0.3) and (0.4) highlight an important point. Competition at the *investment stage* is welfare enhancing. Total investment levels are invariant to which firms are making those investments, but product market outcomes are not. A "second" successful investment is, from a total welfare perspective, redundant in the hands of a monopolist. But, in the hands of a competitor, that second successful investment allows the full value of the uncovered story to be realized. More generally, this analysis highlights how competition in the investment stage can lead to a greater likelihood that consumers will consume the high quality good a low price.

While preferable to the monopoly investor outcome, the competitive investor outcome falls short of the social optimum. Optimally, no dead weight loss would ever be incurred. That will not happen if the full amount of the economic value created by successfully uncovering the story (*VX*/2) were realized in all states of the world. It follows that the optimal level of total welfare ($TW^*(n)$) can be described as follows.

$$TW^*(n) = \left(1 - \phi^n\right)\frac{VX}{2} - nK \tag{0.5}$$

Exhibit 3, which compares the total welfare levels and firm profit levels where X=1000, V=10, σ=.25, ϕ=.75 and k=100, helps illustrate a number of points. First, Exhibit 3 highlights the product market inefficiency that is typically central to any discussion of IPRs. This inefficiency is reflected by the observation that $TW^C(n)$ always exceeds $TW^M(n)$ and that $TW^*(n)$ always exceeds $TW^C(n)$. These differences are attributable to monopoly distortions in the product market.

Second, Exhibit 3 also highlights an investment market inefficiency (on top of the product market inefficiency) that depends on *n*. Regardless of the welfare of scenarios being considered, firms invest too little. Based on the assumptions underlying Exhibit 3, a total of three investigations will be conducted. The optimal number of investigations under the monopoly investor scenario is roughly seven. Under the competitive investor scenario, that number is roughly 10. Implicit in this observation is the notion that multiple investments are not necessarily redundant. The reasoning is clear. Because of investment uncertainties, an investment in the same pursuit is not necessarily *ex post* redundant.

This analysis sets the stage for examining the optimal duration of IP protection. So far, the assumption is that the story could be told only by firms that independently uncover it. That is, stories cannot be copied. In practice, however, the facts at the heart of a given story can be copied. Thus, those that uncover stories have exclusive use of those stories for only as long as it takes others to copy and effectively convey the stories themselves. This section highlights a trade-off. Limiting the duration of intellectual property protection would tend to limit the product market inefficiency by allowing competition to take place after some point in time. At the same time, limiting the duration of intellectual property protection would limit the amount that successful investors recoup and, in turn, exacerbate the investment market inefficiency. The relationship between this trade-off and IP duration is examined in the following section.

III. EXOGENOUS TIME PREFERENCES

This section incorporates limited duration IP protection. The assumption here is that firms can freely copy a story after IP protection expires (assuming that a story has been successfully uncovered to copy in the first place and independent of whether a given firm invested in the story in the first place). The analysis in this section is done under the assumption that the timing of demand is determined exogenously. That is, consumers do not wait for IP protection to expire in order to pay a lower price.

The duration of property right protection is measured in terms of t, the share of the X consumers that demand the product before IP protection expires (t ε [0,1]). Further the value individual consumers place on the story V_i is distributed independently of *t*. Thus, V_i ~ U [0, *V*] for both the *tX* consumers that demand the story before IP protection expires and the *(1-t)X* that demand it afterwards. For expositional convenience, the intertemporal discount rate for both firms and consumers is assumed to be zero. That is, there is no intertemporal discounting.[13]

Because of copying, news producers are motivated to uncover stories only based on the demand of the *tX* consumers that demand the story before the expiration of IP protection. Figure 4 illustrates that demand, along with the monopoly outcome price and quantity levels.

[INSERT FIGURE 4]

Figure 4 highlights that limiting the duration of IP protection scales down the profits a successful innovator can earn. A successful gamble yields *tVX/4* rather than *VX/4*. Consequently, following from equations (0.1) and (0.2) above, a given firm's total profits and incremental profits from a given investment are, respectively, the following:

(0.6) $$E[\pi_j]=\left[1-\phi^{n(j)}\right]\phi^{n(-j)}\frac{tVX}{4}-n(j)K$$

(0.7) $$\Delta E[\pi_j(n)]=\sigma\phi^{n(j)+n(-j)-1}\frac{tVX}{4}-K$$

It follows from above that the equilibrium number of firms in both the competitive investor and monopoly investor scenario satisfies

(0.8) $$\sigma\phi^{n-1}\frac{tVX}{4}=K$$

13 This assumption does not affect the primary results of the analysis.

Figure 4 also highlights the various total welfare outcomes. Total welfare under the monopoly investor scenario can be thought of in terms of both pre-expiration surplus, represented by areas [A] and [B] in Figure 4, and post-expiration surplus represented by area [D]. Production market surplus is created only if at least one of the monopoly investor's investigation is successful (the likelihood of which is $\left(1-\phi^n\right)$). If that happens the consumer surplus realized by the *tX/2* high-value pre-expiration consumers is represented by area [A]. Product market profits are represented by area [B]. Together this adds up to $\frac{3}{8}tVX$. Post-expiration consumer surplus, which amounts to $\frac{1}{2}\left(1-t\right)VX$, is reflected in area [D]. Total welfare in the monopoly investor scenario, after accounting for investigation costs, follows accordingly.

$$TW^M(n) = \left(1-\phi^n\right)VX\left(t\frac{3}{8}+(1-t)\frac{1}{2}\right)-nK \tag{0.9}$$

The total welfare in the competitive investor scenario follows by factoring in the likelihood that the tX/2 low-value, pre-expiration consumers consume the story at the competitive price. This amount is represented by area [C] in Figure 4.

$$TW^C(n) = \left(1-\phi^n\right)VX\left(t\frac{3}{8}+(1-t)\frac{1}{2}\right)+\left(1-\phi^n-n\sigma\phi^{n-1}\right)\frac{1}{8}tVX-nK \tag{0.10}$$

One straight-forward approach to determining the optimal duration of protection is to build on the intuition highlighted in the equation (0.8). That equation highlights that *t* is effectively a policy tool that determines *n* (up to some maximum amount). Accordingly, the optimal duration of IP protection can be thought of in terms of optimizing *n*. Mechanically this can be done by solving for *t* in equation (0.8), substituting t into the welfare equation for the corresponding case and calculation the incremental expected welfare for a given investment. In the monopoly investor scenario, the incremental welfare of a single investment is[14]

$$\begin{aligned}\Delta TW^{M}\left(n\right) &\equiv TW^{M}\left(n\right)-TW^{M}\left(n-1\right)\\ &=\Delta TW^{C}\left(n\right)+\frac{1}{2}k\left[1-\frac{1}{\phi^{n-1}}\right]\\ &=\frac{1}{2}\left[\sigma\phi^{n-1}VX-k\left(2+\frac{1}{\phi^{n-1}}\right)\right]\end{aligned} \tag{0.11}$$

Because $\Delta TW^{M}\left(n\right)$ is decreasing in n for relevant parameter values, a given investment is welfare enhancing as long as $\Delta TW^{M}(n)>0$ and t is optimally set such that $\Delta TW^{M}(n)=0$. Solving for t as such yields[15]

$$t=4\Big/\left[1+\left(1+\frac{\sigma VX}{k}\right)^{\frac{1}{2}}\right] \tag{0.12}$$

Equation (0.12) highlights the risky investment version of the traditional analysis of the optimal duration of IP. Specifically equation (0.12) highlights that t is decreasing in $\sigma VX/k$. That is, t is decreasing as the expected value of a given story goes up relative to its costs. The intuition is that, all else equal a large $\sigma VX/k$ drives investment and, in turn, the likelihood that the story is successfully uncovered. Given that success is sufficiently likely, society as a whole benefits by limiting the period in which the monopolist can charge monopoly prices.

In contrast to the certainty outcome, there is a parameter space of positive measure where protection is optimally of infinite duration (*t=1*). In the case where

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14 See Appendix.
15 See Appendix.

success is certain, a single investment would yield profits of *tVX/4*. Setting that equal to *k* implies that, optimally, *t=4k/VX*. This would ensure that the story is uncovered, that the monopolist would just recoup its costs and that the price would be competitive after *t*. In this case, t=1 if and only if VX/4=k, which is the smallest VX can be relative to k to induce an investigation in the first place.

Equation (0.12), however, implies that t≥1 as long as $\sigma VX/k \leq 8$. Recall that $\sigma VX/k \geq 4$ is necessary to warrant some level of investment. Thus, there is some range, $\sigma VX/k\ \varepsilon\ [4,8]$, such that *t=1* (since *t* is bound by one). While relatively straightforward, this result is non-trivial. Just introducing risk into this simple theoretical analysis suggests that IP protection of unlimited duration might be warranted. This highlights the relative importance of the investment market inefficiency.

Now consider the competitive-investor scenario. Substituting $t = \frac{4k}{\sigma\phi^{n-1}VX}$ into equation (0.10) and solving implies that[16]

(0.13)
$$TW^C(n) = \left(1-\phi^n\right)\frac{VX}{2} - \frac{3nK}{2}$$

The incremental value of a single investment ($\Delta TW^C\left(n\right)$) follows accordingly,

(0.14)
$$\begin{aligned}\Delta TW^C\left(n\right) &\equiv TW^C(n) - TW^C(n-1)\\ &= \frac{1}{2}\left[\sigma\phi^{n-1}VX - 3k\right]\end{aligned}$$

16 See Appendix.

Equation (0.14) implies that, under the competitive investor scenario, n is optimally set such that $\phi^{n-1} = \frac{3k}{\sigma VX}$. Substituting this back into $t(n) = \frac{4k}{\sigma \phi^{n-1} VX}$ implies that t is optimally set such that *t=4/3*.

This result, that *t* is optimally set above one is one of the main results of the paper. It implies that property right duration should not be limited given sufficient levels of investment market competition. The reason involves the relative power of property rights to address the investment and product market inefficiencies. The monopoly investor scenario highlighted that lengthening property rights is effective, but only up to a point. For certain sets of parameters ($k \leq \sigma VX/8$), lengthening IP protection beyond a certain period in order to increase the likelihood of innovation is not warranted because of the associated longer period of dead-weight loss in the product market. In the competitive investor scenario, longer property rights increase the likelihood of product market competition for the whole life of the product. With this factored in, further lengthening the duration of property right duration is always welfare enhancing, regardless of the parameter specifications. That is, as long as the investment market is sufficiently competitive, lengthening property rights is unambiguously the more effective way to enhance welfare.[17]

[17] Careful interpretation of "infinite duration property rights" is required in this context. Despite the explicit analytic results presented here, this analysis does not support the actual implementation of infinite duration property rights in practice. The reason is that property rights are effective in this analysis because the motivate up-front investments. Profits potentially earned in the distant future will not, because of discounting, have a meaningful incentive effect on firm investment decisions (as pointed out by Akerloff, et. al., [2002]). This analysis, like many analyses of IP duration, implicitly assumes that profits are discounted intertemporally at the same rates as consumer surplus. This is not necessarily a fair assumption, especially from the perspective of a consumer whose consumption in the distant future counts for virtually nothing compared to present day consumption. A fair interpretation of this model is that there is a practical upper bound on IP duration that doesn't affect investment incentives, but eliminates deadweight loss in the distant future.

This analysis also highlights how the presence of "competing" firms does not imply efficient levels of investigations. There are certain facts that are virtually costless to "uncover." Examples include natural disasters and facts contained in government and corporate press releases. In terms of this analysis, facts such as these can be thought of as those where $k \approx 0$. As such, this analysis suggests that there may be a fair amount of entry into the marketplace to "convey" these types of facts. But that doesn't imply that firms have adequate incentives to uncover facts in the face of non-trivial investigation costs. Given that new producers have exclusives for periods of time measured in terms of hours or days, this analysis suggests that news producers are under-incentivized with respect to investigating stories that generate some sort of sustained interest among consumers. Put another way, news producers are less motivated by consumers who consume news beyond the relatively short-term. That's because the story, absent IP protection, can be copied and conveyed by competitors. However, stories that do generate more sustained interest are often those that are considered more important.

Alternatively, consider the incentive problem faced by news producers by way of analogy. Movie producers and scientists involved in drug discovery face many of the same non-pecuniary incentives faced by news reporters. Examples include furthering one's reputation and advancing the public good. Yet, the efforts both film producers and drug companies exert in maintaining strong IP protection suggest that IP protection and the corresponding pecuniary rewards are important. Presumably, investment levels in the production of new films would be substantially lower if movies could be legally "pirated" after the opening weekend. The same would likely be true for the production of new drugs if "generic" drug manufactures had the right to enter the marketplace within, for example, a month a month after “branded” drugs were introduced. The analysis here suggests news producers now face comparable marketplace environments due to an inability to practically implement some sort of protection for news producers that uncover previously unknown news stories. This analysis suggests that, as a result, a number of news stories worth investigating are not sufficiently pursued.

IV. ENDOGENOUS TIME PREFERENCES

In this scenario, the timing of demand is assumed to be endogenous. That is, consumers, knowing IP protection expires at some point, might be willing to, depending on their preference, pay a premium to consume the story early. In this scenario, the duration of IP protection is measured in terms of the portion of V_i that that is attributable to consumer’s early consumption of the story. That portion is measured in terms of $\theta \varepsilon [0,1]$. Thought of this way, $(1-\theta)V_i$ is the value consumer i places on consuming the story after IP protection expires and θV_i is the early consumption premium. The θ variable is tied to duration in the sense that the longer one has to wait, the greater the early consumption premium. As such, firms face a demand curve running from θV on the price axis down X on the quantity axis. Because of copying, news producers are only motivated to uncover the story by the early consumption premium consumers place on the story, not the story’s full value. Figure 5 illustrates that demand, along with the monopoly outcome price and quantity levels and the relevant welfare outcomes.

[INSERT FIGURE 5 HERE]

Figures four and five highlight a symmetry between this scenario and the one considered in the previous section. Specifically, the size of areas [A], [B], [C] and [D] are identical when $t=\theta$. Area [A] reflects the pre- expiration of IP protection consumer surplus given a monopoly outcome. Area [B] is the corresponding monopoly profits and area [C] is the corresponding deadweight-loss. Area [D] is the post-protection value created by a successful investigation, realized in the form of consumers surplus because of copying. It follows that the profit and welfare equations derived in the previous section will be identical when $t=\theta$. Consequently, the findings regarding the optimal duration of IP protection will be symmetric. Specifically, the optimal duration IP protection under monopoly investor scenario is characterized as follows

$$\theta = 4 \Bigg/ \left[1 + \left(1 + \frac{\sigma V X}{k} \right)^{\frac{1}{2}} \right]$$

Further, the optimal duration IP protection under the competitive investor scenario is characterized as $\theta=4/3$. As such, the general conclusions described in the previous section holds here as well. Specifically, this analysis highlights an advantage of long duration IP protection is that it can facilitate competition among successful innovators.

V. CONCLUSION

This paper examines the implications of not providing news organizations that uncover previously unknown facts with some sort of IP protection. Based on an analytic framework that incorporates specific characteristics of the market for news, this analysis highlights how IP protection can motivate not just investment, but competition between successful innovators. Specifically, the paper highlights how the risk of deadweight loss due to monopoly pricing is worth incurring the corresponding longer period of IP protection also motivates investment by firms that might end up competing on the product market. This paper also highlights how traditional measures of competition do not reflect the "health" of a market if that competition takes place among imitators (as opposed to innovators). While IP protection for facts seems impractical, this impracticality may be associated with meaningful economic consequences. How to appropriately address these consequences is left for future research (and, possibly, a later version of this paper).

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VII. APPENDIX

Optimizing with respect to *t* under the Competitive Investor Scenario in Section III:

From Equation (0.10),

$$TW^C(n,t) = \left(1-\phi^n\right)VX\left(t\frac{3}{8}+(1-t)\frac{1}{2}\right)+\left(1-\phi^n-n\sigma\phi^{n-1}\right)\frac{1}{8}tVX-nK$$

$$=\left(1-\phi^n-n\sigma\phi^{n-1}\right)VX\left(t\frac{3}{8}+(1-t)\frac{1}{2}\right)+\left(1-\phi^n-n\sigma\phi^{n-1}\right)\frac{1}{8}tVX+n\sigma\phi^{n-1}VX\left(t\frac{3}{8}+(1-t)\frac{1}{2}\right)-nK$$

$$=\left(1-\phi^n-n\sigma\phi^{n-1}\right)\frac{VX}{2}+n\sigma\phi^{n-1}VX\left(t\frac{3}{8}+(1-t)\frac{1}{2}\right)-nK$$

$$=\left(1-n\sigma\phi^{n-1}-\phi^n\right)\frac{VX}{2}+n\sigma\phi^{n-1}VX\left(\frac{1}{2}-\frac{1}{8}t\right)-nk$$

$$=\left(1-\phi^n\right)\frac{VX}{2}-n\sigma\phi^{n-1}VX\frac{1}{8}t-nk$$

In equilibrium (from (0.8)) $t_n^* = \frac{4k}{\sigma\phi^{n-1}XV}$, so

$$TW^C(n^*) = \left(1-\phi^n\right)\frac{VX}{2}-n\sigma\phi^{n-1}VX\frac{1}{8}\frac{4k}{\sigma\phi^{n-1}XV}-nk$$

$$=\left(1-\phi^n\right)\frac{VX}{2}-n\frac{1}{2}k-nk=\left(1-\phi^n\right)\frac{VX}{2}-\frac{3nk}{2}$$

It follows that,

$$\Delta TW^C(n^*) \equiv TW^C(n) - TW^C(n-1)$$
$$= \left[\left(1-\phi^n\right)\frac{VX}{2} - n\right] - \left[\left(1-\phi^{n-1}\right)\frac{VX}{2} - \frac{3k}{2}\left(n-1\right)\right]$$
$$= \left(\phi^{n-1} - \phi^n\right)\frac{VX}{2} - \frac{3k}{2} = \phi^{n-1}\left(1-\phi\right)\frac{VX}{2} - \frac{3k}{2}$$
$$= \sigma\phi^{n-1}\frac{VX}{2} - \frac{3k}{2}$$
$$= \frac{1}{2}\left[\sigma\phi^{n-1}VX - 3k\right]$$

Optimally, n^* is set such that $\Delta TW^C(n^*) = \frac{1}{2}\left[\sigma\phi^{n^*-1}VX - 3k\right] = 0$. This implies that $\sigma\phi^{n^*-1}VX = 3k$. Substituting t^* back in implies that $\frac{4k}{t^*} = 3k$, which implies that t^*, if not constrained, would set to such that $t^*=4/3$.

Optimizing with respect to *t* under the Monopoly Investor Scenario in Section III:

From Equation (0.9),

$$TW^M(n,t) = \left(1-\phi^n\right)VX\left(t\frac{3}{8} + (1-t)\frac{1}{2}\right) - nk$$
$$= TW^C(n) - \left(1 - n\sigma\phi^{n-1} - \phi^n\right)\frac{1}{8}VXt$$

In equilibrium $t_n^* = \frac{4k}{\sigma\phi^{n-1}XV}$, so

$$TW^M(n^*) = TW^C(n) - \left(1 - n\sigma\phi^{n-1} - \phi^n\right)\frac{1}{8}VX\left(\frac{4k}{\sigma\phi^{n-1}XV}\right)$$
$$= TW^C(n) - \left(1 - n\sigma\phi^{n-1} - \phi^n\right)\frac{1}{2}\left(\frac{k}{\sigma\phi^{n-1}}\right)$$
$$= TW^C(n) - \frac{\left(1 - n\sigma\phi^{n-1} - \phi^n\right)}{\phi^{n-1}}\frac{1}{2}\frac{k}{\sigma}$$
$$= TW^C(n) - \left(\frac{1}{\phi^{n-1}} - n\sigma - \phi\right)\frac{1}{2}\frac{k}{\sigma}$$
$$= TW^C(n) - \left(\frac{1}{\phi^{n-1}} - n\sigma - \phi\right)\frac{1}{2}\frac{k}{\sigma}$$

It follows that,

$$
\begin{aligned}
\Delta TW^{M}(n^{*}) &\equiv TW^{M}(n) - TW^{M}(n-1) \\
&= \left[TW^{C}(n) - \left(\frac{1}{\phi^{n-1}} - n\sigma - \phi\right)\frac{1}{2}\frac{k}{\sigma}\right] - \left[TW^{C}(n-1) - \left(\frac{1}{\phi^{n-2}} - (n-1)\sigma - \phi\right)\frac{1}{2}\frac{k}{\sigma}\right] \\
&= \Delta TW^{C} + \frac{1}{2}\frac{k}{\sigma}\left[\frac{1}{\phi^{n-2}} - \frac{1}{\phi^{n-1}} + n\sigma + \phi - (n-1)\sigma - \phi\right] \\
&= \Delta TW^{C} + \frac{1}{2}\frac{k}{\sigma}\left[\left(\frac{1}{\phi^{n-2}} - \frac{1}{\phi^{n-1}}\right) + \sigma\right] = \Delta TW^{C} + \frac{1}{2}\frac{VXk}{\sigma}\left[\frac{\phi-1}{\phi^{n-1}} + \sigma\right] \\
&= \Delta TW^{C} + \frac{1}{2}\frac{k}{\sigma}\left[\sigma - \frac{\sigma}{\phi^{n-1}}\right] = \Delta TW^{C} + \frac{1}{2}k\left[1 - \frac{1}{\phi^{n-1}}\right]
\end{aligned}
$$

$$
\begin{aligned}
\Delta TW^{M}(n^{*}) &= \Delta TW^{C} + \frac{1}{2}k\left[1 - \frac{1}{\phi^{n-1}}\right] = \frac{1}{2}\left[\sigma\phi^{n-1}VX - 3k\right] + \frac{1}{2}k\left[1 - \frac{1}{\phi^{n-1}}\right] \\
&= \frac{1}{2}\left[\sigma\phi^{n-1}VX - 3k + k - \frac{k}{\phi^{n-1}}\right] = \frac{1}{2}\left[\sigma\phi^{n-1}VX - 2k - \frac{k}{\phi^{n-1}}\right] \\
&= \frac{1}{2\phi^{n-1}}\left[\sigma VX\left(\phi^{n-1}\right)^{2} - 2k\left(\phi^{n-1}\right) - k\right]
\end{aligned}
$$

Thus, $\Delta TW^{M}(n) = 0$ implies $\left[\sigma VX\left(\phi^{n-1}\right)^{2} - 2k\phi^{n-1} - k\right] = 0$. From the quadratic equation

$$
\phi^{n-1} = \frac{-b \pm \sqrt{b^{2} - 4ac}}{2a} = \frac{2k \pm \sqrt{4k^{2} + 4\sigma VXk}}{2\sigma VX} = \frac{2k \pm \sqrt{\left((2k)^{2} + \sigma VXk\right)}}{2\sigma VX}
$$

But $\dfrac{2k - \sqrt{(2k)^{2} + 4\sigma VXk}}{2\sigma VX} < 0$, So

$$
\phi^{n-1} = \frac{2k + \sqrt{4k^{2} + 4\sigma VXk}}{2\sigma VX} = \frac{2k + 2\sqrt{\left(k^{2} + \sigma VXk\right)}}{2\sigma VX} = \frac{k + \sqrt{\left(k^{2} + \sigma VXk\right)}}{\sigma VX}
$$

From $t_{n}^{*} = \dfrac{4k}{\sigma\phi^{n-1}XV}$, $\sigma VX\phi^{n-1} = \dfrac{4k}{t_{n}^{*}} = k + \sqrt{\left(k^{2} + \sigma VXk\right)}$, which implies that

$$
t_{n}^{*} = \frac{4k}{k + \sqrt{\left(k^{2} + \sigma VXk\right)}} = \frac{4}{1 + \sqrt{\left(1 + \dfrac{\sigma VX}{k}\right)}}
$$

Exhibit 1: Graphical Depiction of Consumer Demand

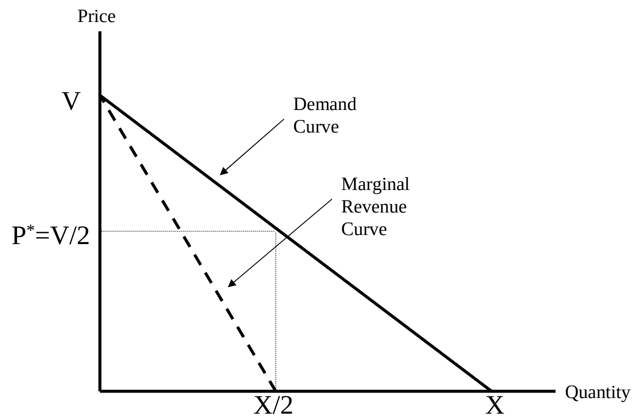

Exhibit 2: Graphical Depiction of Welfare Outcomes

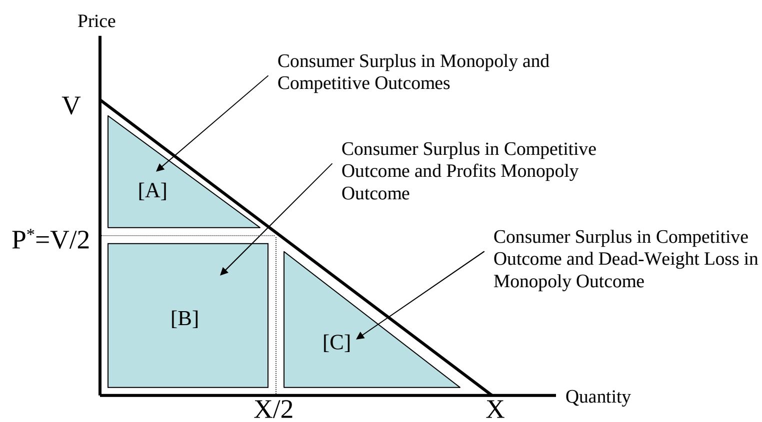

Exhibit 3: Incremental Impact of Investment

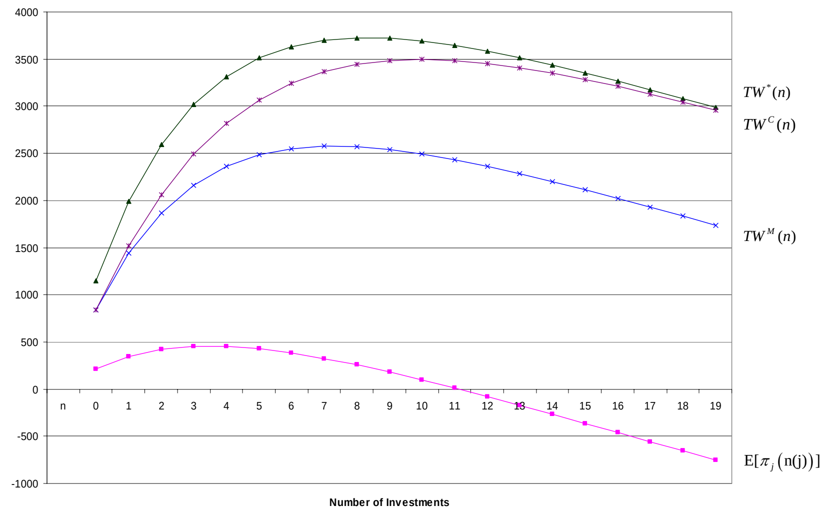

Exhibit 4: Market Outcomes Under "Exogenous Timing" Scenario

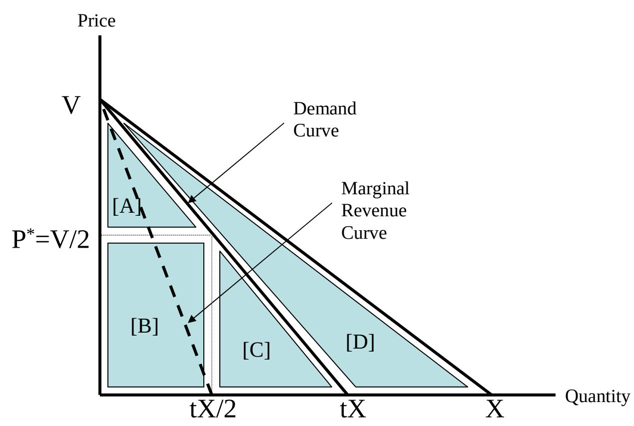

Exhibit 5: Market Outcomes Under "Endogenous Timing" Scenario