The Patent-Antitrust
Intersection: A Reappraisal

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ABSTRACT

The intersection between antitrust law and patent policy has proved to be
an endless source of confusion and controversy for courts and commentators.
In fact, the patent-antitrust conflict is far more severe than most have
realized. Past approaches to the patent-antitrust conflict either evade one
half altogether, utilize question-begging formalistic rules, or misanalyze
the connection between patent and antitrust policy. This paper develops and
analyzes a conceptual solution to the patent-antitrust puzzle. The proposed
test focuses attention on the ratio between the reward the patentee receives
when permitted to engage in a particular restrictive practice and the
monopoly loss that results from such exploitation. Generally speaking, the
greater the ratio, the stronger the case for permitting the practice. This
ratio test is applied to a number of familiar contexts: price-restricted
licensing, agreements involving competing patents, price discrimination, and
patentee control of unpatented end-products. The conclusions reached in each
part call into question much of the previous analysis of these issues.

Both the development of the model and the attempt to apply the theoretical
framework in practice indicate that the problem is far more complex than has
previously been realized. Coherent practical conclusions articulating
patent-antitrust doctrine can only be reached if similar conclusions have
already been made concerning patent policy as a whole, which is problematic
since it is well known that the empirical foundations for current patent
policy are subject to great uncertainty. In addition, there is a seemingly
endless array of issues concerning various effects of most patentee
practices. These issues include not only most of the ongoing disputes
concerning the appropriate contours of antitrust policy, but also numerous
other sources of uncertainty concerning the effects of patentee practices.
This paper is an attempt to clarify the issues, but in the end it may only
contribute to the state of despair concerning the possibility of untangling
the patent-antitrust intersection. The discussion also illustrates the
difficulty of applying economic analysis to concrete problems in a manner
that yields confident conclusions.

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The Patent-Antitrust Intersection: A Reappraisal

Louis Kaplow[1]

Introduction

The intersection between antitrust law and patent policy has proved to be an endless source of confusion and controversy for courts and commentators ever since the passage of the Sherman Act. In the courts, this difficulty can be seen in the many changes in patent-antitrust doctrine, the apparent inconsistency among many segments of the doctrine, and the painful process through which courts must go in articulating the doctrine. Commentators have not only continued the debate for decades, but have been generally unable even to identify the sources of disagreement or agree upon common bases for judgment.

Past approaches to the patent-antitrust conflict fall into three general categories. The first solves the conflict by pretending in one way or another that half of the problem does not exist. Some courts and

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commentators choose one side, some choose the other, and some alternate between the two. The common characteristic of these approaches is that no analysis is offered indicating why the other side is effectively ignored. The second genre of approaches resolves the conflict by invoking formalistic formulae that are indeterminate and address only in the most superficial manner the issues at stake. The third approach focuses on the relationship between the reward a patentee receives and the value of the patent. This approach has much in common with the first in that it emphasizes patent policy at the expense of antitrust policy, and with the second in that it is often justified by reference to appeals to many of the more popular formalisms. Part I of this paper describes the patent-antitrust conflict in a manner that suggests the weakness of many of these approaches, and in the process demonstrates how the conflict is far more severe than has generally been thought to be the case.

A conceptual solution to the patent-antitrust puzzle is developed and analyzed in Part II. The proposed test, which is basically quite simple, focuses attention on the ratio between the reward the patentee receives when permitted to engage in a particular restrictive practice and the monopoly loss that results from such exploitation. Generally speaking, the greater the ratio, the stronger the case for permitting the practice.

When one attempts to apply the results in practice, however, the simplicity vanishes quickly. Part II traces the complexity to a number of sources. First, coherent practical conclusions articulating patent-antitrust doctrine can only be reached if similar conclusions have already been made concerning patent policy as a whole, and it is well known that the empirical foundations

for current patent policy are flimsy at best. Second, even if a completely developed patent policy can be taken as given, one would confront a seemingly endless array of issues concerning various effects of most patentee practices. These issues include most of the ongoing disputes concerning the appropriate contours of antitrust policy, and those disputes are responsible for some of the disagreements that have emerged over elements of patent-antitrust doctrine. It will be seen, however, that there are numerous other sources of uncertainty concerning the effects of patentee practices. This paper is an attempt to clarify the issues, but in the end it may only contribute to the state of despair concerning the possibility of untangling the patent-antitrust intersection.

Part III evaluates the more prominent of previous resolutions of the conflict using the analysis and test presented in Part II. Parts IV-VII apply the framework to the problems of price-restricted licensing, agreements involving competing patents, price discrimination, and patentee control of unpatented end-products. Each of these four Parts reaches conclusions with varying degrees of confidence, many of which call into question much of the previous analysis of these issues.

I. The Directness of the Patent-Antitrust Conflict

and Some Implications

The conflict between the patent statute[2] and the antitrust laws has long
been thought to be troublesome. In fact the conflict is even more dramatic
than is generally perceived. Consider a patentee[3] that intends to employ
some particular restriction, practice, or strategy in exploiting its patent.
If the practice does not violate the antitrust laws, it would be deemed
permissible, if one limits the analysis to the antitrust issues, which is the
intended scope of this paper.[4] On the other hand, if it does violate the
antitrust laws, it would appear that the practice should be held illegal.

It did not take long after the passage of the Sherman Act,[5] however, for
courts to see through so facile an answer.[6] The problem is quite simple. A
practice is typically deemed to violate the antitrust laws because it is
anticompetitive. Yet the very purpose of the patent grant is to reward the

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2. 35 U.S.C. (1976 and Supp. III 1979).

3. The same analysis is generally applicable for assignees, but see
subsection II-B-2-c infra, and in some instances may be applicable to
practices of licensees.

4. Of course, there exist categories of patent abuse not otherwise subsumed
within antitrust, fraud, and other general laws.

5. 26 Stat. 209 (1890), as amended, 15 U.S.C. Secs. 1-7 (1976).

6. See, e.g., Bement v. National Harrow Co., 186 U.S. 70 (1902).

patentee by limiting competition, fully recognizing that monopolistic evils are the price society must pay. Generalizing from this core, it could be said that action by a patentee that violates the antitrust laws is privileged under the patent statute.

This conclusion also came to be seen as excessively simplistic, for it is obvious that the patent statute was not intended to bestow upon each patentee carte blanche in all its endeavors. No one has suggested, for example, that a patentee that negotiates a favorable royalty by holding a prospective licensee at gunpoint would be relieved from the proscriptions and limitations of either criminal law or contract law. The question then becomes whether antitrust law should be viewed any differently. That both the patent grant and antitrust law are directed toward competition arguably cuts both ways,[7] although it should be clear that only the most formalistic of analyses could be influenced by this consideration.[8] The limitation of the statutory grant

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7. On the one hand, one could argue that the patent statute clearly was not intended to displace whole fields of law upon which the statute implicitly relied. (For example, patent exploitation requires the enforcement of a wide variety of contracts even if no licensing is involved.) By contrast, in the realm of competition policy, the patent statute presumably is intended to govern since it is specifically designed to change the ordinary competitive environment. On the other hand, one could argue that as to other fields of law the patent statute clearly would govern in cases of direct conflict. (For example, a sellers right to dispose of goods as it wishes would be overridden if their production infringed on another's patent.) The contrast would be that since antitrust law is specifically designed to regulate competition, it cannot be assumed that its policies were meant to give way in cases of direct conflict. (Here, it would be argued that none of the antitrust statutes contain exceptions for patent exploitation.)

8. See generally Section III-B infra.

to 17 years[9] illustrates the position, now generally accepted by commentators,[10] that the most appropriate reward for inventive activity is not unbounded. What the 17 year provision does not tell us, of course, is whether practices in violation of the antitrust laws are out of bounds.

Most formulations of the problem ask whether the practice merely permits the patentee to realize part of the reward appropriate to the patent, or goes beyond it.[11] This inquiry begs the question of what reward is appropriate. Section II-B will demonstrate than even this formulation, which is directed at some target award level, is substantially misguided. The purpose of the discussion to follow is to demonstrate how this even slightly refined formulation that explicitly addresses the issue of appropriate reward leads to conclusions totally different from those courts and commentators would expect. These conclusions motivate the alternative framework that is constructed in Part II.

To aid the analysis, it will be useful to consider the following two extreme hypothetical scenarios:

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9. 35 U.S.C. Sec. 154 (1976).

10. See, e.g., sources cites in note 42 infra.

11. See subsection II-A-3 and Part III infra.

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1. <u>Antitrust laws reign supreme</u>: no privilege is accorded to patentees. Under this regime, a patentee's practice is deemed illegal if it violates any aspect of antitrust law.[12]

2. <u>Patent statute reigns supreme</u>: absolute privilege to violate antitrust laws. Under this regime, the antitrust laws cannot render the patentee's practice illegal.[13]

From the perspective of antitrust and patent policy, consider how these two regimes differ. Under regime 1, the patentee would not be allowed, for example, to use price-restricted licenses or to enter into certain patent pools, but would still be permitted to exploit the patent on its own, sell all rights under the patent to another entity, or enter into various intermediate arrangements that did not violate any provisions of the antitrust laws. Assume that the typical expected reward to the patentee under this regime is X.[14] Presumably X is hardly trivial. It is, however,

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12. This hypothetical is offered for heuristic purposes only, and thus no effort will be made to be rigorous. It should be noted that this statement of the first regime is problematic from the outset since arguably the very act of enforcing one's patent would be monopolization if no privilege whatsoever is accorded to patent exploitation. This difficulty in articulating one of the extreme positions derives from the attempt to specify the framework in formalistic terms. Compare the discussion in Section III-B <u>infra</u>.

13. The problems noted in the preceding footnote are fully applicable here. For example, if a firm has one little patent, may it price-fix, merge, engage in predatory pricing, or anything else it wishes solely on that account. The limitation that the patent have <u>something</u> to do with the action is obviously insufficient. These examples also foreshadow the argument in Section II-B <u>infra</u>.

14. The reward X could be thought of as an amount, a percentage of something, a vector of many dimensions, or whatever one thought necessary to capture the relevant incentive aspects of the patent system.

less than the reward under regime 2, which I will assume to be $\underline{X} + 10$.[15]

Which regime is preferable? This clearly depends on how much reward is deemed to be appropriate. If patent policy dictated an outcome less than $\underline{X}$ we would prefer regime 1, and if in excess of $\underline{X} + 10$, regime 2. (Outcomes between $\underline{X}$ and $\underline{X} + 10$ will be considered momentarily.[16]) But one might ask why patent policymakers would care which regime courts[17] selected since they simply could adjust the underlying grant, for example by lengthening or diminishing the patent life, in a compensatory fashion. Thus it ultimately seems irrelevent which regime (or which point in between) is adopted.

Two obvious and related reservations should be noted. First, one might note that our patent policymaker, Congress, is noted for inaction, has not acted to change the patent life in over a century, and seems unlikely to do so since the 17 year term appears to have become set in stone. This not

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15. The choice of "10" is arbitrary, and purely for illustrative purposes. Of course, any number could be selected if one simply made the appropriate redefinition of the units in which $\underline{X}$ is measured.

16. The likelihood that an intermediate value is the relevant one depends upon the magnitudes involved. For example, if $\underline{X}$ were large, so that the range between $\underline{X}$ and $\underline{X} + 10$ were relatively small -- i.e., if the choice of patent-antitrust doctrine had only a modest impact upon the aggregate expected reward -- it seems most likely that the optimal scheme would be one of the two extreme regimes presented. Cf. pages 38-39 infra (Turner's position). See generally note 81 infra.

17. To the extent antitrust enforcement is largely determined by actions of government prosecutors, rather than private suits, their actions would presumably be viewed similarly to actions by the courts.

18. Alternative possibilities include that (1) courts have been about right; (2) the effect of antitrust is insignificant anyhow; (3) the patent life had been changed previously; (4) Congress has made other changes in the statute, and actively considered various modifications in light of decisions in this area, see, e.g., Stedman, Patents and Antitrust -- The Impact of Varying

overwhelmingly powerful view[18] could be combined with a second position, that Congress has -- or, perhaps more realistically, a sensible patent policymaking body that explicitly considered this question would have -- chosen to set the patent life[19] only approximately, leaving to the courts the task of fine-tuning the amount of the reward on an ongoing basis, in response to changes in technology and the structure of the nation's economy. Although this second point is perhaps even less plausible than the first,[20] it is worthwhile to accept this view of the role for the courts to see what conclusions it suggests.

Suppose, for example, that the courts were to determine that the appropriate reward were X + 5. The resulting patent-antitrust doctrine would thus be a compromise between regimes 1 and 2; neither the patentee nor the government would always be the victor. But how should the court decide any particular case? It should be apparent that, as is sometimes true in the law, the decision of one case will depend upon the decision of other related

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n. 18
cont.

Legal Doctrines, 1973 **Utah L. Rev.** 588, 614 n.61.

19. The patent life is not the only feature of patents and patentability established by the patent statute; it is used for illustrative purposes since it is the most obvious and straightforward aspect of the patent grant to view as a device for calibrating the magnitude of the typical award. A related and far less studied policy instrument is the breadth of coverage of the patent laws. See Nordhaus, The Optimum Life of a Patent: Reply, 62 **Am. Econ. Rev.** 428, 429-30 (1972).

20. Some of the reasons that could be noted are (1) the explicit delegation of a political/policy decision to courts; (2) the incredible complexity of this area, leading one to expect delegation to a regulatory agency; (3) the inefficiency of this mechanism as a fine-tuning device since it requires substantial litigation that would otherwise be unnecessary; (4) the lack of attention given to the issue by Congress in passing antitrust laws; and (5) the limited bounds of the apparatus and the difficulty of adjusting it. In addition, there are the problems noted in Section II-C infra.

cases, for the question is whether the _totality_ of the courts patent-antitrust decisions leads to the appropriate expected reward of $\underline{X}$ + 5. However, in this context, the interdependence is extreme: in general, it is wholly indeterminate how any individual case, or, similarly, any component of patent-antitrust doctrine, should be decided. A prohibited restriction could just as easily be permitted so long as some other permitted restriction (or group of restrictions) yielding the same aggregate reward were prohibited. Any pattern of doctrine yielding a total reward of $\underline{X}$ + 5 would be acceptable. Reversing all the rules of a given pattern that yields $\underline{X}$ + 5 -- i.e., permitting what was previously prohibited and prohibiting what was previously permitted -- may also yield the same total.[21]

I doubt anyone would argue that this formulation describes what courts and commentators think they have been doing for nearly a century since the passage of the Sherman Act. One reviewing legal materials on this subject perceives extensive activity directed toward deciding each case on its merits, in a manner that bears no resemblance to the approach just described. A clearer understanding of what legal discourse has been about, and how it relates to the discussion here, is not possible until a more refined and comprehensive framework for understanding the patent-antitrust conflict is developed.

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21. It would not necessarily yield the same total since the reward induced by a particular restriction in general will be affected by which other restrictions are permitted. This complication is an instance of the more general issue discussed in Section II-C _infra_.

II. A Framework for Approaching the Patent-Antitrust Conflict

This Part offers partial relief from the despairing conclusions of Part I, which closed with the argument that even if patent-antitrust doctrine mattered in the aggregate, its content was in many respects indeterminate. This result will be shown to derive in part from certain simplifying assumptions implicit in the preceding analysis. As will become clear, these are not assumptions that have been expressly articulated in prior attempts to address the issue. Moving beyond the implicit simplifying assumptions of past analysis, and Part I as well, yields a far more complicated perspective on the patent-antitrust conflict, but one that is unavoidable if there is to be any hope of clarifying what is at stake.

The surprising results of Part I were dependent upon the implicit assumption that various practices that came into conflict with the antitrust laws were fungible in much the same manner as currency. All that was assumed to matter was the denomination -- i.e., how much reward resulted from permitting the practice. Two practices providing the same reward, for example, were interchangeable in that permitting only one or only the other was assumed to have the same effect. It should be apparent that equal reward is not a sufficient condition for fungibility in that it would also be necessary that the practices caused equal detriment. In other words, the indeterminacy result assumed that all restrictions were both equally good and equally bad -- equally good as rewards to the patentee and equally bad in

terms of the monopolistic harms they cause. More precisely, as will be demonstrated implicitly in the derivation of the ratio test in Section B, it was assumed that the ratio of good to bad was the same for each. In other words, one can only assume that two "fives" are the same in value as a "ten," so to speak, if each of the practices yielding half the reward also causes half as much harm.[22]

At first, this may not seem to be a terrible assumption. After all, the patentee's reward is made possible through monopolistic restrictions, and one would expect that both the reward and monopolistic evil would be roughly proportional to the extent of the restrictions. This is simply false as a general proposition. There is no reason to believe that all activities generating equal profits impose equal damages upon society, and the analysis later in this Part, as well as in the applications in Parts IV-VII to follow, will provide numerous counterexamples.

Although much of antitrust commentary (outside the patent-antitrust context) has debated over which practices should be prohibited by the antitrust laws and which should not, little attention has been given to the question of how much profit the antitrust defendant derives from a given practice in proportion to the harm caused. It is not surprising that this issue has been neglected since net harm determines whether antitrust intervention is warranted. The magnitude is irrelevant, except perhaps in

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22. For example, if currency were engraved in stone rather than on paper, one may prefer a "ten" to two "fives" since the latter would be more burdensome to carry. Similarly, if "ten's" were engraved on stones three times as large as those used for "fives," the opposite preference would follow.

determining enforcement priorities. Moreover, the magnitude of the defendant's profit is of no special concern, except to the extent its profit is a component of the measure of harm.[23] But when patent policy is implicated, profit plays a more central role, because it serves as a reward for inventive activity.

When monopolistic evil is viewed as part of the price society pays for inventive activity, the natural economic question is how society can purchase a given level of inventive output -- which entails a given level of incentives -- for the least cost, or, equivalently, how much incentive society can purchase per unit of monopoly loss that it must bear. This question is intimately related both to how society should determine which antitrust prohibitions to apply to patentees and to how it should determine the time period over which patentees may exploit their patents. Moreover, these two policy decisions -- articulating patent-antitrust doctrine and setting the patent life -- are interrelated decisions. Part I already suggested the dependence of the former on the latter. The opposite connection exists for similar reasons because the amount of reward provided and the monopoly loss caused by each added year of exploitation that is permitted depends upon what practices patentees may employ during that time period.

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23. For a discussion of this issue, see Posner, The Social Costs of Monopoly and Regulation, 83 J. Pol. Econ. 807 (1975); Scherer, The Posnerian Harvest: Separating Wheat from Chaff (Book Review), 86 Yale L.J. 974, 978-79 (1977); Kaplow, The Accuracy of Traditional Market Power Analysis and A Direct Adjustment Alternative, 95 Harv. L. Rev. 1817, 1822-23 (1982). Profit will also be related to standard damage measures in private treble damage actions.

In order to untangle this interrelationship and thus clarify the factors relevant to resolving the patent-antitrust conflict, it is best to derive from first principles the appropriate formulation of the problem. The analysis that follows will proceed in a number of steps. Section A will analyze how the optimal patent life should be determined, taking as given a set of rules defining what practices patentees will be permitted during and after that time period.[24] Section B will examine how a given set of rules governing exploitation should be adjusted -- i.e., how patent-antitrust doctrine should be articulated -- taking as given the patent life that has been derived in Section A. But the adjustments to the patent-antitrust rules, as previously suggested, in general will make it necessary to revise the patent life determination. This feedback effect, and the need in principle to decide both questions simultaneously, will be explored in Section C. (The analysis in Sections A-C is presented in a more technical manner in the Appendix.) Along the way, a number of principles, including the derivation of the ratio test, will be established that are directly relevant to the debate over the patent-antitrust conflict. These principles

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24. This derivation is familiar to economists. See generally **F. Machlup, An Economic Review of the Patent System** 66-73 (1958) (Study no. 15 of the United States Congress, Senate Subcommittee on Patents, Trademarks, and Copyrights, 85th Cong., 2d Sess.); **W. Nordhaus, Invention, Growth, and Welfare** 70-90 (1969); Markham, Inventive Activity: Government Controls and the Legal Environment, in **The Rate and Direction of Inventive Activity** 587-608 (1962) (National Bureau of Economic Research Report); Scherer, Nordhaus' Theory of Optimal Patent Life: A Geometrical Reinterpretation, 62 **Am. Econ. Rev.** 428 (1972). Often, however, the dependence of this derivation upon practices permitted to patentees is not made explicit. Scherer's treatise seems to be a possible exception. See **F. Scherer, Industrial Market Structure and Economic Performance** 442 (2d ed. 1980) ("On a more sophisticated plane, the problem is to design a system -- e.g., by adjusting the length or strength of patent grants -- that will yield the maximum surplus of benefits over costs." (Emphasis added.)).

will be summarized briefly in Section D. Section E sketches some limitations

in applying the analysis of this Part in the context of court

decisionmaking.

A. The Optimal Patent Life

1. The Costs and Benefits of Varying the Patent Life :

The problem of determining the optimal patent life[25] is conceptually quite

simple. It should be set such that any further increase in the patent life

would increase the cost of the system by more than the benefits that would

accrue, and conversely any decrease should decrease the benefits by more than

the costs.[26] Thus, the initial steps in the analysis involve defining the

functional relationship between the patent life and the costs and benefits of

the patent system. As noted previously, in order to perform this task, it is

necessary to know which practices of patent exploitation are permitted,

including the content of patent-antitrust doctrine. Thus, for the remainder

of this section, it will be assumed that some such legal regime is in place.

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25. This discussion, like most of the analysis in this part, assumes that a
single patent life will be established for all patents. Thus, the
relationships to be described refer to the aggregate of all inventive
activity subject to the patent laws rather than to individual inventions,
types of inventors, or particular industries. See generally subsection E-1
infra.

26. See generally Markham, supra note 24, at 597; W. Nordhaus, supra note 24,
at 76-96. As a technical matter, the marginal costs and benefits should be
precisely equal at the optimum, assuming the conditions described in the
appendix are satisfied. See subsection A-2 infra. For any discrete change,
the condition described in text would hold if, for example, the cost function
rises at an increasing rate (abstracting from the need to discount both
streams) and benefits are subject to diminishing returns, which seems quite
likely. See note 32 infra.

Determining the relationship between the patent life and the benefits of the patent system involves evaluating a number of connections. First, increasing the patent life presumably increases the reward to the patentee. How much the reward will increase depends upon a number of factors, including the value of the invention, the structure of the market involving the patented process or product, and the attributes of the patentee that determine its range of options within that context.[27] Second, increasing the amount of the reward is designed to increase the amount of inventive activity. How much the activity increases and what kinds of activity are affected are complicated problems that obviously vary substantially from case to case. Relevant factors include the promise offered by further research and development, the risk involved in the undertaking, the nature of rivalry among firms, and the degree to which the enhanced reward to successful patentees is anticipated by inventors. Third, increasing inventive activity affects social welfare. To the extent valuable new inventions are discovered that otherwise would not have been developed, or not developed as soon, social welfare is increased. However, any benefits of inventive activity must be evaluated net of their direct costs. For example, some induced inventive activity is duplicative, with the result that the net gain in welfare from the invention is less than it otherwise might have been, and it

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27. An example of the latter would be that the productive capacity of a patentee may determine whether it is feasible to produce all of the patented produce itself or instead it must license the patent if it wishes to cover the entire market. See note 38 infra.

28. See, e.g., F. Machlup, supra note 24, at 51; Loury, Market Structure and Innovation, 93 Q. J. Econ. 395, 406-07 (1979); Usher, The Welfare Economics of Invention, 31 Economica 279, 286 (1964); Wright, The Economics of Invention Incentives: Patents, Prizes, and Research Contracts, 73 Am. Econ.

is possible that the net for some inventions would be negative.[28]

Each of these connections has received substantial attention in the past, mostly by economists. It is all too obvious that our knowledge of the functional relationship between patent life and benefits from increased activity is quite limited.[29] I make no attempt here to contribute to that understanding, although much of the rest of the paper will be relevant to the first connection -- between patent life and reward -- and some passing comments will be offered concerning the other connections as well. Rather, I intend to proceed for the moment on the assumption that we have already made our best attempt, given existing information, to define this functional relationship.

The patent system imposes costs in addition to the direct costs of research and development activities. In particular, the reward described in developing the relationship between patent life and social benefit arises from allowing monopoly. How much loss results from the legal monopoly will again depend upon the particular invention, market structure, and attributes of the patentee, as well as the legal rules regulating patent exploitation. The longer the patent life, the greater these costs. The increase in patent

n. 28 cont. **Rev.** 691, 691 (1983). There are numerous other considerations as well, such as whether inventions are developed too quickly, and thus at greater cost, see Barzel, Optimal Timing of Innovations, 50 **Rev. Econ. & Stat.** 348 (1968), or whether private actors are more or less prone to taking risks than seems socially optimal, see Arrow, Economic Welfare and the Allocation of Resources for Invention, in **The Rate and Direction of Inventive Activity**, supra note 24, at 609, 611-14.

29. See, e.g., **W. Nordhaus**, supra note 24, at 81-82 (sensitivity of optimal patent life to changes in parameters of the system). But see id. at 83-86 (although determination of optimal live is extremely difficult, welfare effects of departing from the optimal life may be insignificant).

life necessary to induce further inventive activity increases the period of monopolistic exploitation on all patents that would have been forthcoming absent the increase. As to those inventions, the effect of the increase in patent life is a social loss not offset by any social benefit.[30] At this point, it will be assumed that the functional relationship between patent life and monopoly cost is known, although later analysis will address how monopoly cost varies in different circumstances.

2. Determining the Optimum

The functional relationships between patent life and social costs and benefits enable us to determine the optimal patent life from an economic point of view.[31] The simple rule is to set the patent life such that the ˙ ˙

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30. See, e.g., F. Machlup, supra note 24, at 55. One reservation concerns incentives to invest in the development process. See page 39 and note 74 infra.

31. Throughout, this paper explicitly takes this limited perspective; the economic point of view represented here is itself a narrow version. Standard reservations concerning the use of cost-benefit analysis, including the failure to account for distributional effects, see, e.g., W. Nordhaus, supra note 24, at 76 n.9, should be kept in mind. Moreover, concerns over the effect of inventive activity on the quality of life, whether through the speed of technological change, effects on preferences, externalities (such as pollution), or contributions to the emphasis society places on defense activities, are not addressed.

32. Whether such an interior solution will exist depends upon the relative slopes of the marginal cost and benefit functions. It seems plausible, although by no means a necessary conclusion, that the marginal cost function will be rising with the patent life and that the marginal benefit function will be falling. As to the marginal benefit function, one might expect diminishing returns as further resources are devoted to inventive activity. The effect of rivalry leading to duplicative investment, see sources cited at note 28 supra, may contribute to diminishing returns. In addition, since inventive activity is risky and private entities generally exhibit at least some risk aversion, the risk deterrence effect, which is proportional to the cost of the project, would also indicate diminishing returns.

The basic reason one might expect the marginal cost of increasing the patent life to be an increasing function is that the greater the patent life, the greater is the number of patents already in existence, and thus the greater the social cost of increasing the period of monopoly exploitation of pre-existing patents. This is not, however, a necessary result, as it depends upon the curvature of the relationship between the patent life and the level of inventive activity. Ignoring this effect would imply that, as a first approximation, the cost function is linear. Since a number of inventions would occur even without the patent system, even the first year of permitted patent life thus imposes substantial costs, and it is therefore possible that the optimal patent life would be zero. See F. Scherer, supra note 24, at 443-44.

A number of qualifications are in order. One is that since costs must be discounted to the present, future costs are less detrimental than present ones. This will not affect the analysis that compares the marginal costs and of changing the patent life since the reward, which feeds into the benefit function, is similarly discounted by the patentee -- so long as the discount rates are the same, see Nordhaus, supra note 19, at 429. Otherwise, there could be some effect, the direction depending upon which discount rate was larger. That the pattern of costs and benefits do not match year-to-year does not in itself disturb this argument since the decision involves extending the patent life at the margin, which compares costs and benefits in the same year. However, since the marginal extension may change exploitation decisions in earlier years, this neutrality to the discount rate is not completely correct, although it seems reasonable as a first approximation.

Second, allowing patents for more years does not simply replicate the previous year's experience. For example, the market structure after expiration of the patent may be affected by the patent's duration, especially if there are learning by doing effects over the life of the patent. See F. Scherer, supra, at 423. Although such effects do vary with the life of the patent, there is no reason to believe that the relationship is strictly linear. A third factor is that other inventive activity relevant to the initial patent may occur over the life of the patent, thus changing the environment. This will tend to affect both the cost and benefit functions; the issue is explored in one context in Part V infra. Fourth, market structure may be changing for a number of other reasons over time.

The idea that the cost function is roughly linear as a first, simplified approximation -- i.e., ignoring that more patents exist when the patent life is longer -- can profitably be compared to the benefit function which was hypothesized to exhibit diminishing returns. In general, cost and reward (by contrast to benefit) to any individual patentee increase in approximately the same proportion as the patent life is increased. This view is consistent with the qualifications concerning the linearity of the cost function since those same qualifications will have roughly similar impacts upon profits, i.e., rewards. The relationship between reward and benefit, operating through the connection between reward and inventive activity, and between activity and benefit, presumably exhibits diminishing returns. Thus, it is reasonable to expect that equating marginal costs and benefits would yield a unique solution that would be a maximum, unless marginal costs exceeded

marginal cost equals the marginal benefit.[32] If the patent life were shorter than indicated by this rule, the marginal benefit presumably would exceed the marginal cost.[33] Increasing the patent life further would produce benefits in excess of the social cost, so the patent life would have been too short. Similarly, if the patent life were longer than indicated by the rule that marginal costs and benefits should be equated, the marginal cost presumably would exceed the marginal benefit. This time decreasing the patent life would reduce costs by more than the reduction in benefits, so the patent life would have been too long.

Those familiar with this optimization technique are well aware that equating costs and benefits _at the margin_ does _not_ result in equating _total_ costs and benefits. In fact, the latter guideline would be rather silly, since it would imply that the entire patent system was a wash in terms of having any effect on social welfare. The optimum is where the social benefits exceed the social costs by the greatest possible amount. Thus, all that can be known about the relationship between total benefits and costs at the optimum is that the former exceed the latter, for if they did not, we

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cont.
marginal benefits when patent life was zero, making the interior solution only a local optimum -- the global optimum would be a patent life of zero, i.e., no patent system.

33. _See_ note 32 _supra_.

34.

    No economist, on the basis of present knowledge, could possibly state with certainty that the patent system, as it now operates, confers a net benefit or a net loss upon society. The best he can do is to state assumptions and make guesses about the extent to which reality corresponds to these assumptions.

would be better off with no patent system at all.[34]

3. Proportionality Between the Value of the Patent
and the Permitted Reward

Focusing on the components of this optimization process unveils much of the mystery surrounding the common view that patent restrictions should provide the patentee reward in proportion to the value of its patent.[35] This view does have superficial appeal in two respects. First, as between two patentees, it would generally be true that the one with the more valuable patent should receive the greater reward since it is desirable to encourage the more valuable invention even if it should have greater cost. This sort of proportionality has limited implications. It provides no information concerning what the proportion between reward and value should be; it only

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cont.

> If one does not know whether a system "as a whole" (in contrast to certain features of it) is good or bad, the safest "policy conclusion" is to "muddle through" -- either with it, if one has long lived with it, or without it, if one has lived without it. If we did not have a patent system, it would be irresponsible, on the basis of our present knowledge of its economic consequences, to recommend instituting one. But since we have had a patent system for a long time, it would be irresponsible, on the basis of our present knowledge, to recommend abolishing it.

Machlup, supra note 24, at 79-80; see also J. Jewkes, D. Savers & R. Stillerman, The Sources of Invention 253 (1962) ("It is almost impossible to conceive of any existing social institution so faulty in so many ways. It survives only because there seems to be nothing better."); Markham, supra note 24, at 598-99.

35. See, e.g., Sections III-C and III-D infra.

36. Even this limited claim is subject to numerous qualifications to the extent that various factors distinguishing patents and patentees can be used in developing a more case-specific policy, or if variations in any of the relevant factors are systematically correlated with the value or cost of inventions. An example of the second may be risk aversion. See generally subsection E-1 infra.

suggests that this proportion should be roughly similar for all patents.[36]

Moreover, most restrictions on patentee behavior a priori have no systematic

effect that is in conflict with such proportionality.[37] In some

circumstances, one patentee may not be able to exploit its patent in the

manner that others employ without resorting to a prohibited practice, in

which case permitting the practice would promote this sort of

proportionality.[38] In other instances, only some patentees would be able to

obtain most of the rewards made possible by a particular practice, in which

case prohibition would enhance this sense of proportionality.[39]

A more important reason why it appears that the reward permitted should be

linked to the value of the patent is that it corrects the market in a manner

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37. In fact, this assists Bowman in seeing most restrictive practices as
indistinguishable. Thus, he has no difficulty moving from the generally
accepted view that some patent exploitation should be permitted to the
conclusion that virtually unlimited exploitation should be permitted. And,
had he applied this analysis to the patent life, he would have concluded that
it too should be unlimited. However, the inability to make distinctions on
this ground only leads to his conclusions if no other distinctions are deemed
relevant. Section B develops systematically the distinctions that are
relevant. For a more complete discussion of Bowman's views, see Section
III-C infra.

38. One set of situations is where a small patentee needs various
restrictions to mimic what a large or dominant entity could accomplish
through unilateral exploitation. See generally F. Scherer, supra note 24, at
449. Of course, if restrictions were thought to be undesirable, another
response to this situation might be to limit the scope of permissible
single-firm exploitation. Although in some instances this may not be
practical, it does not follow that equality achieved through permitting
restrictive practices is preferable, since two wrongs, although perhaps more
equitable, may not be more desirable.

39. Practices facilitating price discrimination might be an example of both.
As to the former, some patentees may be unable to effectuate price
discrimination unless permitted to impose such restrictions. The latter
point is made by noting that even if such practices are permitted, there will
be still other patentees unable to discriminate effectively.

that induces private actors to develop the appropriate inventions. Absent

patent protection, the problem is that the inventor may only capture a small

portion of the value of its inventive activity, and thus not expect to

receive rewards sufficient to cover its costs, even though those costs do not

exceed the social value of the invention. This suggests that the appropriate

policy would be to permit the patentee to capture reward equal to the full

value of its patent. Any additional reward up to that point can only induce

inventive activity where the expected reward, which equals the expected value

of the invention, exceeds (or at least equals) the expected cost of the

patent.[40]

If one accepted the argument just described, it would suggest that the

optimal policy would be an unlimited patent life without any restrictions

upon practices of exploitation, so long as the latter did not permit reward

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40. Any inventive activity induced by rewards beyond that point would be
those for which the expected cost exceeded expected value. However, if
inventors are risk averse it might be appropriate to offer an expected reward
in excess of the value of the patent.

41. This statement is not fully accurate. For example, rivalry that led to
duplicative research activity might justify reducing the reward. And private
benefits may generally exceed social benefits even without patent
protection. See Hirschleifer, The Private and Social Value of Information
and the Reward to Inventive Activity, 61 Am. Econ. Rev. 561 (1971). Adding
the possible adverse effects from long-run changes in market structure
occurring over the patent life reinforces this conclusion concerning the
relation of private to social benefits, and adds another element to
aggregrate social cost. One offsetting tendency is that if spillovers from
the patentee's research are not included in determining the value of the
patent, there would be a tendency for the reward based on value so measured
to be insufficient. This issue is relevant to determining the appropriate
breadth of the patent grant. All these qualifications do not affect the
argument in text, which establishes that even further reductions in reward
will always be appropriate. Of course, it is possible that after taking all
these effects into account, the patent system would be unnecessary.

beyond the total value of the patent.[41] There is a simple, but thoroughly destructive flaw in this position: it overlooks the costs of providing the reward. Using the preceding framework, this proportionality view refers to the maximum of the social benefit function viewed in isolation. The real concern, however is with <u>net</u> social benefits, i.e., the excess of benefits over costs. It should not be surprising that ignoring the costs of the patent system, including the costs of antitrust restrictions, would simplify the analysis. Taking those costs into account leads to the more accurate intuitive view that in the optimum patent life combined with the optimum set of antitrust restrictions would provide <u>less</u> reward than indicated by the full value of the patent.[42] Thus, reward not exceeding the value of the patent is a necessary, but not sufficient condition for permitting a practice.[43]

Optimization through equating marginal cost and benefit will yield some average proportion between reward and value of the patent. But that relationship, which refers to <u>average</u> rather than <u>marginal</u> conditions, is an informational by-product of the optimization process. The proportionality view implicitly begins by picking a proportion between reward and value and using it as a decision rule. This process is both conceptually backwards,

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42. <u>See, e.g.</u>, F. Machlup, <u>supra</u> note 24, at 39, 62-66; W. Nordhaus, <u>supra</u> note 24, at 88-89; F. Scherer, <u>supra</u> note 24, at 442.

43. A reservation is necessary if spillovers from the inventive process were sufficiently great to overwhelm all the effects discussed in note 41 <u>supra</u>.

44. Using a proportion less than one is little help. First, such an approach offers no answer to the conceptual question of where such a proportion should come from. Even the most modest policy recommendations along the lines of the cost-effectiveness analysis described in subsection B-1 <u>infra</u> will be

and, since the assumed proportion typically is one,[44] is surely wrong in its
implications.

Moreover, once it is observed that the optimal proportion is less than one,
it becomes obvious that there is not only the need to regulate the total
reward a patentee receives, but also the means by which that total is
realized, which brings us to the issue of patent-antitrust doctrine. To
illustrate, it may be that permitting one restrictive practice will reward
one group of patents at moderate cost while permitting a different
restrictive practice will reward another group of slightly more valuable
patents only at a massive cost. It might then be appropriate to permit the
former practice and not the latter, in direct violation of any strict
principle of proportionality. This observation is generalized in Section B.

B. Patent-Antitrust Doctrine and the Ratio Test

1. Deriving and Interpreting the Ratio Test

Section A, in deriving the optimal patent life, took as given a

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seen to depend on far more subtle information. See the appendix at pages
142-43. Second, the only conceivable virtue in the proportionality test is
its ease of application. However, it is only easy to apply when the
porportion is one. The typical argument, see, e.g., Section III-C infra, is
that a licensee's or buyer's willingness to deal with the patentee implies
that the reward is less than the value of the patent -- i.e., that the
proportion of the reward to the value of the patent is less than one. Such
an observation offers no basis for the inference that the proportion is less
than some smaller number (e.g., .6). Making the latter inference would
require far more detailed information concerning not only the rewards but
also the value of the patent. The latter could prove most difficult. See
also subsection E-2 infra.

patent-antitrust doctrine[45] that indicates the scope of permissible patent

exploitation.   This   Section   will   address   the   question   whether   that

configuration of doctrine is optimal taking as given the patent life thus

derived.[46]

Assume, for example, that the optimal patent life had been calculated at 17

years.   If the question were whether to permit a currently forbidden

practice, it would be appropriate to compare (1) the effects of that practice

in terms of both the costs it imposes and the rewards it brings to the

patentee with (2) the effects in terms of costs and reward of lengthening the

patent life.   Suppose further that the patent life would have to be

lengthened to 18 years in order to produce the same additional reward that

the practice in question can offer for the given 17 year patent life.[47] If

the practice imposed more loss in order to get the additional reward than

would have been imposed in order to achieve the same additional reward

through lengthening the patent life to 18 years, the practice should not be

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45. There are other doctrines, such as rules governing patent misuse, aspects
of contract law, etc., that regulate patent exploitation. They are taken as
given in a literal sense for the purposes of the discussion in this paper.
However, the analysis herein is fully applicable to those issues as well.

46. Section C will relax this restriction. As will be noted in the course of
that discussion, there is a sense in which this restricted view of the
problem corresponds to the situation facing courts who have jurisdiction to
articulate patent-antitrust doctrine, but must accept the patent life set by
Congress.

47. The implicit assumption in this analysis, and much to follow, is that
reward is fungible. See subsection B-2-c infra. In other words, patentees
do not care how they get their profits, but simply how much profits they
receive. Divergences from this assumption are considered in subsection 2-c
infra (ex ante versus ex post, for example) and in Section IV-A infra
(non-maximizing behavior).

permitted. The reason is simple: permitting the practice is inferior to
extending the patent life as a technique of enhancing reward, and the
conclusion that a 17 year patent life was optimal implied that extending the
patent life to 18 years is undesirable; hence, permitting the practice is
undesirable. On the other hand, if the practice in question would produce
the same reward at a substantially lower cost, it would follow,: roughly
speaking,[48] that it should be permitted.

Analysis should thus focus on the following ratio:

$$\frac{\text{Patentee Reward}}{\text{Monopoly Loss}}$$

Practices yielding higher ratios are preferable. This is true not only for
restrictive practices, which are the subject of patent-antitrust doctrine,

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48. This qualification may be quite important, and its consideration is
largely the content of Section C. Briefly, the problem is that the cost of
the practice being lower than the cost of extending the patent life to 18
years is a necessary but not sufficient condition for the practice to be
desirable because extending the patent life to 18 years was itself found
undesirable. If the practice yielded less loss for a given amount of reward
than the 17th year of patent life, then it would be desirable to permit the
practice, perhaps accompanied by shortening the patent life. The problem
arises because although marginal benefits and marginal costs are precisely
equal at the optimum, changes in the life of the patent by one year are not
discrete changes just as an all-or-nothing decision to permit a practice
previously prohibited is not a discrete change. Thus, it may be that
permitting the previously forbidden practice would be superior to extending
the patent life by a full year, but still not sufficiently low in cost in
order to warrant implementation. A discrete increase in the amount of the
reward reduces the marginal benefit of further increases in the amount of the
reward, due to the diminishing returns assumption, see note 32 supra. Hence,
an infinitesimal increase in reward using a particular practice may be
desirable whereas full adoption of the practice, which may be the only
practical alternative to prohibition, may not be. For a given ratio, the
greater the increase in the reward from allowing the restrictive practice,
the less likely it is that the change will be desirable, ceteris paribus, due
to the diminishing returns of the benefit function.

but of changes in the patent life as well. The technique just described for determining the appropriateness of restrictions can be summarized in terms of this simple ratio as follows. One first determines the ratio implicit in the optimization of the patent life. It is crucial to note that this ratio is that of marginal reward to marginal cost (marginal monopoly loss) rather than marginal benefit to marginal cost, the latter having been the one relevant when determining the optimal patent life.[49] The reason is that this Section's analysis takes the optimal patent life as given, and asks whether the reward thus provided can be achieved at a lower cost.[50]

For example, if the patent life were 17 years, one could look at the amount of reward and monopoly loss that would result from extending the patent life

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49. Of course, at the optimum, this latter ratio equals one since marginal costs and benefits are equated. The difference in these ratios can most clearly be seen using the notation in the Appendix. See note 332 infra and accompanying text.

50. Alternatively, one could ask whether additional reward can be produced at the same cost. These formulations are equivalent in some circumstances. They would diverge here only if, after some point, additional reward rather than further increasing social benefit actually caused it to diminish. However, since the optimum patent life will be short of this point, given the costs of the patent system, see page 24 supra, the alternative formulation would hold, unless the extent of the change in reward caused by permitting a previously prohibited restrictive practice were substantial, see note 48 supra.

51. Instead, one could do the same for the seventeenth year. The issue discussed in the preceeding footnote arises precisely because these two ratios might differ. Practices having an effect on reward less than the effect resulting from a one year change in the patent life, roughly speaking, can be unambiguously characterized so long as their ratio exceeds or falls short of the ratios for both the 17th and 18th years of the patent life. Ambiguity arises if they fall between. Since the ratios for the two years are probably rather close, this problem may not be very significant.

A further qualification arises with respect to the assumption that the impact of the practice on reward be less than or equal to the impact of a one

to 18 years, thus yielding a ratio of reward to loss for the eighteenth year.[51] This ratio can now be compared to the ratio for any given restrictive practice.[52] Practices with higher ratios should be permitted, and those with lower ratios prohibited.[53]

This method of analysis is important because the ratio will not be the same for all restrictions. Two examples, to be discussed at length later in this paper, should illustrate the point. At one extreme, consider a patentee that has invented a minor process improvement, but arranges a price-restricted

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n. 51 cont.   year change in the patent life, moving from the optimum life. The problem is that if more than one practice may be changed from the pattern assumed to have been in place while deriving the optimum, it would be necessary that the total effects of all the changes fall within the necessary boundary. This issue is the topic of Section C.

52. See F. Machlup, supra note 24, at 73 (discussing compulsory licensing).

53. See the qualifications presented in note 51 supra.

It is also useful to ask what the result should be if there existed a practice for which the ratio was high, but the reward was in excess of the value of the patent. Since there would be a large effect upon the total reward, there would be a need for a corresponding downward adjustment of the patent life. The result would be to permit massive reward, but only for a brief period of time. So long as the ratio for the practice is higher than the ratio implicit in the patent life, this trade-off would be beneficial. This conclusion may appear to contradict the earlier point that reward being less than the value of the patent is a necessary condition for the desirability of permitting a practice. See subsection II-A-3 supra. The paradox can be resolved by noting that the value of the patent is typically viewed in a static sense; i.e., when it is said that reward exceeds the value of the patent, it is usually meant that the reward for a given time period (say a year) exceeds the value contributed by the patent during that same time period. However, that relationship does not imply that the reward for the given time period exceeds the total contribution of the patent over the entire useful life of the invention. Hence, apparently excessive rewards are given for some time periods and no rewards in others, with the result that the total reward over the readjusted patent life is less than the value of the invention over its useful life (which in this case would have to be longer than the patent live) even though at any instant of time during the brief patent life, reward would exceed value.

license covering the entire industry and sets prices substantially above those prevailing prior to the licensing agreement. Assume further that the royalty is rather small, in line with the significance of the invention. Here, the patentee's reward will consist of the modest royalty payments and a share, in proportion to its share of the market, of the excess profit resulting from the cartel prices. Unless the patentee has a very high market share, its reward from being permitted to use this scheme will be moderate by comparison to the total loss imposed, and thus the ratio will not be very high.[54] Contrast this with a patentee that increases its profits by charging discriminatory royalties to users of its invention in different industries. Permitting this sort of price discrimination may well result in minimal adverse effects, aside from the transfer of surplus from the buyers to the patentee. The ratio in this example would clearly be higher than in the first.[55]

Even if the ratio implicit in the optimized patent life could not readily be determined, some cost-effectiveness analysis would still be possible. In principle, one could derive the ratio for every sort of restriction, and

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54. See generally subsection 2-b and Part IV infra. To the extent the patentee already has a very high market share, its ability to increase price above the competitive level will often not be substantially enhanced by such a cartel arrangement. See Landes & Posner, Market Power in Antitrust Cases, 94 Harv. L. Rev. 937, 951-52 (1981).

55. See generally subsection 2-a and Part VI infra. If perfect price discrimination were possible, there would be no deadweight loss from the patent system (subject to the reservations indicated in notes 28 and 41 supra), which is suggestive of the conclusion that direct price discrimination should be viewed more favorably than other restrictive practices. The reservation pertaining to the resulting increase in the total reward, see note 48 supra, is, however, applicable.

order them from highest to lowest. This would be useful from either of two perspectives. First, regardless of what implicit patent life ratio is assumed, it would be clear that improvements might be possible by shuffling the extant pattern of restrictions. For example, a currently permitted practice with a low ratio might be traded against a currently prohibited practice with a high ratio. If the total reward provided remained approximately the same as a result of such modifications, one could unambiguously conclude that the changes as a whole were beneficial, even though it may be impossible to know whether any single change were desirable.[56] This process essentially amounts to cost-minimization since the changes in patent-antitrust doctrine provide the given amount of reward at the least possible cost.

A second, closely related perspective deriving from the analysis in Part I appears more powerful, but ultimately fails in providing any guidance absent information concerning the determination of the optimal patent life. In response to the question of how the courts should go about providing a reward of X + 5, there would be a determinate answer. Courts would move down this ordered list of ratios, permitting those practices with the highest ratios, and stopping when they reached the point that the aggregate reward was X +

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56. In fact, if the ratios for two restrictions were sufficiently close to each other, and to the ratio implicit in the optimum patent life, it would be possible that both changes, if taken in isolation of the other, would be undesirable.

57. Of course, to the extent the decision concerning the permissibility of each restrictive practice is an all-or-nothing choice, see subsection E-1 infra, this could not be done precisely since the change that moves the total reward up to X + 5 may overshoot somewhat, requiring some shuffling to get as close as possible at the elast possible cost.

5. [57] The conclusion that no restrictive practices are permitted if that regime still provides a reward above the target, whereas all practices are permitted if that still leaves a reward short of the target, would just be special cases of this approach. It should be apparent, however, that obtaining knowledge of all the appropriate ratios, which will be seen to be a most formidable and controversial endeavor, will not be sufficient to determine any doctrine[58] unless one begins with a target for how much incentive is appropriate. Section A examined how the appropriate reward could be determined. However, the reward implicit in the optimum patent life was not itself the target of the optimization process, but rather one of its by-products.[59] For example, whether it is appropriate to permit the 17th year of exploitation was not determined by asking whether the target total for appropriate reward had yet been reached by permitting a 16 year patent life. Rather, the question was whether permitting a seventeenth year increased social benefits by more than it increased social costs. It was that determination that fixed the total patent life, and that patent life

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58. The exception would be where the denominator were zero or negative, in which case antitrust considerations alone would permit the restriction so there would be no conflict, or where the numerator were zero or negative, in which case patent policy in addition to antitrust policy would be impinged by permitting the restriction. In these exceptional cases, there is no direct conflict between patent and antitrust policy. Even this exception must be qualified if the marginal social benefits of increasing patent reward were negative.

59. Compare the discussion of the proportion of reward to the value of the patent at page 24 supra.

60. It will be recalled that the social benefit function connects patent life to reward to inventive activity to ultimate benefit. The optimization chooses a particular patent life, and the implicit total reward is determined simply by reexamining the functional relationship that corresponds to the first connection.

that implicitly determined the total reward.[60]

2. Factors in Applying the Ratio Test

As will be demonstrated in Parts IV through VII, there is much disagreement over the effects of various practices. This paper makes only modest attempts to resolve such controversies. Instead, the focus is upon how one should evaluate a practice once one has determined its effects. This section discusses three recurring issues relevant to determining the ratio for particular practices. It will be seen that some past intuition and insight that has been brought to bear on the patent-antitrust conflict indicates awareness of the relevance of these factors. This subsection, in combination with the rest of this Part, indicates precisely how these issues should be placed in a comprehensive framework.

a. How Much of the Profit Is Pure Transfer?

It is helpful to consider this question as a simple generalization of the price discrimination example previously discussed. The point here is not to argue the merits of transfering wealth from consumers to producers in general, or to patentees in particular. These considerations are directly relevant to the construction of the social benefit function described in subsection A-1. One undertakes further analysis along the lines analyzed in this paper only after having decided in favor of some such reward. Given that a practice yields reward to the patentee that is thus deemed appropriate, the next step would be to consider its cost. To the extent that the reward is accomplished through a pure transfer, i.e., with no accompanying misallocation of resources or inefficiency in production, the

cost is kept to a minimum. One way to view this is to say that, for a given numerator of the reward/monopoly loss ratio, it is best to minimize the denominator if one hopes to maximize the ratio.

An alternative perspective yields the same result. Assume we know how much a given restraint is costing society. Given the cost, however high, one would hope that the corresponding gain was as great as possible, and the greater the portion of the expense to various groups that is transferred, rather than lost through inefficiency, the better the situation.[61] This perspective considers a fixed denominator, and notes that the more the restraint results in pure transfer, the greater is the numerator, and thus the higher the ratio. From either viewpoint, restrictions that are closer to pure transfers are to be preferred to those that are not, ceteris paribus.

b. What Portion of the Profit Acrues to the Patentee?

This question has two components. The first focuses on how much of the profit accrues to entities other than that which is exploiting the patent. The earlier example of the price-restricted license used to cartelize the industry demonstrates this point. There, other firms in the industry shared in the reward roughly[62] in proportion to their share of the market. Simply put, to the extent that some of the profit accrues to others, the numerator is smaller for a given denominator, and thus the ratio is smaller as well.

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61. Again, there is a qualification necessary if the marginal benefits were to become negative.

62. This will not be true to the extent of any royalties paid to the patentee by other firms in the industry.

The relevance of this simple principle has been noted previously, although the analysis indicating why the factor is important generally has been inaccurate or incomplete.[63]

A second component, which has been largely overlooked by courts and commentators alike, focuses on how much of the reward acrues to the patentee in those instances in which the patentee is not the entity exploiting the patent. For example, to the extent that some patentees must assign (sell) their rights for prices that do not reflect the true value of their inventions, permitting the assignees to reap a greater harvest may do little to stimulate innovative activity.[64] This issue also arises to some extent when a patentee licenses its invention, since the return to the licensee may not all be transmitted to the licensor. There are three reasons why this consideration might not have occupied a higher place on the patent-antitrust agenda. First, one might argue simply that patentees who assign their rights receive a price based upon the value the buyer expects to receive in exploiting the patent, which in turn is directly based upon the rewards as previously discussed. It is not obvious, however, that the market for the sale of inventions functions in a way that passes through all the reward to

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63. See, e.g., sources cited in note 176 infra. The problem is that they generally do not understand precisely how this factor is relevant, relying on proportionality notions rather than the ratio test. These tests are distinguished in this context in Section IV-B infra. See also note 53 supra.

64. But there is also the need to discuss the reward for exploitation itself. See page XXX infra.

65. See generally Caves, Crookell & Killing, The Imperfect Market for Technology Licenses, 45 Oxford Bull. Econ. & Stat. 249 (1983) (only 40% of surplus to licensor).

the patentee.[65] For many inventions, there may not be a large number of buyers.[66] More importantly, there may be substantial information problems relating to the difficulty of the seller in evaluating the potential for exploitation and of the buyer in evaluating the operational value of the patent. This problem is compounded to the extent the patentee or potential buyers fear that extensive discussion with prospective buyers that do not end up acquiring the patent may give them advance information on the patents exploitation, thus diminishing its competitive benefit, or make it easier for them to invent around the patent, at least by giving them a head start.[67]

A second reason why this consideration may not have come to the fore relates to the difficulty our legal system may have had in acting upon it. The implication of this issue in a given set of cases would be that a restriction that is permitted when practiced by the original inventor could be prohibited when practiced by a purchaser. Such a distinction seems to violate the command to treat like cases alike since the rule treats differently classes of similarly situated defendants. Although this formalistic objection has little appeal since the phrase "similarly situated"

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66. See id. at 250, 254. This problem only arises, of course, when the patentee cannot itself exploit the invention, either through licensing or directly. The latter will often be the case, especially for individual or small-scale inventors. The former may be true because of various costs in the licensing transactions and to the extent antitrust provisions limit licensing. In fact, that there are few buyers may indicate that there would be few licensees, or at least only a few for each use of the invention, in which case all the problems, not merely those due to information costs and other transaction costs, described in the text that arise in negotiating a sale would also arise in negotiating a license. This divergence will be magnified to the extent the antitrust laws limit the range of potential buyers. See generally Part V infra.

67. See id. at 250, 257.

begs the question, one can imagine that the argument may have inhibited the inquisitiveness of many courts and commentators.

This consideration is problematic for a third reason: it is terribly difficult to determine its significance in any given case, or in a broad category of cases that may lend itself to more general rules. It is for this reason, and because the information relevant to making the inquiry is typically not available in prior cases, that I will not explore the point further here. These issues have much in common with the factor to be considered next, as well as the issue raised in subsection E-1.

c. To What Degree Is This Source of Reward an Incentive?

Over the years, this difficult question has provoked much commentary but little in terms of confident conclusions.[68] Most of the discussion has focused on the general issue of the extent to which patent rewards serve as a stimulus to invention. It should be noted that this factor differs in kind from the proceeding two in that it moves beyond the terms of the ratio test itself. It will be recalled from subsection 1 that the ratio concerns _reward_ and loss. At that time, the numerator was distinguished from _benefit_, which was relevant in determining the optimal patent life. This factor focuses on the connection between reward and incentive, which was one of the links between reward and benefit. Such an examination brings into question the proposition that all reward can be treated alike, and asserts that some

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68. See, e.g., F. Machlup, _supra_ note 24, _quoted at_ note 34 _supra_.

reward may for some reason act as more or less of an incentive than another.[69]

Turner has advocated the position that since researchers, be they individual or corporate, "can make only the grossest calculation of whether the prospective rewards are likely to exceed the costs," and thus the marginal reward produced by patent exploitation that relies on restrictive practices is unlikely to have any substantial effect on inventive activity.[70] From this perspective, it is not irrational to focus solely on the denominator of the ratio, which asks essentially the antitrust question of whether monopoly loss results from a practice,[71] as Turner does in much of his discussion.[72] Turner's position, however, does not distinguish between the reward flowing from any one sort of restriction versus another, nor even on the difference between the reward flowing from some set of restrictions and an equivalent amount of reward that would flow from a corresponding increase in the patent life. Thus, his position is surely

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69. See note 47 supra.

70. Turner, The Patent System and Competitive Policy, 44 N.Y.U. L. Rev. 450, 459 (1969); see id. at 463. He states that "[i]t is doubtful that anyone who would be induced to invest in research in hopes of a thousand-to-one payoff would be deterred if the potential payoff were reduced to eight hundred-to-one." Id. at 459. Of course, depending upon the expected cost of the project and the probability of the payoff, this may or may not be the case. Moreover, Turner offers no support for his numerical estimates. This is not to say that his hunches are necessarily off track, for I do not believe that anyone else has been able to demonstrate convincingly the contrary.

71. Such a limited focus is discussed more generally in Section III-A, infra.

72. See Turner, supra note 70, at 461 (analysis based solely on antitrust policy), 463 (clearly indicating that the analysis to follow derives solely from antitrust policy).

relevant to the desirability of a patent system and the issue of how much reward it should provide since it directly addresses one of the connections between patent life and social benefit, but does not directly impact upon the proposed ratio analysis once such decisions have been reached.

It would be relevant to comparing restrictions, however, if some rewards had a greater incentive effect than others. One simple, although largely unexplored, reason why this might be the case concerns inventors' perceptions of the benefits of various restrictions before they undertake their research. This ex ante perspective is the relevant one since it is their perceptions before undertaking inventive activity that influence their decisions concerning that activity, not what is in fact received afterwards. Thus, if patents were abolished altogether, one might expect inventive activity to decrease in some quarters, whereas if the Supreme Court further limited restrictions through a series of decisions, there may be many inventors who would never be aware of the developments,[73] or of the benefit from such restrictions in the first place.

This factor also seems a difficult one from which to derive useful conclusions. A few generalizations are possible. One might expect some restrictions to be most relevant in the later development stages of an innovation, where investment (development) decisions are being made based upon practices that will be implemented in the immediate future or are

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73. See, e.g., F. Machlup, supra note 24, at 75 ("To be sure, restrictive licensing agreements can increase considerably the profits of a patentee. But, much as this might affect the value of his patents, it would hardly be taken into account at the stage when he plans his investment outlays for industrial research and development work.").

already being used.[74] Also one might expect regular inventors to better appreciate the value of some practices than those who have little experience with patent exploitation. Of course, it is also possible that regulars might realize that antitrust limitations in fact only minimally limit their reward while the less initiated, who know enough to know that various antitrust restrictions exist, may have overblown fears. As was the case when discussing patentees who sold their inventions to others for eventual exploitation, it seems necessary to formulate rules that vary depending upon the identity of the patentee if one were to implement these ideas, and the prospect of acquiring the relevant information seems equally unpromising.

C. Simultaneous Determination of Patent-Antitrust Doctrine and Patent Life

The technique described in subsection B-1 for determining the appropriate pattern for patent-antitrust doctrine by taking advantage of the ratio implicit in the optimum patent life it not wholly satisfactory. It will be recalled that the optimum patent life was determined in Section A <u>by taking patent-antitrust doctrine as given</u>. Now that Section B has permitted the patent-antitrust doctrine to be changed, it may no longer be true that the patent life derived in Section A is optimal. In general, to the extent the modification in patent-antitrust doctrine has changed the total expected reward available to patentees, a partial offsetting adjustment in the patent life will be appropriate. For example, if the adjustment in patent-antitrust

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74. <u>See generally</u> **F. Scherer**, <u>supra</u> note 24, at 440-41; Kitch, <u>The Nature and Function of the Patent System</u>, 20 **J. L. & Econ.** 265 (1977).

doctrine results in a greater scope for patent exploitation and thus greater reward for any given patent life, it would be appropriate to decrease the patent life from the level set in Section A.

That adjustment is not, however, the end of the story, for the now adjusted patent life may change some of the conclusions reached in Section B. After all, the patent-antitrust doctrine was determined by reference to the reward/loss ratio implicit in the optimum patent life, and if the optimum patent life changes, so may this ratio. The new ratio yields a further shift in patent-antitrust doctrine, which in turn feeds back on the patent life, and so on. Thus, it can be seen that, in general, setting the patent life and determining patent-antitrust doctrine are _interdependent_ questions. Put somewhat more technically, there is a need to solve the systems simultaneously.[75]

The following description indicates how one could view the process of reaching the simultaneous solution in a manner that seems less roundabout. Rather than defining the set of practices as only those subject to patent-antitrust doctrine, consider the broader set of practices defined to include each year of patent exploitation as well. Of course, for various reasons, it seems unlikely that one would permit the fifth year of patent exploitation and not the fourth, but that need not be of concern to this

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75. The formal solution to this problem is presented in the Appendix.

76. It need not be of concern because if there are indeed good reasons for this conjecture, the earlier years will always have higher ratios than the later years, and results that later years would simply never be selected before earlier years.

explanation.[76] One could now imagine ordering the ratios from highest to lowest for all the practices in this more broadly defined set. There is the complication that the ratio for each practice depends upon which others are assumed to be permitted, but this problem may be resolvable through the following sequential approach.[77] Begin with no exploitation allowed. The first practice that presumably would be permitted[78] is the first·year of exploitation.[79] One would then ask, given the first year, which practice, be it another year of exploitation or a restrictive practice subject to patent-antitrust doctrine, offers the highest ratio. That one would be added to the list and the next could similarly be selected, this time assuming that the first year of exploitation and the practice just selected are taken as given in determining the ratios of the remaining possibilities.[80] Continuing this process would yield an ordering of all the practices. One would then determine the social benefits and costs at each step along the way and find the point after which the marginal benefit of permitting further practices no

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77. There still may be reversals in such a process due to synergistic effects among various practices. This complicates the process but does not alter the ability to derive determinate results. See the discussion of this issue in the formal derivation in the Appendix at note 336 infra.

78. None would be permitted if the patent system, for any formulation of patent-antitrust doctrine, were undesirable.

79. See note 76 supra concerning the ordering of the years.

80. Each step along the way such ratios will be changing. For example, the reward and monopoly loss associated with practices governed by patent-antitrust doctrine may not increase in strict proportion over time. This might be the case because inframarginal consumers will have a greater incentive to seek alternatives the longer is the patent life. Their finding an adequate substitute does not decrease the welfare loss from the longer period of exploitation (and may increase it) but does decrease the reward to the patentee since there is less demand for its product.

longer exceeded the marginal costs. The practices allowed up to that point would be the solution, which would embody a patent life and a particular delineation of patent-antitrust doctrine.

The implications of the analysis in this section for the role of courts is rather complicated. The argument advanced is that patent life and patent-antitrust doctrine can only be determined in a sensible way if the analysis is done simultaneously. However, Congress set the patent life a long time ago, and has not changed it since the implementation of the antitrust laws. Thus, it does not seem that in fact courts can count on Congress to perform its half of the feedback loop.[81] Thus, the simplifying notion that Congress set the general contours by defining the patent life and left the details to be worked out by the courts is problematic. Simply put, since the optimal patent life depends upon how the "details" are worked out, there can be no presumption that the courts will arrive at sensible overall results relying upon the method outlined in Section B,[82] although the

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81. It is conceivable that no feedback is necessary if the courts have articulated the doctrine in the manner Congress predicted, which is a highly unconvincing conjecture since Congress no doubt did not think about patent-antitrust doctrine prior to the existence of the antitrust laws and since the courts have reversed their position on restrictive practices over time. More plausibly, if the impact of patent-antitrust doctrine on the total reward to patentees were very small relative to the total reward typically received from exploitation for the optimal patent life, there may by little need to adjust the latter in light of modifications in the former. There has been no attempt to determine whether this is the case, and in the instance of price discrimination, see Part VI infra, it seems unlikely. Moreover, if this were generally true, it would suggest that, in the grand scheme of patent policy, patent-antitrust doctrine is quite unimportant, unless practices resulting in massive monopoly losses were permitted.

82. This analysis suggests that the separation of functions is itself irrational in this context.

cost-effectiveness point developed there is still valid.[83]   If courts believed that Congress set a patent life that is too short or too long in light of the analysis performed in evaluating patent-antitrust restrictions, it might be appropriate to pursue a second best strategy of allowing more or less restrictive practices, respectively, than suggested through application of the ratio implicit in the current patent life.[84]

D. Summary of Guidelines

The conclusions relevant to courts that follow from the analysis in Sections A-C are as follows:

1. The ratio test, which focuses on the ratio of reward to the patentee to the monopoly loss imposed, should guide evaluation of restrictive practices. As among any group of such practices, those with higher ratios are to be preferred. Factors aiding in the application of this test to specific practices include:

    1. the extent to which the profit (reward) is pure transfer,

    2. the portion of the profit that acrues to the patentee, and

    3. the degree to which the profit serves as an incentive.

2. The ratio for each practice is itself insufficient to determine overall patent-antitrust doctrine. These ratios must be compared to that

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83. See page 31 supra.

84. This strategy is implicit in the discussion at in Part I.

implicit in the optimum patent life. There are two problems in making this comparison.

1. That ratio may be unknown or very difficult to determine.

2. That ratio is based upon a patent life that was derived taking patent-antitrust doctrine as given. Thus, the interdependence between the patent life decision and that concerning patent-antitrust doctrine must be addressed.

3. The notion that the restrictive practices should be evaluated by determining whether the reward exceeds the value of the patent is wholly misguided. In general, the reward should be less than the value of the patent. Moreover, in determining whether a practice should be permitted, the relevant inquiry is that indicated by the ratio test --i.e., whether the marginal increase in reward is substantial by comparison to the marginal increase in monopoly loss that results, and how that ratio compares to that for other restrictions and the existing patent life.

E. Limitations on Courts' Use of the Analysis

As is often the case when examining a problem in detail, asking the right questions begets more questions. The analysis described thus far may seem rather complicated. The following discussion indicates three respects in which the inquiry is even more intricate than may have been apparent. These difficulties are in addition to the problem of working out the appropriate role for the Courts in its interaction with Congress, as discussed in Section

C.

1. Further Case-by-Case Variations in the Applicability

of the Analysis

As has been indicated in making many of the above points, the applicability of some of the analysis varies case-by-case, depending not only upon the restriction employed, but also upon the nature of the patent, the attributes of the patentee, and the structure of the market. Thus, all the preceding discussion referred, either explicitly or implicitly, to the reward expected by the "typical patentee," or the cost imposed in the "typical situation" where a restrictive practice is employed. It seems clear, however, that a regime that provides a reward of $\underline{X}$, for example, to the typical patentee may provide far more than $\underline{X}$ to some and far less than $\underline{X}$ to others. The effect will be to substantially overreward some activities and underreward others. Moreover, the ratio test implicitly refers to some typical ratio for a given restriction; it may be far higher in some instances than others. How much difficulty this variance causes will depend substantially on ex ante perceptions. To the extent that prospective inventors are unaware of which situation they will be in, the average tendencies will be the most relevant indicators, subject to the qualifications noted previously.[85] On the other hand, prospective inventors who know that they will benefit more or less than the average would presumably take that information into account, and thus it would be desirable if the rules could also be adjusted accordingly.

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85. See note 32 (risk), page 35 (when patentee is not the one exploiting the patent), and subsection B-2-c (extent to which reward is an incentive) supra.

In a parallel fashion, it was assumed that the policy instruments available

to courts and Congress were quite limited. Congress was assumed to choose a

single optimal patent life, rather than a different life for different

industries, different sorts of inventions, and different classes of

inventors.[86] Courts were assumed to permit or prohibit practices according

to what essentially were hypothesized to be a pattern of per se rules. Of

course, the rules could be further and further refined to adjust for market

conditions, the nature of the invention, and the like.[87] It would be

possible to consider any degree of refinement on these assumptions, and the

same analysis would apply.[88] Of course, any attempt to apply more

case-specific rules would further complicate an already difficult problem

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86. See, e.g., Markham, supra note 24, at 602.

87. Moreover, in reference to the problem relating to discrete versus
infinitesimal changes, see notes 48, 50, 51, and 57 supra, courts in theory
could rely upon a mixed strategy where they chose different outcomes with
pre-determined probabilities. This would make all of the previous
complications vanish since the functions would now be continuous. Of course,
in the process, an additional risk consideration would be introduced, in
addition to increased administrative costs.

88. In theory, direct award systems are preferable because they avoid the
monopoly costs associated with a patent system. The primary reason for
reliance on a patent system is that it is not possible to determine the
appropriate level of reward on a case-by-case basis. Thus, the more it is
thought possible to vary the patent life and rules of exploitation
industry-by-industry and case-by-case, the less is the warrant for rewarding
invention through a patent system.

89. See, e.g., Stedman, The Patent-Antitrust Interface, 58 J. Pat. Off. Soc'y
316, 325-26 (1976) (emphasis omitted):

> The courts, for whom avoidance is not so easy, have usually
> chosen the per se approach in pure or slightly modified form.
> ... Occasionally, it is true, the courts have invoked a "rule of
> reason" as in the General Electric price-fixing case, but on the
> whole they have avoided this approach like the plague -- and when
> one looks at the horrendous problems and complexities involved,

facing the courts.[89]

2. Lack of Information

At numerous points, courts may simply lack the information necessary to make the decisions.[90] To determine ratios, the subject of the applications in Parts IV-VII of this paper, a number of complicated phenomena must be measured and compared. And it was seen that if more than a minor reshuffling through cost-effectiveness analysis was desired, it is also necessary to have information concerning the ratio implicit in the existing patent life, which in turn requires knowledge concerning all the links in determining the costs and benefits of the patent system. Moreover, approximate valuations for the total benefits and total costs would be virtually useless, as it is necessary to know the marginal costs and benefits, and the degree of reward that can be derived from analysing them. Finally, in order to take a more coherent approach toward the interdependency problem discussed in Section C would require not merely such information evaluated in the present system, where the patent life is given, but also how such measures vary as the aggregate total reward is varied. In the end, therefore, only the most limited improvements, achieved as a result of comparing restrictive practices to each other, may be possible.

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n. 89 one is hard put to say that they are wrong in doing so.
cont.

90. See, e.g., Markham, The Joint Effect of Antitrust and Patent Laws Upon Innovation, 56 **Am. Econ. Rev.** 291, 292 (1966) ("[T]he linkage between technological change and the patent system and antitrust policy -- only two of the several environmental factors affecting it -- would still have to be determined. Again, the prospects of establishing these linkages in precise terms seem remote.").

3. Interdependency Among Cases

It was already indicated in Part I how the appropriate outcome in one case may depend on the outcome in others in ways that go beyond the simple desire for consistency in doctrine.[91] The discussion in this Part has reinforced that view. The cost-effectiveness discussion in subsection B-1 was the refinement of that earlier story. It can now be seen that such analysis may be the most promising approach in light of limitations in available information. But the previous discussion demonstrated that even if it might be possible to reach decisions in two areas of the doctrine taken together, it would be uncertain whether either change alone was an improvement.[92]

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91. See page 10 supra.

92. Each taken alone could be undesirable. See note 56 supra.

III. Previous Solutions to the Patent-Antitrust Conflict

Section A will indicate how many of the earliest reactions to the patent-antitrust conflict were to avoid it altogether, and how this tendency continues to the present. Avoidance, although a frequent response, have not been the only one. From the outset, attempts to meet the conflict more directly began to emerge. The task was to determine which methods of exploiting patents were permissible, and when exploitation came into conflict with the antitrust laws. The approachs typically lead to compromise results -- i.e., antitrust proscriptions sometimes, but not always, were to be enforced. The most popular methods, particularly with the courts, consisted of formalistic tests that purported to indicate which practices were permissible. In Section B, I will indicate how all such tests are question-begging and thus indeterminate. This criticism is not completely novel, but for some reason has been given little attention, and is occasionally missed even by those who seem aware of the problem when discussing approaches other than their own. It will be seen that the approaches described in Sections A and B hardly even attempt a solution to the patent-antitrust conflict, much less a satisfactory one.

Sections C and D will consider the tests proposed by Bowman and Baxter, respectively. Their work is the most extensive and thoughtful to date; both attempt to develop a consistent framework and to apply it to a variety of

contexts in which the patent-antitrust conflict arises. The discussion in this Part will indicate the shortcomings of each of their proposals; some particular manifestations will be illustrated in the later Parts that deal with specific applications. Overall, Bowman and Baxter are each partly right, and, curiously enough, each tends to miss an important part of what the other has to offer.

A. Common Confusion of Courts and Commentators: Evading the Conflict

The conflict between the patent statute[93] and the antitrust laws has long been thought to be troublesome. Part I indicated that in fact the conflict is even more dramatic than is generally perceived. The complexity of the patent-antitrust conflict, fully revealed in Part II, makes it easier to understand why courts and commentators have often responded to the dilemma by evading one side altogether.

Part I presented a progression, beginning with the position that the antitrust laws were controlling in all cases of conflict, followed by the position that patent policy should always prevail, and concluding with a more extended discussion indicating how patent policy was itself limited, suggesting the possibility of a result somewhere amidst the tension between provision of greater rewards for invention and minimizing monopolistic injury. The juxtaposition of such a result with patent-antitrust doctrine was seen to be problematic, to say the least. As that Part began, there was some suggestion that the progression of argument followed the historical

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93. 35 U.S.C. (1976 and Supp. III 1979).

evolution of antitrust doctrine and commentary, although by the conclusion of the discussion it was clear that the link at some point had been broken. It would, however, be more accurate to qualify even the claim that the first steps of that hypothesized process of development are fully reflected in the law and its literature. In addition, it is remarkable that despite the tendency of the most naive resolutions of the patent-antitrust conflict to erode over time, even the most sophisticated modern commentators, who explicitly criticize the old, rejected ways, still slip into the same never-forgotten patterns.

The earliest court decisions -- which addressed license provisions requiring, for example, that the licensee adhere to prices set by the patentee, or purchase various supplies only from the patentee (tying clauses) -- uniformly favored the patentee, based in large part on the theory that the greater includes the lesser.[94] The argument noted that patentees were legally entitled to refuse to license their patent, and thus the lesser restriction of licensing the patent subject to certain conditions was legally immune from attack. Arguments of this kind have been rejected in a vast range of contexts,[95] typically because the lesser can be more of an evil than the greater or because regulation of the lesser can lead to further improvement in light of the unwillingness of the regulated entity to resort to the

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94. See, e.g., Henry v. A.B. Dick Co., 224 U.S. 1, 32, 35 (1912).

95. Early criticism in the patent context can be found in Powell, The Nature of a Patent Right, 17 Colum. L. Rev. 663, 678-79, 684 (1917).

greater restriction,[96] and it is rare to see this position explicitly advocated in the patent context in recent times.

Even after the apparent antitrust immunity granted by the patent statute fell in the second decade of this century,[97] the purpose of the patent statute was blindly invoked in support of restrictive practices by patentees. The most famous instance is the Supreme Court's decision in United States v. General Electric, upholding the patentee's right to issue price-restricted licenses.[98] The Court stated that a price-restricted license was permissible, "provided the conditions of sale are normally and reasonably adapted to secure pecuniary reward for the patentee's monopoly."[99] This formulation ignores antitrust policy altogether, unless one renders the Court's test question-begging by giving a broad reading to "normally and reasonably adapted,"[100] which the Court gave no evidence of doing. Resolving the conflict by avoiding the antitrust component has proved

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96. The equal protection and due process protections in the Constitution are perhaps the most notable, but by no means the only examples. Virtually all government regulation, whether of employment conditions or sales of consumer products, takes place in a context where firms have the option to go out of business and thus not hire or sell at all.

97. See Bauer & Cie v. O'Donnell, 229 U.S. 1 (1913) (resale price maintenance); Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502 (1917) (tying).

98. 272 U.S. 476 (1926).

99. Id. at 490.

100. See Section B infra.

101. See, e.g., SCM Corp. v. Xerox Corp., 645 F.2d 1195, 1206 (2d Cir. 1981) ("where a patent has been lawfully acquired, subsequent conduct permissible under the patent laws cannot trigger any liability under the antitrust laws"), cert. denied, 455 U.S. 1016 (1982).

long-lived.[101] For example, Professor Sullivan, despite making a similar criticism of <u>General Electric</u>[102] and explicitly noting the failure of such easy answers to the conflict,[103] makes the same mistake in commenting on field restrictions that reserve exclusive fields to the patent holder.[104]

As criticism has mounted to some of the Supreme Court's permissive rulings concerning restrictive practices by patentees, so has the tendency for commentators to make the opposite mistake, that of resolving the patent-antitrust conflict by invoking antitrust analysis as though patent policy were irrelevant to the issue. Professor Sullivan exhibits this tendency more frequently than the first, although in some instances there is ambiguity over whether his statements reflect his views as to what the law

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102. **L. Sullivan, Antitrust** 542 (1977).

103. <u>Id</u>. at 505, 527.

104. <u>Id</u>. at 560 ("these are all advantages the patent holder is plainly entitled to under the patent if it excludes licensees entirely").

105. He explicitly states that the conduct element of Section 2 is met "under circumstances where it meets the basic test for exclusionary conduct laid down in nonpatent cases." <u>Id</u>. at 509 (footnote, citing cases, omitted). He proceeds by offering the following formulation: "A patent acquisition policy is exclusionary when it is not an 'honestly industrial' expression of 'superior skill or industry,' but represents a deliberate effort to preempt others, in the sense that the defendant could have avoided following the policy without acting in an economically irrational manner, or in a way inconsistent with its own self-interest." <u>Id</u>. If the latter is interpreted broadly, no monopolistic action by a patentee would be proscribed since such action would presumably be more profitable than abstaining from the action, and thus abstention would be economically irrational and inconsistent with self-interest. Presumably a narrower interpretation is intended, in which case the emphasis of the formulation would be upon "deliberate attempt to preempt others," but that, after all, is precisely how one exploits a patent. Later he acknowledges that "[s]ince the purpose of the patent law is to encourage innovation by protecting inventions, one feels intuitively that the process of invention, application and grant, at least, ought to be safe from antitrust challenge." <u>Id</u>. at 511 (footnote omitted). But presumably

should be, merely state what he believes the law to be, or both.[105]

n. 105 cont. the process of profitably exploiting the patent, at least to some degree, is also protected, and the proffered explication of the limits prescribed by Section 2 does not seem to acknowledge this, although Sullivan's further discussion of the subject is sufficiently vague that one cannot be sure of how, if at all, he believes patent policy should enter into the analysis.

A more clear-cut example arises in Sullivan's discussion of territorial restrictions where he states that "[t]he higher return to the patent holder [made possible by the opportunity to discriminate in price] is, from the vantage point of the public, unnecessary to the stimulation of any socially desired conduct." Id. at 540. This statement is quite remarkable, for it directly assumes that there exists no social policy favoring increased reward to patentees. See generally Section VI-A infra (discussing benefit of price discrimination independent of output effect). Sullivan's analysis of General Electric is similar:

> But if, on the face of the matter, it is clear either that the patentee would license whether or not permitted to fix prices (as might occur, for example, if the patent had no application in the industry where the patentee operated), or that there would be no significant adverse effect on the public were the patentee not to license (as where the patent convincingly appears to have only trivial commercial advantage), then permitting the patentee to fix prices would be gratuitously to allow an unnecessary competitive restriction.

Id. at 551. To argue that permitting the restriction is gratuitous even though it offers the patentee greater reward is to ignore the patent policy half of the conflict.

106. "The dominant purpose of Robinson-Patman, as opposed to old section 2 [of the Clayton Act], was to protect the structural integrity of the customer industry; and the legality of the seller's monopoly is irrelevant to that purpose." Baxter, Legal Restrictions on Exploitation of the Patent Monopoly: An Economic Analysis, 76 Yale L.J. 267, 297 (1966) (emphasis added). That the legality of the patent monopoly is irrelevant to the Robinson-Patman Act's purpose does not imply that it is irrelevant to its application, unless patent policy is to be ignored when in conflict with this provision of the antitrust law. The point is not that the Act is necessarily inapplicable, but rather that patent policy is relevant in determining whether it should be deemed applicable. See generally Part VI infra.

107. "Where the patents block each other, restrictive licensing can be prohibited with impunity because neither patentee is likely to refuse to license the other in reaction to the rule." Gibbons, Price Fixing in Patent Licenses and the Antitrust Laws, 51 Va. L. Rev. 273, 296 (1965) (hereinafter cited as Gibbons, Price Restrictions. To state that price restrictions can be prohibited with impunity ignores that restrictions may promote patent

Baxter,[106] Gibbons,[107] and others[108] have on occasion proceded in a similar fashion.

B. Formalistic Conceptions of Courts and Commentators

In light of the analysis in Parts I and II, it is not surprising that courts and commentators have had some difficulty when confronting the patent-antitrust conflict. However, not all analyses have been marked by the sort of evasion just noted.

The Supreme Court has made a number of attempts to formulate a rule that properly indicates which practices are permissible. One of the earliest attempts was in Bement v. National Harrow Co., where the Court declared lawful "any conditions which are not in their very nature illegal with regard to this kind of property."[109] After the Court's decisions in

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n. 107 cont.
policy by increasing the reward to the patentee. Similarly, in opposing grant-back provisions, id. at 297-98, Gibbons does not even consider the argument that permitting such restrictions increases the reward to the patentee. In another article, Gibbons ignores the possibility that permitting field restrictions may directly increase the reward to the patentee, even if it is not necessary to prevent its refusal to to license at all. Gibbons, Field Restrictions in Patent Transactions: Economic Discrimination and Restraint of Competition, 66 **Colum. L. Rev.** 423, 441-42 (1966) (hereinafter cited as Gibbons, Field Restrictions. In each instance, my point is not to quarrel with whether Gibbons reaches good conclusions, but with whether he can reasonably reach any conclusion without considering the effect of the result on patent rewards.

108. See, e.g., Burstein, A Theory of Full-Line Forcing, 55 **Nw. U. L. Rev.** 62, 93 (1960), who is fairly criticized in **W. Bowman, Patent and Antitrust Law** 118 (1973), for supporting the proscription against tying on the ground that "it limits the potential gains of monopoly power," which directly translates into a limitation of the patentee's reward.

109. 186 U.S. 70, 91 (1902).

110. United States v. Trans-Missouri Freight Assn., 166 U.S. 290 (1897).

Trans-Missouri[110] and Addyston Pipe,[111] one would have thought that price restrictions were "in their very nature illegal," but the Court concluded otherwise.[112] This is hard to understand unless a metaphysical inquiry into the difference between the naturally and unnaturally illegal is thought possible.[113]

From this point, the Supreme Court advanced in Motion Picture Patents to the view that "[the] scope of every patent is limited to the invention described in the claims contained in it."[114] Although this formulation is derived from decisions, pre-dating the antitrust laws, that focus on the rights derived from a patent grant,[115] it was invoked in Motion Picture Patents against the background of the patent-antitrust conflict,[116] and has

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111. United States v. Addyston Pipe & Steel Co., 175 U.S. 211 (1899).

112. 186 U.S. at 93-94.

113. See, e.g., Cohen, Transcendental Nonsense and the Functional Approach, 35 **Colum. L. Rev.** 809 (1935).

114. Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502, 510 (1917).

115. See id.

116. Motion Picture Patents was not technically an antitrust case. The Court affirmed a decision that held the patentee's tying clause to be invalid. Tying clauses used by patentees had been previously upheld against antitrust challenge in Henry v. A.B. Dick Co., 224 U.S. 1 (1912). This decision was discussed, along with the other relevant antitrust precedents, and expressly overruled in Motion Picture Patents.

117. See, e.g., Ethyl Gasoline Corp. v. United States, 309 U.S. 436, 456 (1940); United States v. Studiengesellschaft Kohle, m.b.H., 670 F.2d 1122, 1135 (DC Cir. 1981) ("None of the anticompetitive effects of the challenged restriction ... exceed the anticompetitive effects which the patent authorized."); SCM Corp. v. Xerox Corp., 463 F. Supp. 983, 1014 (D. Conn. 1978) ("The exercise of [the] prerogative [of unilaterally refusing to license a patent] is a corollary of the explicit statutory grant of the right

continued to be used for that purpose.[117] It is hard to understand how
careful study of the papers describing a patent can resolve the
patent-antitrust conflict. One approach would be to hold the antitrust laws
always controlling since no reference to any of the prohibited practices can
be found in the patent description. Of course, little else relevant to
patent exploitation can be found there either. Although Motion Picture
Patents offered this formulation when striking down a restrictive practice,
it did not purport to be siding totally with the antitrust half of the
conflict and later decisions have not interpreted it that way. How it is
that one is to know which restrictive practices are within the "scope of
[the] patent" and which are not remains a mystery.

A decade after Motion Picture Patents, the Court's General Electric
decision, in the process of unanimously permitting the use of
price-restricted licensing, offered some additional formulations for
resolving the patent-antitrust conflict.[118] One was that the patentee may
include in licenses "any condition the performance of which is reasonably
within the reward which the patentee by the grant of the patent is entitled
to secure."[119] Another was no less blatantly question-begging in considering
the degree to which a restriction bore a "direct relation and [was] germane

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n. 117   to exclude others from making, using, or selling the patented invention."),
cont.   aff'd, 645 F.2d 1195 (2d Cir. 1981), cert. denied, 455 U.S. 1016 (1982).

118. United States v. General Electric, 272 U.S. 476 (1926). These are in
addition to the one-sided formulation, discussed at page 53 supra.

119. 272 U.S. at 489 (emphasis added).

to the _rights_ of the patentee."[120] More recent formulations seem no
different. In _Zenith Radio Corp. v. Hazeltine Research, Inc._, the Court
states that "the patentee [may not] extend the monopoly of the patent to
derive a benefit not _attributable_ to use of the patent's teachings."[121]

Each of the Court's tests seems to assume that in the back of everyone's
mind is some notion of what "normal" or "proper" patent exploitation looks
like. If there were a well-established vision, courts may have little
difficulty reaching consistent and relatively uncontroversial decisions on
these issues despite their failure to explicate that vision in the text of
their pronouncements. However, patent-antitrust doctrine is noted for its
uncertainty and frequent shifts in direction.[122] This may suggest that
courts in fact lack such a vision, which should not be surprising since the
basis for any vision on such issues is likely to be complex and is surely
beyond the range of the everyday experience of most.

Commentators have often lapsed into formalistic formulations no more
informative than those employed by the courts. For example, Professor
Sullivan suggests inquiry into whether the "power to fix the prices charged
by the licensee or to divide territories among licensees [is] part of the

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120. _Id_. at 493 (emphasis added). _See also_ _id_. at 489 ("scope of the
patentee's rights").

121. 395 U.S. 100, 136 (1969) (emphasis added).

122. For example, note the reversal of _A.B. Dick_ by _Motion Picture Patents_,
see note 116 _supra_, and the rocky history of _General Electric_, _see, e.g._, L.
Sullivan, _supra_ note 102, at 541, 543.

patentee's grant,"[123] which seems similar to the version of the "scope of the patent" test that focuses on the patent itself.[124] Professor Buxbaum has discussed the use by the EEC of a test upholding practices "inherent in the patent monopoly."[125] He initially criticizes its shortcomings apparently not on the ground that the test is empty or indeterminate but rather because it forgoes the antitrust inquiry in many instances where it should.not,[126] although later he goes further, characterizing such tests as "circular"[127] and as mere "labels for conclusions, not aids to analysis."[128] Yet the latter rebuke of such labels as "inherent restrictions" and "legitimate reward" is immediately preceded by his own argument based on a determination that a territorial restraint might exceed "that legitimated by the patent monopoly,"[129] which seems to be little more than a slightly different formulation of "legitimate reward." Baxter at one point phrases the issue very similarly, as whether "the premium ... constitute[s] income of the kind contemplated by the patent system."[130] Perhaps the most sweeping recent use of such formalistic formulations appears in Stedman's description of the

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123. **L. Sullivan**, supra note 102, at 531.

124. See 57 supra.

125. Buxbaum, Restrictions Inherent in the Patent Monopoly: A Comparative Critique, 113 **U. Pa. L. Rev.** 633, 641-45 (1965).

126. Id.

127. Id. at 648.

128. Id. at 661.

129. Id.

130. Baxter, supra note 106, at 343.

various legal approaches he claims to be available for resolving the patent-antitrust conflict.[131] His typology relies for definition upon such tests as "full monopoly power of the patentee" and "scope of his patent."[132]

Most attempts to devise solutions that do not evade the issue by ignoring one half of the conflict seem instead merely to restate the issue in a disguised form. Most disguises have been seen to be transparent, and some have on occasion been revealed before, although not sufficiently frequently to put an end to the masquerade. In examining the more developed proposals of Bowman and Baxter, it will be useful to consider the extent to which their analysis does any better.

C. Bowman's "Competitive Superiority" Test

1. Understanding Bowman's Test

Bowman states that his test

> assumes the propriety of allowing a patentee to use any method
> of charging what the traffic will bear if, but only if, the
> reward to the patentee arising from the conditional use measures

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131. Stedman, supra note 18.

132. Id. at 595 (emphasis in original). His attempt to apply the scope of the patent test proves difficult, see id. at 599 (text at note 25), which he later acknowledges to some degree, see id. at 600 (text at note 29).

133. W. Bowman, supra note 108, at x; see id. at 88. Years earlier, Furth had offered a similar test in the context of evaluating price-restrictive licenses:

> [P]rice-fixing clauses should not enable the patentee and his
> licensees to acquire a greater total return or a greater power
> over the market than the patentee, assuming ability to exploit
> the patent fully himself, could otherwise command. The patent's
> competitive superiority should set the bounds of the reward

the patented product's competitive superiority over substitutes.[133]

His test of competitive superiority is thus essentially an objective one, typically taking as affirmative evidence of legitimacy that a licensee or buyer is willing to accept a restriction as a condition to the deal.

He does not, of course, adhere strictly to this objective test, for it would immunize any restriction, even the blatent cartel.[134] Since he sometimes departs from this objective test,[135] there must be some other, unarticulated limitation that he has in mind under the rubric of "competitive superiority," and that implicit principle, even if rarely applicable, must be addressed in every case. It appears that in determining the application of this limitation, Bowman may be relying upon formalistic conceptions such as

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n. 133 cont.   afforded its users regardless of the way the patentee chooses to exploit the patent.

Furth, Price-Restrictive Patent Licenses Under the Sherman Act, 71 **Harv. L. Rev.** 815, 817 (1958). Thus, it might be more appropriate to refer to "competitive superiority" as the Furth-Bowman test, or simply the Furth test. I choose the Bowman label primarily because he and his book have become far more prominent and the analysis is more generally associated with him, and because he applies the test in a far wider variety of contexts, thus presenting it as a truly general test.

Others have since used similar formulations. See, e.g., **R. Bork, The Antitrust Paradox**, at x (1978) ("Bowman's own book, Patent and Antitrust Law, is so good and so definitive that I have not even attempted in this book to comment upon that branch of the law. There is nothing more so say." (Footnote omitted.)); Bower, The Misapplication of Antitrust Theory and Patent License Conditions, 10 **Akron L. Rev.** 39 (1976).

134. See page 100 infra (discussing Bowman on price-fixing cartels, his chapter 10).

135. For another example of an apparent departure from his test, see the discussion in Priest, Cartels and Patent License Arrangements, 20 **J. L. & Econ.** 309, 337 n.101 (1977) (Bowman's discussion of Standard Sanitary).

those discussed previously.[136] In fact, Bowman often resorts to arguments, formulations, or justifications for his test that revert to the formalistic genre. For example, in his first chapter, he reasons that

> evaluating whether certain patent licensing practices should be sanctioned will involve the proper <u>scope of the legal monopoly</u>. Is more being monopolized than <u>what the patent grants</u>, or is the practice merely maximizing the reward <u>attributable</u> to the competitive advangage afforded by a patent?[137]

One reason why the mystery surrounding this key component cf Bowman's test may appear hidden upon reading his book is that since pure horizontal cartelization is virtually the only behavior he would prohibit, and since it seems that today everyone agrees with that part of his position,[138] the reader is apt to be less careful when scrutinizing Bowman's analysis at this point.

In addition to Bowman's ambiguous language, there is a further difficulty in understanding and thus analyzing Bowman's test. In most contexts he finds it satisfied a fortiori because he believes that most allegedly restrictive practices should not be held to violate the antitrust laws even in the absence of patent policy considerations.[139] These beliefs, which Bowman

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136. <u>See</u> <u>id</u>. at 226 (characterizing the pure cartel as a "scope extension"); <u>see also</u> pages 101-02 <u>infra</u> (more on Bowman on distinguishing the pure cartel).

137. <u>Id</u>. at 8-9 (emphasis added). <u>See also, e.g.</u>, <u>id</u>. at 54 ("the 'scope' problem," "monopoly beyond the patent's proper scope," "advantage properly ascribable to the invention"); note 136 <u>supra</u>.

138. <u>See</u> notes 237, 238 <u>infra</u>.

139. <u>See</u> <u>id</u>. at ix-x, 64.

holds in common with others in the "Chicago School,"[140] derive from criticisms of arguments based upon leverage, forclosure, and exclusionary practices[141] that have been the subject of considerable controversy.[142] To the extent Bowman´s argument rests on such beliefs, his book has nothing to add to the resolution of the patent-antitrust conflict. This paper will devote little attention to these issues, and instead will focus on how the patent-antitrust conflict should be resolved where some conflict is found to exist. Since Bowman so rarely finds anything worth worrying about from the antitrust side of the conflict, most of his discussion that is relevant to the conflict addresses it only tangentially. Nonetheless, his simple statement of the competitive superiority test in his introduction, quoted previously, combined with frequent passing references and applications, seems sufficient to understand the rule he intends.

2. Criticism of Bowman´s Test

The shortcomings of Bowman´s competitive superiority test can be seen quite

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140. See generally, e.g., **R. Bork, The Antitrust Paradox** (1978); **R. Posner, Antitrust Law** (1976).

141. See, e.g., **W. Bowman**, supra note 108, at 54-61.

142. See, e.g., Blake & Jones, In Defense of Antitrust, 65 **Colum. L. Rev.** 377 (1965); Blake & Jones, Toward a Three-Dimensional Antitrust Policy, 65 **Colum. L. Rev.** 422 (1965); R. Bork, Contrasts in Antitrust Theory: I. 65 **Colum. L. Rev.** 401 (1965); Kaplow, Extension of Monopoly Power Through Leverage (in progress); **R. Posner, Antitrust Law** 177-211 (1976).

143. Bowman also misunderstands the connection between setting the optimal patent life and determining patent-antitrust doctrine. He states that "[l]engthening or shortening the patent period seems a far better solution to the rewarding problem than is manipulating patent exploitation standards." **W. Bowman**, supra note 108, at 52. See also id. at 115. Basically, he mischaracterizes what is at stake by using the loaded term "manipulating" to

clearly by comparing it with the ratio test proposed in Part II.[143] Bowman's

test can be interpreted as focusing solely on the numerator of the ratio --

the patentee's reward. From this perspective, the test permits any reward to

the patentee so long as it does not exceed the bound set by competitive

superiority.[144] To the extent this is a fair analysis, Bowman's test is

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n. 143   characterize the views of any who might disagree with him. Of course, no set
cont.   of patent-antitrust doctrine is a "manipulation" except by reference to some
         unbiased starting point. Bowman's reference point will be shown in this
         Section to be quite biased in that it is derived from a one-sided analysis.
         More fundamentally, Part II demonstrated that the rewarding problem
         inevitable combines analysis of the patent period and patent-antitrust
         doctrine in a manner that renders Bowman's position incoherent.

144. Bowman's test, by permitting any restrictive practice that the licensee
or buyer is willing to endure, implicitly compares the situation where the
practice is permitted to that where the invention had never existed, or,
equivalently, where the patentee refuses to practice the patent. See id. at
88; page 130 infra. From this perspective, Bowman's test can be seen as
another version of the greater includes the lesser, see page 52 supra, which
was seen to ignore the antitrust side of the conflict.

145. Bowman ventures the conclusion that various restrictions "are all means
not of creating monopoly, but rather of maximizing the return the patent
affords." Id. at 55-56. He is correct that the restrictions probably help
maximize the patentee's reward, the numerator, but the reference to "creating
monopoly" seems more germane to the magnitude of the denominator -- monopoly
loss. In this instance, Bowman thus appears to assert a conclusion
concerning the magnitude of the denominator based solely upon the magnitude
of the numerator, as though each were a mutually exclusive category, or there
were a trade-off between the two. As demonstrated previously, this is
clearly incorrect, since the general tendency is for the numerator and
denominator to move together. This illustrates how Bowman's analysis not
only bears no resemblance to the ratio test, but also is occasionally quite
careless when he is attempting to muster all conceivable arguments to support
his position that patent restrictions should be permissible.

When discussing the economics of the patent system more generally, Bowman
takes notice of both the costs and benefits.

> The revenue obtainable from the right granted an inventor
> depends ultimately upon how users evaluate the benefits of the
> invention. Informed users can be expected to pay no more than
> the added value the invention makes possible. The limitation of
> the user's willingness to pay is, of course, applicable to all
> monopolies, whether condemned by the antitrust laws or

clearly flawed, since it ignores the magnitude of the denominator.[145]

Although it was noted previously that the numerator and denominator -- the

patentee's reward and monopoly loss -- tend to vary together, it was

established that the connection is very loose indeed. Moreover, it was noted

that if the connection were perfect, there would be no basis for reaching a

determinate resolution to any component of patent-antitrust doctrine. Thus,

Bowman's test seems useless. This is not surprising since it fails to focus

on the ratio. Merely knowing that the numerator is not too large in any

given instance does not tell us whether the restriction at issue is better or

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n. 145
cont.

permissible under the patent system. The benefits of a patent
system, if they exist, must be assedded in terms of what
alternatives consumers have with or withour the disadvantage of
the temporary monopoly a patent system imposes upon them. The
most obvious case of net social advantage of a patent system
arises when except for the patent protection the product of the
invention would not be available. In such a case anything users
would be willing to pay would be an improvement (wealth
increasing) over not having the product. If, however, to take an
opposite extreme case, a patent monopoly were granted for a
product which would have been forthcoming anyway, then the
restricted output caused by the patent monopoly leads to a net
social loss to the community.

... The problem should thus be recognized as involving a
trade-off between the short-run disadvantages of monopoly on
already granted patents and the possibility of greater advantages
of having new or better products not otherwise available.

Id. at 16-17. But Bowman's test does not take account of the trade-off. In
essence, Bowman's approach implicitly (and erroneously) assumes that, but for
the reward provided by each restrictive practice he advocates, none of the
inventions would have been forthcoming. The cost half thus gets left behind
as he proceeds to examine the patent-antitrust conflict.

146. Since the numerator is of concern due to the patent policy component of
the conflict, there is a very rough sense in which Bowman's choice can be
analogized to evasion of the conflict by ignoring the antitrust side of the
issue. See pages 52-54 supra. This is consistent with Bowman's views of
antitrust generally and his conclusions concerning the permissibility of
patent exploitation practices.

worse than most others.[146] At best, it has some bearing on the notion that rewards should be in proportion to the value of the patent, a test shown in subsection II-A-3 to be wholly inadequate.

Of course, the limit imposed by the competitive superiority test -- what the traffic will bear -- is not totally unrelated to the magnitude of the denominator, for if the denominator is sufficiently large the traffic may not bear the restriction.This refinement, however, does not rescue the competitive superiority test. The test does not focus on the ratio, which is necessary to compare the desirability of various restrictions. The buyer's or licensee's decision to accept a deal depends upon whether it expects to derive a net benefit, but that decision does not tell us either how much of the buyer's or licensee's cost accrues to the patentee as reward or how much detriment, for example, in terms of resource loss, results.[147] Reconsidering the cartel example helps illustrates one way in which Bowman's test can be misleading. It will be recalled that strict application of his objective formulation -- what the traffic will bear -- would lead one to find such disguised cartels permissible.[148] This is possible for both of the reasons just described.[149] Bowman does avoid this embarassing result, but only, as

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147. For example, individuals may accept the conditions knowing that if they do not, others will. However, if the conditions are outlawed, the patentee may come forward with a better offer. This is not to say that under such circumstances the result is always preferable, for the patentee no doubt receives less benefit. The point is instead that one would have to consider all the effects to determine the ratio, which in turn would guide the decision concerning whether the conditions should be permitted.

148. See page 62 supra.

149. This example is developed further in Section IV-B infra.

was described previously,[150] by departing from the objective test.[151]

D. Baxter's "Comparability" Test

Baxter's test is that

> a patentee is entitled to extract monopoly income by restricting utilization of his invention, notwithstanding that utilization of other goods and services are consequently restricted, provided that in each case he confines the restriction to his invention as narrowly and specifically as the technology of his situation and the practicalities of administration permit.[152]

This test seems remarkably similar to the formalistic formulation based upon discovering the "scope of the patent."[153] One possible interpretation of Baxter's "comparability test" is that it is concerned exclusively with containing the reward to the patentee. In fact, he states that the reason his formulation is desirable is that it provides "a stream of benefits to the

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150. See 62 supra.

151. Furth's briefer explication fares little better. For example, he argues that "[e]very undesirable licensing arrangement is characterized by the fact that the patentee and his licensees acquire a margin of profit or a degree of control over their industry which is unrelated to the competitive superiority of the patent." Furth, supra note 133, at 838 (emphasis added). Thus, he explicitly claims that passing the competitive superiority test, regardless of the ratio, is a sufficient condition for legality. In addition to the deficiencies of this approach, it is unclear how in practice Furth would determine when this condition is satisfied.

152. Baxter, supra note 106, at 313. Gibbons frequently takes a similar approach, see, e.g., Gibbons, Field Restrictions, supra note 107, at 465-66, as does Buxbaum, supra note 125, at 649.

153. See pages 57-59 supra (especially distinction of Motion Picture Patents in General Electric).

patentee ... roughly <u>comparable to the ultimate value of the invention.</u>"[154]
Such an interpretation makes it seem the same as Bowman's competitive
superiority test. To the extent this is true, of course, the central
criticism of that approach along the lines developed in subsection II-A-3 is
applicable here. On the one hand this apparent congruence is not surprising,
since Bowman's test also seemed open to the "scope of the patent"
characterization. On the other hand, this seems shocking since Bowman and
Baxter reach strikingly different conclusions from these starting points.
This could be seen as merely demonstrating the manipulability of such tests,
and the sort of analysis that each applies, or the limitations in our
understanding of the practices that leave so much room for guesswork that one
can reach any conclusion.

It seems, however, that Baxter's language is more restrictive in terms of
what limits it would impose on patent exploitation in that it does not permit
the patentee all that the traffic will bear, but imposes further requirements
that confine the range of permissible restrictions. The basis for this
further restriction is never clear, although arguably it reflects a bias
toward minimizing the infringement upon antitrust policy.[155] Even assuming
that Baxter's test is more restrictive, the criticism leveled against

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154. Baxter, <u>supra</u> note 106, at 31 (emphasis added).

155. Of course, one could just as easily take Baxter's test as the starting
point and see Bowman's test as biased against antitrust policy. This dual
possibility merely restates the emptiness of formalistic attempts to resolve
the patent-antitrust conflict. It is worth recalling that the Supreme Court
decisions reaching opposite conclusions concerning the proper treatment for
such restrictions were all based on such formalistic reasoning. <u>See</u> Section
B <u>supra</u>.

Bowman's test still seems applicable.[156] At best, each offers a test regulating the maximum reward without offering any analysis that bears on whether the level selected is anywhere near the appropriate amount.[157]

One could view Baxter's test in a rather different way, however. Since the focus is upon minimizing restriction to the extent possible, it could be seen very roughly as directed toward minimizing monopoly loss, the denominator of the ratio, an interpretation supported by Baxter's analysis of many specific applications.[158] This perspective is consistent with the characterization that Bowman's approach tends toward results on the patent side of the conflict, which is the basis for the numerator,[159] whereas Baxter's tends toward the antitrust side, which is concerned only with the denominator. Accepting this heuristic recharacterization of Baxter's test leaves it subject to essentially the same criticism as that leveled against Bowman's test. Focusing exclusively upon the denominator is a priori no better than

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156. See note 44 supra (proportionality test when the proportion is less than one). For example, Baxter simply asserts that his "formulation ... gives appropriate scope to both antitrust and patent policy." Baxter, supra note 106, at 313. Yet he offers no reason whatsoever indicating why this compromise makes the right balance either overall (in terms of the total reward patentees receive) or as to particular restrictions (see Section II-B supra. Of course, there is also the problem that Baxter's formulation is presented in extremely vague terms, with no clear underlying principles to guide their interpretation.

157. In this context, the criticism of these tests by reference to the ratio test mean that even if the total were approximately correct, it may be achieved in an inefficient fashion since there is no attention given to whether those restrictions that are permitted have the best ratios and those prohibited have the worst.

158. See Section VII-C infra.

159. See page 65 supra.

focusing only upon the numerator when it is the ratio that is relevant. And, as true with the analysis of Bowman's test, recognizing the implicit connection between the numerator and denominator does not help avoid the problem.[160]

Baxter offers an additional warning as part of his comparability approach:

> The value to the patentee of licensee conduct may far exceed its detriment to the licensee; indeed, the conduct may be as beneficial to the licensee as to the patentee, in which case the licensee has no incentive to resist the demands, and any expectation of comparability is foolish.[161]

This refinement seems to be a crude version of the factor discussed in subsection II-B-2-b concerning what portion of the profit accrues to the patentee, although in the context of the statement, Baxter seems more concerned with ensuring that the reward ("[t]he value to the patentee") not exceed the value of the patent (which Baxter equates with the "detriment to the licensee"[162]). Note that, unlike Baxter's primary formulation, this consideration does have a direct bearing on the magnitude of the ratio. Furthermore, whether or not this limitation is violated will not necessarily indicate the absolute magnitude of the reward to the patentee, which was the focus of the inquiry that was more directed toward proportionality.

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160. See page 67 supra.

161. Baxter, supra note 106, at 314.

162. See id. at 313.

IV. Applications: Price-Restricted Licenses

The permissibility of price-restricted licenses -- i.e., licenses under which the patentee sets the price at which licensees sell -- depends substantially upon what one believes to be their purpose.[163] Sections A through C will explore three sets of motivations for price-restricted licensing: protection of the patentee's market, facilitation of collusion, and advancement of efficiency. To the extent price-restrictions are motivated by the facilitation of collusion, they should be prohibited. The issue becomes complicated to the extent other purposes that imply good effects are also plausible. In that event, the appropriate approach depends upon whether it is possible to distinguish one situation from the other, and, if not, the significance of the contrary effects and the likelihood that each will occur even if the restrictive practice is probibited. These aspects of the decisionmaking process will be included in Section C's discussion. Finally, Section D will consider some additional issues that arise when price restrictions are employed in cross-licensing arrangements.

A.   Protecting the Patentee's Market

Perhaps the earliest and now one of the most enduring explanations

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163. Most of the analysis in this Part applies equally well to output restrictions.

proferred for price-restricted licensing was central to the Supreme Court's reasoning in General Electric that led it to conlude that such restrictions were permissible.

> One of the valuable elements of the exclusive right of a patentee is to acquire profit by the price at which the article is sold. The higher the price, the greater the profit, unless it is prohibitory. When the patentee licenses another to make and vend on his own account, the price at which his licensee will sell will necessarily affect the price at which he can sell his own patented goods. It would seem entirely reasonable that he should say to the licensee, "Yes, you may make and sell articles under my patent, but not so as to destroy the profit that I wish to obtain by making them and selling them myself." He does not thereby sell outright to the licensee the articles the latter may make and sell, or vest absolute ownership in them. He restricts the property and interest the licensee has in the goods he makes and proposes to sell.[164]

This explanation continues to find favor with a number of commentators today.[165]

It is now well-known, however, that this explanation is superficial.[166] So long as the patentee charges a royalty that at least equals the difference

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164. United States v. General Electric Co., 272 U.S. 476, 490 (1926).

165. Furth, after quoting this language from General Electric, finds that it "aptly summarizes the principle that the proper measure of the patentee's reward is his competitive superiority." Furth, supra note 133, at 819-20. He affirmatively advances the market protection rationale later in his discussion. Id. at 830. Gibbons asserts that "the purpose of the [price] restriction is protection of the patentee from competition." Gibbons, Price Restrictions, supra note 107, at 286. He advances the same explanation for field restrictions, Gibbons, Field Restrictions, supra note 107, at 458, and this theory seems implicit in his analysis of territorial restraints, Gibbons, Domestic Territorial Restrictions in Patent Transactions and the Antitrust Laws, 34 **Geo. Wash. L. Rev.** 893, 912 (1966) (hereinafter cited as Gibbons, Territorial Restrictions.

166. See, e.g., **W. Bowman**, supra note 108, at 128; Baxter, supra note 106, at 316, 332-35.

between what is believed to be the best price and the patentee's own costs, the patentee would appear to have no interest in protecting its own sales. It profits at least as much due to the royalty income from sales by licensees. And if the patentee believes that some licensees are more efficient than itself, all the better, because the patentee may be able to charge a royalty greater than the profit it could make per unit, and licensees would in any event be able to make more sales at a given profit margin than could the patentee. Price restriction motivated by market protection is not profit-maximizing, and to that extent may not seem to be a plausible motivation for the licensing practice.[167] This would suggest that the alternative theories discussed in Sections B and C are more relevant for the purpose of determining antitrust policy for this issue.

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167. It is possible that market protection would be consistent with profit-maximization if the licensor was seeking to maintain its position in the industry to enhance its bargaining power in any necessary renegotiation of agreements with licensees where licensees are limited in number and may thus have countervailing power. Alternatively, the licensor may hope to have a strong market position when the license expires. Two reservations should be noted. First, to the extent such motives are operative, the restriction would be costly to the licensor in that licensees who would be receiving less would not be willing to pay as much for the privilege offered by the license. Second, both objectives can probably be achieved as well through royalty arrangements which can protect the licensor's sales while extracting profits from the licensees. Again, it would appear that price or output restrictions are redundant.

Posner and Easterbrook argue that if the patentee has a rising marginal cost for its own production and is insufficiently informed about licensees' costs of production, it may be profitable to set a price floor in addition to a royalty rate. See R. Posner & F. Easterbrook, Antitrust 269 (2d ed. 1981). Although this is possible, it hardly seems likely. Posner and Easterbrook's argument assumes that patentees cannot renegotiate the royalty rate, that the output effect for the industry as a whole is less than the rising marginal cost effect for the patentee, and that the patentee's information concerning the latter comparison is sufficiently precise to reach the on-balance conclusion yet insufficient to act upon in setting the royalty rate.

That the market protection theory is inconsistent with profit-maximization,
however, does not rule it out as an explanation for price-restrictive
licensing. The patentee's rationale may be based "on a misconception of his
economic interest or on a non-economic consideration."[168] The former is
quite plausible, for if the market protection theory convinced all members of
the Supreme Court in 1926 and is still convincing to some commentators today,
it may have been or still be convincing to some patentees. Alternatively,
some patentees may be interested in maintaining the level of their own
production and sales for its own sake.[169]

If either of these explanations were valid, the question would be whether
these theories cut in favor of permitting or prohibiting price-restrictive
licensing. Baxter does not find any support for prohibition:

> If the explanation is a misconception of economic interest or a
> non-economic factor, the royalty structure may do economic harm;
> but no justification occurs to me for the general subordination
> of unidentified non-economic objectives to economic goals or for
> using the antitrust laws to assure that private economic
> interests are correctly perceived.[170]

It is unclear why not, especially when Baxter concedes that economic harm may
result. Although it may be true that the antitrust laws were not enacted for
this purpose, there seems little benefit in avoiding their application in

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168. Baxter, supra note 106, at 318. See generally Kaplow, supra note 142.

169. See generally W. Baumol, Business Behavior, Value and Growth (1967); R.
Marris, The Economic Theory of Managerial Capitalism (1964); O. Williamson,
The Economics of Discretionary Behavior (1964). This theory is highly
controversial, see generally F. Scherer, supra note 24, at 37-41, and its
merits will not be considered further here.

170. Baxter, supra note 106, at 318.

circumstances where the effect would be beneficial. This argument would be particularly strong if one concluded based on the analysis of Sections B and C, to follow, that the most plausible alternative explanation for price-restrictive licensing in many instances will be that they disguise cartelization. The question would then become whether the antitrust proscription should be withheld because the practices might not be causing the targeted harms, but other harms instead.

This response is not wholly satisfactory. To the extent firms pursue noneconomic objectives or misperceive their interests, being permitted the opportunity to pursue those objectives, or their perceived interests, would presumably be viewed as every bit as much of a reward as additional profits would be to a profit-maximizing firm. As a result, permitting price-restrictive licensing would serve the purpose of rewarding patentees and thus encouraging inventive activity. In this context, determining how much of an incentive results would be even more problematic than in the already-difficult profit-maximization scenario, discussed previously.[171] If one believed that non-profit-maxizing behavior were a frequent plausible explanation, and that price-restrictive licensing had a sufficiently high ratio of reward to loss from this perspective, one would then have to determine in which cases this theory, rather than disguised cartelization, explained the observed behavior. The relevant analysis of this question is found within Section C.

B. Disguised Cartelization

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171. See subsection II-B-2-c supra.

If there were no limits on price-restricted licensing, even the most
trivial patent could become the centerpiece of a price-fixing cartel.
Consider the following example, which is simply a more detailed version of
that discussed previously.[172] Before the licensing arrangement, marginal
costs and prices in the industry are $100. The new patented process reduces
production costs by $0.01. The patentee licenses each firm in the industry
to use its new process for a royalty of $0.01 per unit, subject to the
restriction that it must sell at prices established by the patentee, who also
produces the product. After all firms in the industry have accepted such
licenses, the patentee sets a price of $150, which is its best guess of the
profit-maximizing price for the industry. The result is essentially a
price-fixing cartel, which has the benefits that it can openly engage in
price-setting and enforce its agreement as well![173] Note that this result

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172. See page 29 supra.

173. The enforcement aspect is perhaps the less important of the two since
individual firms can upset the scheme -- to the degree indicated by their
market share, production costs at different levels of output, and market
conditions, see generally Landes & Posner, supra note 54 -- simply by
refusing to join in the first place, or perhaps by cancelling their licenses
to the extent this is permitted or would be a possible remedy in an
enforcement suit. This does not deny all force of this aspect of the
agreement, for cheating on the cartel would at least be much more open and
thus less effective.

174. For example, if the patent decreased production costs by $10 per unit,
and the royalty were $10 per unit, prices could still be set at $150, rather
than at $100, which would reflect the true cost plus the value of the
invention.

175. The price could be set equally high even if the new process were no more
efficient, or a new product was deemed no more desirable by consumers, so
long as end-product prices were controlled, or there were an implicit
agreement to confine production to the new process or product, which might be
easy to monitor, especially since the patentee could inspect operations under

could follow even if the patent had substantial value,[174] or no value.[175]

The conclusion that such practices should not be permitted is slightly less obvious than it may first appear. After all, the patentee does benefit from the scheme, and prospective inventors would no doubt be encouraged if they knew that their invention could be rewarded not only by a royalty payment covering its value but also by a slice of the potential monopoly profits for the market entire to which the patent is relevant. The most typical response is that this reward may be totally out of proportion to the value of the patent, as the illustration suggests.[176] As demonstrated in subsection II-A-3, disproportionate reward may well be a sufficient condition for condemnation, but if it were a necessary condition it would be necessary to establish the value of the patent in every such case.[177] Moreover, even if the reward were not that substantial because the potential for monopoly profit in the industry were limited, or if there was uncertainty or disagreement concerning how much reward is too much, one probably would still want to condemn this practice for the reasons suggested by the ratio test,

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n. 175 cont. the guise of ensuring royalty compliance.

176. See, e.g., L. Sullivan, supra note 102, at 554 ("cannot be said to be ´reasonably within the reward´ to which the patentee is entitled"); Baxter, supra note 106, at 339 ("sharing the monopoly profits ... suggests restraint unwarranted by the value of the invention"); W. Bowman, supra note 108, at 63 (in discussing collusion through combination, states that the "output restriction ... is unrelated to the reward attributable to the patent"); McGee, Patent Exploitation: Some Economic and Legal Problems, 9 J. L. & Econ. 135, 136-37 (1966) ("increase expected values of private return from patents without increasing social value").

177. The objective test for determining whether reward is in excess of the value of the patent, which simply looks to whether licensees or buyers have accepted the condition, fails in this case. See subsection III-C-1 (discussing Bowman).

since only a portion of the resulting profit accrues to the patentee.[178]
That earlier discussion described how, unless the patentee's market share is
very large,[179] the numerator is likely to be small relative to the
denominator, making the practice relatively undesirable regardless of the
magnitude of the effect upon market price.[180]

C. Alleged Justifications for Price Restrictions

1. Resale Price Maintenance and Related Justifications

A frequently proffered justification for allowing price restrictions is
that they in essence permit the patentee to practice resale price
maintenance, which is both a generally beneficial arrangement and is
necessary for the patentee to secure an apporpriate reward.[181] The argument,

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178. See subsection II-B-2-b supra. See generally subsection II-A-3 supra.

179. In this case, there may be almost as much market power even without the
restrictive license or the patent itself. See note 54 supra.

180. This conclusion would have somewhat less force to the extent that in
such a cartel arrangement the patentee imposed a royalty substantially in
excess of the value of the patent and kept the proceeds, rather than
redistributing them to the licensees. The greater the excess royalty, the
greater the slice of the reward that would go to the patentee, which would
improve the ratio. Of course, the proportionality problem could become quite
severe at this point. Essentially, there would be great incentives,
resulting in great social costs, to encourage even the most trivial of
inventions. See note 48 supra. One might doubt that this excess royalty
situation would occur frequently, or be significant, for it entails one
member of the cartel, the patentee, getting a disproportionately large share,
even after accounting for the value, if any, of the patent.

181. See, e.g., W. Bowman, supra note 108, at 132-35; Priest, supra note 135,
at 324-25.

which has been explored extensively elsewhere,[182] suggests that buyers or licensees need a guaranteed additional profit premium to induce them to provide necessary services to promote sales, which would increase the total royalty payments to the patentee. The difficulty faced in the absence of restrictions is that buyers´ or licensees´ expenditures to promote product sales, for example through advertising or providing extensive services to inform customers about their products, will not be rewarded because others will take a free ride on their efforts. The free riders, by refraining from undertaking their own expensive promotional efforts, will have lower costs than their more diligent rivals, and thus be in a position to offer a lower price thereby securing the sales that would not have resulted but for the efforts of others.[183] A typical example offered in support of this thesis is the stereo discounter who sells at cut rate from a warehouse to customers who have just received extensive demonstrations from the higher-priced full-service stereo boutique located across the street.[184]

Accepting this view that restrict practices sometimes might be used to

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182. See generally R. Bork, supra note 133, at 280-98; W. Bowman, supra note 108, at 120-39; R. Posner, supra note 142, at 147-66); F. Scherer, supra note 24, at 591-93.

183. Similar arguments, particularly relevant in the patent context, could be made concerning product development costs.

184. This view of resale price maintenance as efficiency-promoting of course runs counter to rule established in Dr. Miles Medical Co. v. John D. Park & Sons Co., 220 U.S. 373 (1911), which continues to be the law. Analysis along the lines of that justifying resale price maintenance was accepted as the basis for upholding a vertical territorial restriction in Continental T.V. v. G.T.E. Sylvania, 433 U.S. 36 (1977), although the Court expressly indicated that it believed vertical price restrictions to be different, id. at 51 n.18. Of course, it does not automatically follow that the prohibition should be applicable when the restraint is imposed by a patentee.

facilitate resale price maintenance would lead to the conclusion that there is no net monopoly loss, and in fact may be some gain, from permitting the practice. One ground to object would be to argue over the alleged effects of resale price maintenance are in fact desirable. Since that issue has no unique application in the patent-antitrust context, it will not be the focus of analysis here. The remainder of this subsection will assess whether this traditional argument is applicable in the patent-antitrust context, the significance of any benefits that might be lost if resale price maintenance were not permitted, and whether restrictions employed for resale price maintenance can be distinguished in practice from those used to facilitate collusion.

a. Applicability of the Argument

An important preliminary question is whether the preceding story describes what is really going on in the case of price-restricted licenses. The strongest argument indicating that this analysis describes the true motivation of manufacturers that impose resale price maintenance on dealers is self-interest. To the extent a price maintenance scheme simply raises dealer prices, the manufacturer makes the same profit per unit but will sell less units since the higher retail price results in a reduction in demand. Thus, it can be assumed that manufacturers think that higher sales will result, and that could only be true if retailers were induced to undertake promotional activity that had a positive effect on sales that exceeded the negative effect due to the price increase. The argument in the patent licensing context is similar: the royalty determines the patentee's profit per unit, and resale price maintenance would only be profitable if it

similarly induced sales activity sufficient to offset the adverse effect on demand due to higher prices.

Even if one accepts this basic argument,[185] its applicability to price-restrictive licensing is not obvious. Most notably, it is not obvious that price-restrictive licensing should be characterized as a vertical rather than horizontal restraint. Assuming that the patentee is in competition with its licensees,[186] as was the case in most of the leading Supreme Court decisions on the subject,[187] it is quite clear that patentee self-interest is hardly inconsistent with its propogating a cartel scheme, as the example in Section B demonstrated. Despite this fact, Bowman, a leading promoter of the resale price maintenance justification, repeatedly characterizes

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185. An important flaw in this argument has generally been overlooked. The claim that the manufacturer does not stand to gain from higher retail prices, which essentially amounts to sponsoring a retailer cartel, is not necessarily true, for it assumes that the manufactures reduced sales will be made at the same profit per unit. However, it may be that retailers would be willing to pay manufacturers for their assistance by passing along some of the monopoly profit in the form of higher payments per unit of the product. Since the maximizing collusive price in the downstream market provides greater profits than existed before the scheme, there will be sufficient funds to make both the manufacturer and the retailers better off. This is not to say that all resale price maintenance serves to disguise cartel behavior, for it is obvious that such a scheme can only work under restrictive conditions. However, if, for example, most manufacturers of any given product use this practice, or retailers were willing to agree tacitly not to trade in the products of manufacturers that refuse, it would be possible for a sector previously characterized by competition at both the manufacturing and retail levels to become cartelized.

186. If this is not the case, the proviso in the previous footnote is applicable, although in the case where a patent is involved such a scheme may be enforceable in a wider range of contexts.

187. See, e.g., United States v. General Electric, 272 U.S. 476 (1926); United States v. United States Gypsum Co., 333 U.S. 364 (1948); United States v. New Wrinkle, Inc., 342 U.S. 371 (1952).

price-restrictive licensing as a vertical arrangement.[188] And when he admits the possibility that a collusion theory might conceivably explain the arrangement in General Electric, he emphasizes that such a theory "was not the basis for the decision in the case."[189] Of course not. General Electric was decided in favor of the patentee![190] He further suggests that "the evidence required for [determining whether collusive behavior is present] is not different from that required in the usual cartel case."[191] At first glance it might appear that Bowman has just reversed his position, for proof of a written price-fixing agreement -- a price-restricted licensing scheme being such an agreement -- would typically be more than sufficient. This is not the case, however, as Bowman goes on to suggest that "the appropriate restriction to look for is restriction of the nonpatented, or the competing other patent."[192] If that were the test, the simple cartelization scheme described in Section B would be legal.[193]

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188. See, e.g., W. Bowman, supra note 108, at 121, 129 (in reference to Furth's suspicions of collusion in General Electric), 130, 138.

189. Id. at 138 n.38 (emphasis in original!).

190. As noted previously, Bowman himself criticized the rationale offered by the General Electric Court to explain the arrangement, see page 73 supra, and the Court did not even address the collusion theory.

191. W. Bowman, supra note 108, at 138.

192. Id. (emphasis in original).

193. Bowman does not seem to believe this either, for when reviewing cases prior to the passage of the Clayton Act, he notes that the Court in Bement v. National Harrow Co., 186 U.S. 70 (1902), may have overlooked an "industrywide horizontal price agreement" hiding beneath the patent arrangement. W. Bowman, supra note 108, at 150-51. See also the discussion in subsection III-C-1 of Bowman's approach in the context of collusion.

Characterizing price-restrictive licensing as a horizontal agreement, however, does not dispose of the resale price maintenance rationale, because the patentee-licensee arrangement has vertical features as well. Since the patentee derives some of its profit through royalties, it does have an incentive for its licensees to maximize sales, given a particular royalty rate. The analysis behind this conclusion was presented in discussing the market protection theory of price-restrictive licensing in Section A. Licensees are both distributors of the patentee's invention and competitors with the patentee's production. Thus, it is not clear, a priori, whether one or the other motive explains a given arrangement.[194] Whether one needs to distinguish these possible motivations depends upon whether there is a compelling justification for preserving the resale price maintenance option.

b. Importance of the Argument

In presenting the typical justifications for resale price maintenance, little attention is given to whether there exist alternatives that could achieve the benefits attributed to it. Only those activities subject in some significant way to the free rider problem need be addressed; as to others, retailers or licensees can undertake them without price maintenance since the costs can be recouped through charging higher prices. One example would be the quality of repair and service after purchase, since presumably such activities would or could be limited to purchases from the outlet offering the service, or there could be separate charges, either directly to the

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194. In the case where there is a patent with nontrivial value and a price-fixing scheme nonetheless, as in the case of an earlier example, see note 174 supra, both motives could conceivably be at work.

customer or to the dealer that originally sold the product.[195]

Where the free rider problem is serious, as in the case of advertising the manufacturer's or patentee's product, alternatives such as direct provision, targeted subsidies, sales quotas, or direct requirements are possible.[196] In addition, restrictions on the number of licensees may be equally effective and far less dangerous.[197] To the extent these alternatives were not fully adequate, the loss would be limited to the degree to which they fell short of

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195. If no such arrangements are possible, there would be the same free rider problem even with resale price maintenance.

196. See, e.g., Priest, supra note 135, at 325 n.56. But see White, Vertical Restraints in Antitrust Law: A Coherent Model, 50 Antitrust Bull. 327, 333, 338 (1981).

197. Restricting the number of licensees will drive up margins in much the same manner as resale price maintenance or territorial restrictions. The key difference is that this technique can only be successful to the extent the patent is valuable. The reason is that licensing a patent of little or no value to a limited number of licensees will not increase prices because other firms, operating without a patent license, can compete. It would be noted that this analysis rests on the notion that proportionality is a necessary condition for a practice to be desirable. See subsection II-A-3 and Section IV-B supra. Application of the ratio test could in principle yield the conclusion that patentees should not be permitted even to limit the number of licensees. Cf. pages 119-20 infra (territorial and field restrictions limiting the number of licensees in each territory or field). This question will not be considered further here.

198. The assumption throughout this discussion is that devoting resources to sales promotion to the extent dictated by profit-maximization is desirable, which is subject to some dispute, particularly in the case of product advertising that provides little information and has as its primary effect shifting sales from one brand to another. See generally Comanor, Vertical Territorial and Customer Restrictions: White Motor and Its Aftermath, 81 Harv. L. Rev. 1419 (1968); Scherer, supra note 23, at 997-1000. This discussion also assumes profit-maximizing behavior. To the extent firms maximize sales or growth, one might expect excessive resources to be devoted to promotional activity even by comparison to the profit-maximizing level. See sources cited note 169 supra. Whether this warrants proscribing resale price maintenance when so motivated parallels the analysis of the market protection theory for restrictive licensing when similarly motivated. See 75

the incentives provided by resale price maintenance.[198] In this regard, it is also often forgotten that resale price maintenance alone is not the sure cure for the free-rider problem. The mechanism can be circumvented if discounters can, for example, tie to the sale of the product in question a good or service sold below-cost. Also, in the case of advertising, for instance, substantial free riding is still possible. In addition, there is no guarantee that promotional efforts will be directed primarily at other brands, rather than at other distributors of the same brand, which is of little help to the manufacturer or patentee.[199] Overall, the free rider justification for resale price maintenance is frequently advanced but rarely analyzed in much detail. The strongest argument suggesting that it explains observed behavior is that no other explanation is as plausible,[200] which, as described in subsection a, cannot be so readily applied in the price-restrictive licensing context. Whether allowance should be made for the possibility that restrictions are in fact so motivated depends upon how often they would be important to promote patent exploitation -- a very difficult empirical question about which little can be said at this point -- and how readily restrictions of this sort can be distinguished from disguised

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supra.

199. See Caves, Crookell & Killing, supra note 65, at 263 (licensors granting exclusive licenses often request performance clauses, minimum royalty payments, and sometimes downpayments for protection).

200. On this mode of inference, see generally Kaplow, supra note 142.

201. W. Bowman, supra note 108, at 131-38, relying upon Bork, The Rule of Reason and the Per Se Concept: Price Fixing and Market Division II, 75 Yale L.J. 373 (1966), describes seven "efficiencies created by price fixing," W. Bowman, supra, at 131. Of these, the first five are essentially the arguments for resale price maintenance. His fourth argument concerning transferring information about appropriate price strategy seems the least

collusive activity, which is the next topic to be considered.[201]

c. Distinguishing Resale Price Maintenance from Collusion

Since the resale price maintenance theory can be asserted in defense of virtually any price restriction scheme,[202] and the dangers of wholly unregulated price-restrictive licensing are substantial, it is only possible to permit such restrictions under some circumstances if cartelization can

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persuasive since he is attempting to justify enforced adherence to price minimums. His sixth argument is that local (retailer) monopolies can be kept in check through maximum prices, which is a very different issue from the regulation of minimum prices. See, e.g., Easterbrook, Maximum Price Fixing, 48 **U. Chi. L. Rev.** 886 (1981). His final argument, protection against possible fraud by a joint venturer, is no doubt of limtied application, and Bowman does not indicate how one could be assured that this were the true motivation rather than a cover for cartelization.

202. As suggested by the discussion in note 203 infra (analogy to Topco), this is true even in the case of traditional horizontal price-fixing. The parties can argue that the industry's product cannot best be promoted in the absence of restrictions because of free rider problems; hence, it is necessary for the industry to fix a price above that yielded by unfettered competition so that each firm will have an incentive to advertise the product and provide pre-sale information.

203. An analogy to the relationship between the rules in United States v. Topco Associates, 405 U.S. 596 (1972), and Continental T.V. v. GTE Sylvania, 433 U.S. 36 (1977), is instructive. Sylvania dealt with vertical territorial restrictions, which have similar effects to vertical price restrictions, and Topco dealt with horizontal territorial restrictions, similar in effect to horizontal price restrictions in that market division is one way of cartelizing an industry. The justification offered as a defense in Topco was essentially the same as the free rider argument offered in justification of resale price maintenance. Had the Court accepted the defense, it would either have had to permit all territorial agreements or be faced with the task of having to determine the effects of the arrangement in every case (and if Topco had been decided the other way, there may have been many such cases). Without claiming to resolve whether Sylvania or Topco were correctly decided, one can well understand why the Court would have decided the cases in opposite ways. Similarly, one could imagine the Court overruling its decision in Dr. Miles Medical Co. v. John D. Park & Sons Co., 220 U.S. 373 (1911) (resale price maintenance per se unlawful), much more readily than one could imagine the Court changing its mind about United States v. Socony-Vacuum Oil Co., 310 U.S. 150 (1940) (horizontal price-fixing per se

readily be detected.[203] Priest has undertaken an extensive examination of this problem, and reached the conclusion that detection is feasible.[204] His formulation relies upon market data rather than internal memoranda indicative of the subjective intent of the parties. For example, he would take as evidence of collusive behavior that royalties are rebated to licensees, that the price rises after the licensing of cost-reducing technology, that the royalty does not approximate the magnitude of the alleged cost reduction, and that prices fall by more than the royalty after the outbreak of unexpected competition.[205] He applies his analysis to a number of the leading court cases and reaches confident conclusions that are frequently contrary to the actual decisions.[206]

Priest's analysis represents a substantial advance. It is, however, somewhat hard to know whether sufficient certainty can be achieved in most cases, especially when agreements are of short duration, as would be true when there is a challenge to a proposed licensing scheme before or immediately after it goes into effect. The evidence appears rather unambiguous in many of the cases Priest analyzes precisely because the

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unlawful). The Court usually does not find it overwhelmingly difficult to distinguish horizontal and vertical arrangements, but in the patent context described in text, the arrangement is both horizontal and vertical, see subsection a supra, so the option of simply maintaining different rules for each is far more problematic.

204. See Priest, supra note 135.

205. Id. at 327. He also offers other factors, such as reduced or ceased production by smaller licensees and significant variations in market share, that negate an inference of cartelization. Id. at 328.

206. For some similar suggestions, see Furth, supra note 133, at 838-41.

offenses were so egregious and there was ample time to observe their effects.[207] In others, his conclusions are based upon an analysis of the agreements themselves, which is somewhat different from the tests he generally proposes and also may be less obvious when firms write their agreements with particular legal tests in mind.[208] And his conclusions that in some cases there was no cartelization seem more ambiguous than he admits.[209]

It is thus not altogether clear that a case-by-case inquiry is feasible, although the above reservations are not in themselves sufficient to rule out the possibility. Should courts choose to pursue such an ad hoc approach,

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207. See Priest, supra note 135, at 332 (discussing Rubber Tire, where the royalty was 4% and prices increased 30 to 37.5%), 346 (discussing General Electric, noting 2% royalty and Westinghouse's ability to survive massive price drops).

208. Id. at 331 (discussing National Harrow, noting that the holding company admitted that its royalty was merely an administrative fee), 334-40 (discussing Standard Sanitary, emphasizing evidence that the firms agreed to restrict the production of seconds).

209. Id. at 353 (discussing Masonite: decline in market share of largest licensee from 20% in 1935 to 12% in 1940 hardly seems conclusive of lack of conspiracy), 354 (failure of one licensee during time of stiff competition from other building materials indicates modest market power, but does not negate it since under any theory that licensee must have had higher costs than others). Id. at 349-50, is critical of the Court in Ethyl, but his ability to infer that cartelization was unlikely was not based upon market data, which he properly criticizes the Justice Department for not gathering, but rather derives from his belief that the Department's theory was simply implausible. Even if something like a per se rule against price-fixing were adopted, one could make exceptions for arrangements that by their very nature could not be thought to operate as a cartel in disguise.

210. Priest also argues that there is no choice but to undertake the sort of inquiry he proposes in every case since a per se prohibition on price restrictions could readily be circumvented by resort to territorial restrictions, which are protected by the patent statute. See id. at 315. This position is flawed for a number of reasons. First, the language of the

which is perhaps what they are doing now, Priest's insights offer useful guidance.[210] Courts should not, however, consider market data _to the exclusion_ of other evidence, as Priest suggests. For example, internal documents may help discover royalty rebates. Moreover, such documents may help determine whether such rebates constitute payments for promotional services or the distribution of cartel proceeds. In general, the analysis a firm would undertake before instituting resale price maintence would differ substantially from that necessary to analyze the feasibility of a cartelization scheme, and the process of determining what price should be set for each of the two purposes would be based upon very different factors. Thus, company records may often leave tell-tale traces. Although market data in some cases analyzed by Priest left little doubt, there may be substantial

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patent statute is hardly an unambiguous resolution of this aspect of the patent-antitrust conflict on the side of the patentee. See, e.g., **L. Sullivan**, _supra_ note 102, at 535-38; Baxter, _supra_ note 106, at 348-52 ("Only by amateurish literalism or cynical distortion can it be argued that Sec. 261 places a general imprimatur of legality on territorial restrictions."); Gibbons, _Territorial Restrictions_, _supra_ note 165, at 895-900. And if it were, it seems Priest should be arguing at least in part that Congress amend the statute. Second, the argument assumes that territorial restrictions are fully effective substitutes for cartelizing an industry. This is surely not the case. Absent a patent that revolutionizes an industry, territorial division of sufficient scope to isolate each producer may substantially disrupt well-established capital investments, customer relations, and the like. Finally, if territorial restraints were in fact both impermeable to antitrust attack and perfect substitutes for price restrictions, Priest's efforts would have been in vain, for in the long run it would do no good to detect which price restrictions were disguises for cartelization if patentees knew in advance that a safe harbour would lie in territorial restrictions.

211. One indication that such other evidence might be useful can be derived from Priest's analysis of _Standard Sanitary_. Priest, _supra_ note 135, at 337-39. Priest negates possible nonpernicious motives by reference to what he terms "objective evidence," _id._ at 339, which here includes Standard's dropping some terms but insisting upon others after having been served with the Government's complaint. It would seem that the Government's "subjective" evidence, _see id._ at 337, was sufficiently convincing to reach the same conclusion. While it is true that the more companies learn of antitrust

room for supplementation when doubt is greater.[211] Of course, such investigations will be distracting if one is looking for general evidence of collusion, an inquiry criticized by Priest[212] and others,[213] rather than evidence of the sort described here.

2. Other Justifications

In addition to offering ways to detect disguised cartelization, Priest's article examines alternative reasons that patentees might justifiably employ price restrictions. His mention of resale price maintenance was noted previously.[214] To the extent that other bona fide motivations are likely explanations for restrictive practices, the case against an unqualified per se proscription is strengthened, and the complexity of case-by-case inquiry is increased.

Priest's first additional justification is that patentees might regulate price to "prevent[] licensees from disassembling the product to reduce royalty payments."[215] "[I]f the royalty charge is set as some function of

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n. 211 cont.   enforcement policy, the more they can hide, or never produce, smoking guns, the same can be said of the defendant's behavior in modifying its restrictions after the filing of an antitrust suit. Also, Priest indicates how his proscriptions "might deter cartel behavior simply by increasing the costs of cartel coordination," and continues by indicating how even "the most careful of disguises will generate still other evidence of illegality." Id. at 328-29. But such evidence may well be found in corporate papers that reveal the efforts to circumvent other forms of detection.

212. See id. at 313.

213. See, e.g., Furth, supra note 133, at 824-28.

214. See note 181 supra.

215. Priest, supra note 135, at 323.

the licensee's sales revenues, the licensee may gain by disassembling the product to reduce royalties, notwithstanding some consequent diminution in product sales."[216] The idea is that if a component containing the patented item, or produced by the patented process, can be sold separately from the rest, the sales proceeds on the rest would escape royalty payment, whereas under a price restriction the licensee cannot charge any less for the component that is based on the patent. This assumes, of course, that royalties must be based upon a percentage of total sales, and not the number of units of the patented component that are sold.[217] Other options available to the patentee would include incorporating product definitions into the license either as product regulation or in stating the basis for the royalty rate, and correspondingly increasing the royalty on the separated component, to the extent disassembling can be forseen. It also may be that this theory could readily be ruled out in a large portion of cases,[218] in which case a qualified per se proscription would still be feasible. Finally, to the extent this were a serious problem, one might have thought it would have achieved greater notoriety by now, and been offered as a defense in prior antitrust cases, regardless of whether it was the actual explanation for the defendant's behavior.

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216. Id.

217. See id. at 324 n.53 (suggesting that this might be superior to price restriction from the patentee's perspective). If the portion of the patented component to the total is variable, the discussion in Part VII infra would be relevant here.

218. This might be possible with many process patents, and where the patented component, such as a light bulb filament, could hardly be sold separately to consumers.

Priest also offers a far more intricate justification based upon the desire

of the patentee to take advantage of future cost reductions by licensees.[219]

The idea is that a licensee that is able to reduce its cost below that of the

other licensees will have some market power, and thus will not fully expand

its output to the efficient level, which both leads to inefficiency in the

allocation of production among licensees and reduces the potential benefit to

the patentee in terms of royalties. Priest's theory is that price and output

restrictions will prevent the licensee from expanding output altogether.

While this seems to make matters worse, Priest reasons that since the

constrained licensee will see the potential for improvement in the absence of

present restrictions, it will have an incentive to approach the patentee to

renegotiate terms. The theory is that since there are net gains to be had,

the patentee and licensee will be able to reach an agreement that leaves them

both better off not only than before the renegotiation, but also than they

would have been if there had never been any price or output restrictions.

The problem of market power on the part of the single licensee is not

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219. Priest, supra note 135, at 318-23.

At the outset of his discussion, Priest "[a]ssume[s] that the licensor
neither manufactures not distributes the patented product but licenses other
firms to do so." Id. at 318. The footnote indicates that "[t]his assumption
does not affect the analysis." Id. at 318 n.35. Although it does not affect
the technical discussion, the assumption is relevant to determining an
appropriate policy for price-restricted licenses. Quite simply, if the
patentee is not in competition with its licensees, arrangement is purely
vertical, thus changing the analysis of subsection 1-a supra. But see note
185 supra. Thus Priest's criticism of the Supreme Court in General Electric
for believing that price-fixing could only be justified if the patentee
competed with its licensees, see id. at 318 n.35, understates the Court's
error, because the strongest case for permitting price-restricted licensing
is in just such cases.

unusual; generally, a firm with lower costs than others will exercise some amount of market power, the amount depending upon market conditions.[220] The relevant issue in all such cases is how significant that market power is. Here, if the power is not significant, Priest's scheme would not induce renegotiation at all since the licensee's optimal price would still exceed, although by a lesser degree, that set in the license. Moreover, it must be kept in mind that some of the beneficial effect will result without any need for renegotiation in the absence of restrictions;[221] any gain from the restrictive scheme must be compared with that level.[222] The patentee would have to know in advance that the likely extent of unforseen gains in

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220. See generally Landes & Posner, supra note 54; McGee, supra note 176, at 158 (discussing the Cracking case). Priest seems aware of the connection. Priest, supra note 135, at 320 (noting that the number of licensees may be small).

   To the extent licensees have different cost functions at the time of the initial licensing -- which may often be the case -- Priest's "problem" exists from the outset. Absent complicated arrangements, one would expect that patentees and licensees could not fully resolve the problem Priest raises, either initially or in the process of renegotiations. (Priest apparently contemplates that the mechanism that would be used is a simple royalty. See Priest, supra note 135, at 320 n.41.) Of course, the initial negotiation is presumably at least as good as a future renegotiation could be in meeting the combined interests of the patentee and licensees. Thus it is likely that renegotiations addressed to changes that cause new differences to arise in licensees' cost functions would also be less than fully successful.

221. Priest admits this point. See Priest, supra note 135, at 323. This fact corresponds to the existence of Priest's problem to some extent even at the outset. See note 220 supra.

222. Also, to the extent that the unrestricted scheme does not lead to an optimal result, it too creates incentives for negotiation. In the cases where the cost reduction is most significant, and thus the loss from continuing the current pattern of exploitation is the greatest, such negotiations would be most likely. In general, there is less incentive for negotiation with the unrestricted scheme, but that corresponds to there being less of a problem in the first place.

efficiency -- as well as which licensees would make the break-throughs, to the extent the market situations of each were different -- were such that on-balance it was better off with the restrictive scheme than without, taking into account both the cost of negotiations and the likelihood that negotiations might break down, leaving the patentee worse off than if it has opted for the unrestricted scheme. Another consideration is that this system may provide less return to the licensee than the unregulated scheme, especially to the extent that renegotiation takes time or breaks down, the result being that the licensee's incentive to develop cost-reducing techniques is diminished.[223] Finally, if this is a serious issue, one might wonder why it has not received greater attention heretofore, particularly in defendants' briefs. In this regard, Priest's comment that the General Electric "Court, of course, was unaware of [such] efficiency-enhancing effects of price-fixing"[224] is most notable, because one suspects that the Court's ignorance might have been otherwise had the defendant, who might in theory have acted for the proffered reason, informed the Court of this

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223. It is also not completely certain that correcting the problem Priest identifies would be an improvement. The adjustment induced by price restrictions results not only in a decrease in production costs and an increase in the reward to the patentee, but also in an increase in price and thus a decrease in output. See Priest, supra note 135 supra, at 319 ("unanticipated cost reductions ... make the royalty too low so that licensees are able to sell below the profit-maximizing price"). As will be seen in Parts VI and VII, the effect on the ratio is formally indeterminate in such circumstances, although it may be quite plausible that in this context the ratio for permitting restrictive practices -- ignoring all the reservations in the text -- would be relatively high. As a policy matter, this would only be important if the effect were substantial and if price restrictions employed for the purposes Priest here describes could be distinguished from those used to facilitate collusion.

224. Priest, supra note 135, at 342 n.121.

alternative motivation.

D. Price Restrictions in Cross-Licensing Arrangements

1. Competing Patents

When prices are restricted among firms that cross-license competing patents, the dangers previously discussed arise again.[225] If one attempts to determine in an individual case whether the arrangement is a disguised cartel, the inquiry will be more complex, for the royalties actually paid will not reflect the actual values of the patents, but only the difference. Thus, for example, two firms could cross-license combination patents of similar value with there being little or no transfer of royalties. Of course, to the extent that nonmembers of the cross-licensing group are licensed, the royalties they pay could be analyzed in the same way that one makes inferences based upon the payment of royalties to a single patentee.[226]

2. Complementary Patents

With complementary patents, just as with competing patents, there exists a

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225. When competing patents are cross-licensed, the dangers discussed in Part V infra also arise.

226. See Priest, supra note 135, at 329-30, 347-48 (using such analysis to interpret the arrangement in General Electric under the assumption that Westinghouse also held valuable patents), 357.

227. See, e.g., F. Scherer, supra note 24, at 452:

> Some of the most egregious price-fixing schemes in American economic history were erected on a foundation of agreements to cross-license complementary and competing patents. ...

significant danger that cross-licensing schemes will cover for price-fixing conspiracies.[227] In this context, Priest advances the contention that

> [w]here firms have cross-licensed complementary patents ... some form of price restriction is essential for the firms to take advantage of licensing efficiencies and still gain the full monopoly return for their inventions. ... But since the cross-licensing makes each firm a competitor of the other, the two must agree to restrain sales to avoid competing away the patent rents.[228]

It would seem, however, that if each charged the other a royalty that reflected the value of the licensed patent,[229] profits would be preserved.

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n. 227 cont.

Typically, such arrangements have been implemented by adding to the patent exchange agreement provisions specifying prices, market quotas, membership in the industry, and other aspects of conduct and structure.

228. Priest, _supra_ note 135, at 357.

229. There is, of course, a conceptual problem in placing values on each patent independently when some or all of the benefit can only be achieved when both patents are used together.

230. Consider the following example: The cost of production for firms A and B is $6 when both patents are exploited. A's patent is worth $2 per unit, and B's is worth $1. A charges a royalty of $2, and B charges $1. Thus A's cost is $7 ($6 plus the $1 royalty owed to B). B's cost is $8 ($6 plus the $2 royalty owed to A). Under these circumstances, a price of $9 would prevail, and each would earn a profit equal to the value of its invention on each and every unit sold, either directly in the case of its own production or through royalty payments in the case of production by its competitor. To see that this price results, consider the result if, for example, price were to equal $8. At that price, B can make no profit on its own production, since its costs are $8, and B makes $1 on A's production from royalties; hence, it would not produce at that price. Similarly, A makes only $1 per unit on its own production (its costs are $7), but $2 on B's through royalties; hence, A would also prefer not to produce at this price. One would thus expect prices to rise. Alternatively, if price were $10, B would make $2 on its own production and only $1 on A's, while A would make $3 on its own production and only $2 on B's. Thus, each would try to sell more, which would compete the price downward. Equilibrium is at a price of $9, since there each firm makes the same profit regardless of which firm produces the output, and thus there is no further downward pressure on the price.

An example is offered in the margin.[230]

However, price-fixing can essentially be accomplished through such royalty schemes. As the footnote example demonstrates, the resulting price from such a system will be the producers cost plus the total of their per unit royalty obligations. There are some limits, however. Other firms could undercut the conspirators price if the patents were not worth the royalty payments. Of course, the same can be said for a price-restriction scheme unless it includes most firms in the industry. But there is another consideration that makes the royalty scheme more difficult to disguise. If the cross-payments are not of the same magnitude, those receiving larger per unit payments will benefit to a correspondingly greater amount, and one might expect firms, especially if the numbers are not very small, to be unable to agree on such a disparate sharing of the spoils. Attempts at equalization[231] may be detectable. As discussed previously, and as argued by Priest, substantial rebates will be hard to hide for long.[232] The only alternative would be to set all the cross-royalty obligations at equal levels. But such an arrangement, especially as the number of firms became larger, would very likely take on the appearance of a sham, for the firms defense would have to be that each and every firm in the group possesses one or more patents that, taking each firm's patent holdings as a unit, have the same value. Moreover,

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231. In this context, "equalization" may mean, for example, reward in proportion to market share.

232. See pages 88, 90 supra.

the firms would have to find patents for which such claims could plausibly be made,[233] which are all valid, and none of which expire during the course of the agreement. The justification for tolerating price-restriction among patentees with complementary patents thus seems unpersuasive.[234]

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233. One element of plausibility would be that a defensible claim can be made that each patent is as valuable as the group royalty rate.

234. An additional difficulty with the approach, which Priest explicitly recognized, Priest, supra note 135, at 358, is that it may be difficult to distinguish competing from complementary patents. Thus a more relaxed approach toward the latter may have to be abandoned to prevent abuse in cases involving the former.

V. Applications: Acquisition, Cross-Licensing, and
Settlements Involving Competing Patents

This Part will deal only briefly with these subjects, each of which raises numerous issues of its own. All, however, have in common the combination of patents that might have been licensed or otherwise exploited in competition with one another.[235] Bowman describes the sort of analysis he thinks appropriate as follows:

> The problem of patent accumulation, the aggregation of several numerous patents under single ownership or control, is conceptually indistinguishable from the merger problem under antitrust law.
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> ***
>
> A pool of competing patents can be more readily analogized to a loose association than to a horizontal merger. This, of course, depends upon one's evaluation of the pool's efficiency-creating potential. A pool of competing patents is difficult to distinguish from a cartel in this respect.[236]

The courts,[237] as well as most other commentators,[238] take essentially the

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235. Difficulties that might arise when complementary patents are combined or cross-licensed are examined in subsection IV-D-2 supra and note 234 (noting problem of distinguishing complementary and competing patents).

236. W. Bowman, supra note 108, at 200-01.

237. See, e.g., United States v. New Wrinkle, Inc., 342 U.S. 371 (1952).

238. See, e.g., R. Posner, supra note 142, at 91-92; L. Sullivan, supra note 102, at 567-68.

same approach. The reasoning is that if competing patents were held separately, royalty rates would be competed down to the point where each patentee could only hope to charge a royalty that reflected the degree to which its patent was more valuable than any of the others. Combination or collusion eliminates this competition.

Although I believe that this consensus position probably reaches the appropriate result, the explanation typically offered is incomplete. A hint of the problem can be found in Bowman's argument that the combination of two competing patents raises costs to licensees "above that measured by the 'competitive superiority' of either of the patents."[239] One should recall, however, that Bowman typically uses the concept of competitive superiority in a manner that infers from licensees' willingness to accept the terms of the agreement that monopoly has not been extended.[240] His manipulation of his own test in this context offers two warnings. First, one might question whether the test is as determinate or as appropriate as he claims, an issue discussed previously.[241] Second, one might have doubts about his reasoning in this context. The deficiency in the consensus approach is that it essentially ignores whether patent policy might dictate a different result, in that no concern is expressed for the diminution in reward to the patentee that results from prohibiting these arrangements. In terms of the ratio

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239. W. Bowman, supra note 108, at 201.

240. See subsection III-C-1 supra.

241. See subsection III-C-1 supra.

test, the denominator is the focus and the numerator is ignored.[242]

Application of the ratio test by itself does not automatically resolve this problem since the numerator, which measures reward to the patentee, is quite substantial. However, one suspects that these practices are undesirable since, as in the case of price-fixing, only a fraction of the reward flows to the patentee. Similarly, although less accurately,[243] the problem here can be seen as one of proportionality: given the amount of incentive appropriate in the situation, the rewards in such combinations are substantially excessive. The true social value of any one of the competing patents, given that the others exist, is only the degree to which it is superior to the others.[244] Thus, in the simple situation where each patent is essentially a perfect substitute for the others, any one patent has no value in an economic sense, for if the invention had never been made, the same cost reduction or product improvement could have been achieved equally well.[245] Thus, the

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242. When discussing Hartford-Empire Co. v. United States, 323 U.S. 386 (1945), Bowman resorts to his more usual error of focusing exclusively on the numerator -- the patentee's reward -- which ignoring the denominator. See **W. Bowman**, supra note 108, at 222 n.37 ("considerable doubt as to whether the method of licensing was anything more than a profit-maximizing device").

243. Cf. subsection IV-B supra (collusion).

244. A good discussion concerning the appropriate reward for partially and completely redundant inventions is Beck, Patents and Over-Investment in Process Inventions: Reply, 45 **So. Econ. J.** 289 (1978). See also **F. Scherer**, supra note 24, at 446.

245. See, e.g., Wright, Supra note 28, at 694.

246. This is arguably Bowman's point, see page 101 supra, if one emphasizes in his language the reference to "the 'competitive superiority' of either of the patents." The criticism in text is still valid, however, for if they are pooled, licensees will in fact will be willing to pay the premium as though only one of the patents existed. In this instance, Bowman essentially is

reward provided by the competitive process is the appropriate one.[246]

The analysis, unfortunately, is even more complex. Even though each patent is of no incremental value to the others in the hypothetical, it is still true that without any of the patents the situation would be worse. And if combination is precluded, yielding a competitive environment that eliminates all reward to the competing patents, one might ask what incentive exists to come up with the first patent. Moreover, one might consider the situation where there is already one patent, with the patentee being rewarded accordingly for its monopoly over the improvement, and ask what the proscription on combination does to the incentives for inventing around the initial patent to create the competition in the first place. Both arguments look to the future where the competing patents do not yet exist and ask whether the result from the competition regime will be any better than from allowing unrestricted competition.

All of these problems appear to be resolvable. The simplest is that concerning the incentive to invent around,[247] where it should be noted that inventing around provides no social benefit if the new invention is no better

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n. 246 cont.   requiring that one analyze the situation in the absence of the restrive practice as a basis for comparison, and not making decisive the licensees' choice when the restriction is present.

247. As to the feasibility of inventing around, see Scherer, Research and Development Resource Allocation Under Rivalry, 81 **Q. J. Econ.** 359, 364 (1967) ("in the new product category, few positions impregnable to the imitation of rivals are attainable; it is possible to 'invent around' all but the most basic patents").

248. Recall that to the extent the second patent is better than the first, that increment of value will be rewarded even with competition. Allowing for such cases does not affect the analysis to follow.

than the first[248] and the two patentees are permitted to combine in order to recover as though they were one. In fact, the only effect of inventing around in such circumstances is to redistribute the reward from the original patentee to others.[249] Since inventing around does not contribute to welfare when combinations are permitted, the resources devoted to the task are a pure waste; thus, to the extent inventing around is discouraged in this way there will be a social benefit.[250]

The issue of the incentive for the initial invention is more difficult. But for the possibility of potential competition (inventing around), the initial inventor faces the prospect of the full monopoly reward under either

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249. See Priest, supra note 135, at 362, 373. Priest concludes from this that "[a] cross-license in this context unambiguously diminishes welfare," id. at 363, but he fails to consider the effect upon incentives for future inventive activity, see id. at 373 (expenditures on inventing around "can increase social welfare if they lead to erosion of the monopoly rent and reduction of the deadweight loss").

250. On the general issue of monopoly profits being translated into costs, see Posner, supra note 23.

Kitch has tangentially addressed an aspect of the issue in this part. He advocates permitting "pooling as a way to stop what will otherwise be a wasteful and continuing investment process." Kitch, supra note 74, at 279 n.37. First, Kitch assumes that firms would be admitted to a pool before most of the resources necessary to complete the inventing-around process have been spent, which seems of questionable plausibility. Second, and more decisively, he overlooks the fact that firms will have a greater incentive to begin the inventing-around process if they know that pooling will be permitted. In the example in note 253 infra, Kitch's implicit model simply envisions a lower cost of inventing around (since the process need not be completed to be admitted into the pool), which in general has no effect of decreasing the total resources wasted as a result of permitting pooling. If Kitch's theory were right, there generally would be less waste per duplicative invention but a proportionately greater amount of duplication.

system. Inventing around followed by combination dilutes this reward.[251] The issue thus becomes whether preventing combination would dilute the reward more or less than otherwise. The important point to note is that noone will have an incentive to invent around unless the antiticpated profit, which must take into account the fact that it cannot combine but must compete, provides a sufficient incentive. To the extent, for example, that the result of a second patent would be to compete away much of the reward,[252] there would be only a modest incentive to develop the competing patent. There would be sufficient incentive despite limited reward in cases in which the cost of inventing around is sufficiently small. It is quite true that if such circumstances can be anticipated by the initial patentee, there may be a serious diminution in its incentive to come up with the invention in the first place. However, the same result occurs if combination were permitted, for when the cost of inventing around is relatively low, more and more will procure their own patents, which will force the existing combination to either sacrifice its profits or admit the new patentees. In general, this process would continue until the diminuation in profit remaining for the original patentee was as severe as under the competitive system. The net

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251. This general connection was noted by Priest, supra note 135, at 361. Priest claims, however, that such a reduction "is unlikely [since] the return to the innovation is a function solely of the time-lag between the first commercial use of the process and its duplication." Id. at 363. The flaw in this argument is that the time-lag is not exogenous, but may depend upon the rules adopted. He thus does not discuss the potentially ruinous effects of inventing around upon incentives to invent in the first instance.

252. With two patents, there would be a duopoly, and it is difficult to predict how much competition might result in general. As the number of patents increases, the amount of remaining aggregate reward will be less. The analysis in text holds regardless of the precise relationship between number of patents and degree of competitiveness.

result is that forcing firms that invent around to compete will tend to both
decrease the resources wasted from duplicative research and development
activity and diminish the monopoly cost associated with a given level of
reward for the first inventor, although this conclusion is subject to

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253. The following example illustrates these phenomena. Let $\underline{C}$ be the cost of
inventing-aroung -- i.e., the cost of developing an equivalent invention for
all later inventors after the first invention has been made. Consider the
effects under two regimes:

(1) _Invent and Merge_: It is assumed for this illustration that the share of
reward going to a later inventor is simply its market share divided by the
total market shares of all firms that are in the pool -- i.e., all firms who
have come up with the invention. To further simplify the example, assume
that all firms are the same size. Additional firms will develop the
invention if their share of the profits is greater than or equal to the
cost. Thus, the equilibrium condition is:

(A) $(1/N) \times P = C.$

$\underline{N}$ denotes the number of firms in the pool (who have developed the invention)
and $\underline{P}$ denotes the maximum profits that can be achieved with the invention.
This implies:

(A´) $N = P/C.$

Of course, the total expenditure of resources in this regime is simply $N \times C$,
which equals $\underline{P}$.

(2) _Invent and Compete_: Here it is necessary to specify how industry
profits (P) decrease as the number of firms with the invention increases.
Any formulation will yield the same qualitative result. For illustrative
purposes, assume that industry profits equal $(1/N) \times P$, and that each firm
with the invention realizes the same share of the industry profits as any
other firm with the invention. Then the equilibrium condition is:

(B) $[(1/N) \times P]/N = C,$

which implies that

(B´) $N = (P/C)^{1/2}.$

The total expenditure of resources under this regime is $N \times C$, which equals
$(P \times C)^{1/2}$. This is less than the total cost of $\underline{P}$ under the first regime
unless $\underline{C}$ is greater than or equal to $\underline{P}$, but in that case no firm would have
an incentive to invent around under either regime, and the issue would never

arise.

The basic difference between the two systems is that under the competition regime, profits erode faster than under the merge regime, so equilibrium is reached with less firms having invented around, and thus less waste of resources. There is, however, an additional benefit to the competition regime. Since profits are eroded through competition, the monopoly cost of the patent system is also less. It should be noted that this savings has no cost in terms of the total reward to the initial invention by comparison to the regime that allows later copiers to merge. Under both regimes, the reward that remains to the initial inventor is simply C. It should be noted that neither result is dependent upon the particular formulation of the example presented. Essentially, this is an example of how potential excess profits are translated into social costs when no barriers prevent competitors from eroding the profits. See generally Posner, supra note 23.

This, of course, may be problematic in that under either regime there may be insufficient incentive for anyone to develop the initial patent. See, e.g., F. Scherer, The Economic Effects of Compulsory Patent Licensing 24 (1977) (New York University Graduate School of Business Administration, Monograph Series in Finance and Economics, No. 1977-2) ("If small potential innovators come to expect that their innovative thrusts will be promptly countered by established firm defensive moves, they may be discouraged from trying."). From this example, the problem would exist whenever the cost to the initial inventor was greater than the cost of inventing-around, and it seems plausible that this condition would often be satisfied. There are, of course, other benefits that go to the first inventor, such as receiving the full industry profit until others begin to invent-around, and retaining various benefits that often accrue to the first to offer a new product. See, e.g., F. Scherer, supra, at 21, 23. The potentially ruinous effects of inventing around upon incentives for the initial invention is here demonstrated to plague the patent system generally. That this issue should prove difficult for the patent system is hardly surprising. Inventing around is just a more involved mode of copying, which it was the very purpose of the patent system to prevent. The issue arises because of the difficulty in defining the appropriate scope of the patent grant, and here by "scope" I do intend to refer to the description of the patent found in the documents constituting the patent grant.

One cannot be certain of the result described here given the simplicity of the example. It is conceivable that delays in the time it takes to invent around a patent may affect the expected profits for the first inventor more under one regime than under the other. Also, the simultaneity of competitors' research and development activities combined with technological uncertainty concerning the likelihood of success from any given endeavor complicates the story. At present, I see no a priori grounds for assuming that such complications bias the result in one direction or another. Yet the very complexity of the problem warns against confident conclusions at this stage in the development of the analysis.

There is one technical qualification to the results described in both regimes. The equilibrium conditions for the number of firms (A´ and B´) may

not be integers, and it is not possible for a fraction of a firm to develop a fraction of an invention in the sense described here. As a result, under both regimes, the process would stop where N was the greatest integer such that the the next inventor would expect to receive negative profits. This would have only a small, and happenstance, effect on the results. Since reward declines more rapidly under the competitive system, there would be a tendency for it to be favored slightly more than the results indicate. An extreme example illustrates the point. If prospective second patentees, for example, anticipate that rewards would be competed down so much that there is insufficient reward left to recover research and development costs, no one would have an incentive to develop the second invention in the first place, leaving the original patentee with a more substantial reward than under a combination which involves sharing of the aggregate profit but no diminution in its aggregate amount due to competition and also saving the resources that would have been consumed by the duplicative invention.

The analysis may appear to have one further complication: prospective second (or third, and so on) patentees must factor into their analysis not merely their share of the spoils after sucessfully having invented around, but also that they will no longer have to make their royalty payments to others. As a result, it may seem that they will be more likely to invent around than the previous analysis suggested. This effect operates under both systems, and thus would not alter the basic results. The effect, in fact, has already been accounted for implicitly in the preceding presentation. The argument assumed that inventing around would occur when profits it yields are positive. This rule is correct since firms paying royalties are charging prices that reflect those royalty levels. If a firm obtains the patent, it no longer needs to pay royalties, but its share of the spoils was already deemed to include its share of production.

Finally, it is worth noting that under either regime, the largest firms will have the greatest incentive to invent around. This is because the larger the firm's market share, the greater its share of the reward, so long as aggregate rewards (not rewards per unit of output) are positively correlated to the firm's market share, which seems a plausible assumption. One might thus expect the resulting pattern of development to be one where the largest firms are the ones with the patents. In addition, for similar reasons, they may be the most likely to invent in the first place.

This point does not support the view that larger firm size is most conducive to innovation, which is a highly controversial issue. See generally F. Scherer, supra note 24, at 407-38; Kamien & Schwartz, Market Structure and Innovation: A Survey, 13 J. Econ. Lit. 1 (1975). The analysis in text instead seems to indicate that in any given industry, it will be the firms with the greatest relative size that will be more likely to innovate, and duplicate others' inventions, when the costs of inventing around are low relative to the value of the invention. This perhaps suggests that the empirical literature on the relationship between market structure, firm size, and innovation, discussed in the sources cited supra, is biased toward the conclusion that firms with larger market shares tend to be more innovative. (In this regard, it should be noted that, beyond intermediate levels of size and concentration, the studies do not generally find a positive relationship

substantial uncertainty given present knowledge of the subject.[253]

This part has not compared the various contexts in which patent combinations arise. Nor has it attempted to address many of the issues that might prove relevant in determining the appropriate rules in each of those contexts. Rather, it has indicated the deficiencies in the analysis typically offered in defense of the prevalent suspicion of patent combinations of various sorts and offered a reformulation of the problem suggesting that existing fears may in fact be justified.

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cont.
between size or concentration and innovation.) I call this a bias in that the relationship is likely to be found even though it does not indicate that higher concentration or firm size will increase innovative activity. The only sense in which it might in fact result in an increase is that the equilibrium level of copying activity would be higher, but for the reasons suggested in the text this is socially undesirable, and thus adds a further sort of bias to the observed relationship in the same direction as the other.

VI. Applications: Price Discrimination

A. The Desirability of Permitting Price Discrimination by Patentees

The analysis indicating the benefits of price discrimination by patentees was presented in subsection II-B-2-a[254] which addressed the factor of how much of the reward is pure transfer. The argument was that for a given numerator -- patentee reward -- the denominator -- monopoly loss -- would be less the greater the extent to which the patentee achieved its reward through transfers.[255] Price discrimination was offered as the typical situation where this process occurs in the marketplace.

Although restrictive practices by patentees aimed toward price

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254. See also page 30 & note 55 supra.

255. Outside the patent context, this effect may be deemed undesirable for a number of reasons. One, explored by Posner, supra note 23, is that added rents induce rent-seeking behavior that eventually competes away the rents while wasting resources along the way. It is precisely this process that the patent system attempts to convert to an advantage, for it is the holding out of the patent reward that induces the rent-seeking behavior that in this context constitutes inventive activity. (Unfortunately, it also involves wasteful duplication, see, e.g., Part V supra, litigations costs, and other losses as well.)

   Outside the antitrust context, the principle that price discrimination can be used to raise needed revenues from consumers with less elastic demands while keeping losses to a minimum has arisen in a number of settings. See, e.g., A. Atkinson & J. Stiglitz, Lectures in Public Economics 366-93 (1980); Bailey & White, Reversals in Peak and Offpeak Prices, 5 Bell J. Econ. & Mgt. Sci. 75 (1974); Baumol & Bradford, Optimal Departures from Marginal Cost Pricing, 60 Am. Econ. Rev. 265 (1970).

discrimination have been greeted by many with favor, the analysis leading to this result is often deficient. Bowman, for example, finds discrimination acceptable largely because it increases the patentee's return.[256] As was seen to be generally true with Bowman's "competitive superiority" test,[257] this analysis focuses on only part of the story, the numerator of the ratio. He protests the unfairness imposed upon patentees who are not permitted to rely upon restrictive practices needed to facilitate price discrimination when others capable of fully exploiting the patent on their own are often in a position to discriminate without having to rely upon restrictions.[258] He correctly criticizes the inefficient inducement this provides for further integration of firms to the detriment of more efficient smaller firms,[259] but that argument may well not be decisive if the practice of the larger firms is undesirable, particularly if the practices of the latter could be regulated.[260]

Another reason that price discrimination is often viewed with favor, this time not only in the patent context, is that in some circumstances it will result in increased output, and thus a more efficient allocation of resources. It is well known that whether this result will occur depends upon

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256. See, e.g., **W. Bowman**, supra note 108, at 56. Elsewhere, he refers to the effect of price discrimination as "maximiz[ing] the return ascribable to the differential advantage the patent affords." Id. at 101.

257. See subsection III-C-2 supra.

258. See **W. Bowman**, supra note 108, at 56.

259. Id.

260. Cf. note 38 supra.

the circumstances, and that output contraction is possible, although it is often believed that expansion is more likely.[261] There is a tendency among patent-antitrust commentators to assume, to the extent they move beyond the simple view that any increase in reward is a good thing,[262] that the desirability of permitting patentees to price discriminate depends upon what the output effect will be in various circumstances.[263] Although this effect will be relevant, it is hardly the major factor, as demonstrated through

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261. See generally, e.g., **F. Scherer**, supra note 24, at 320-22 (noting that, despite this tendency, "we really do not know, and so it is impossible to determine whether on balance third-degree discrimination increases output and improves the allocation of resources").

262. Bowman avoids the error of others (although he makes a similar mistake in a related context, see Section VII-C infra) precisely because he buys into this simple view.

> [I]t has been suggested that price discrimination deserves proscription when it results in output contraction. But evaluating this contention, especially in the patent context, merely raises the question whether a patentee should receive the "full reward" provided by the superiority of his patent in some circumstances but not in others.
>
> Why, it needs to be asked, if temporary monopoly (by nature restrictive) is what a patent monopoly necessarily involves, should it be more reprehensible to achieve it from several demand curves than from just one?

W. Bowman, supra note 108, at 112. Thus, Bowman moves from question-begging ("full reward") to a superficially appealing quip, never really analyzing the issue.

263. See, e.g., **L. Sullivan**, supra note 102, at 540-41 (discussing territorial restrictions, noting that "[t]he higher return to the patent holder is, from the vantage point of the public, unnecessary to the stimulation of any socially desired conduct."); id. at 557 (taking the same position on field restrictions). Williamson's criticism of Bowman (whose statement is quoted at note 262 supra) also relies heavily on the efficiency consequences -- although he considers transaction costs in addition to the output effect -- while attributing little significance to the effect on the patentee's reward. Williamson, Book Review, 83 **Yale L.J.** 647, 660 (1974).

application of the ratio test. For example, if there were no output effect, or even if the output effect were moderately adverse, there will often still be a substantial increase in patentee reward. Thus, it seems plausible that the net effect of discrimination will more often be an improvement in the ratio due to a relatively large transfer effect, accompanied by a more minor adjustment in the ratio due to the output effect, the direction of the adjustment depending upon the output effect in any given case. Since the transfer effect is likely to dominate even an adverse output effect in terms of the net change in the ratio, general conclusions concerning the benefits of price discrimination by patentees in many contexts can be made even if the output effect is uncertain.

It also may be necessary to consider whether the additional reward accruing to the patentee as a result of being permitted to pursue practices facilitating price discrimination is appropriate.[264] The possible concerns are obvious, varied, and complex. The distributional implications and other problems with the fairness or inequality involved with price discrimination will not be considered here, as consideration of these issues is little affected by the interaction with patent policy, except to the extent that one might reach different results after taking into account the possible positive effects in that regard that were just described.

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264. To the extent price discrimination were deemed inappropriate, presumably principles of the Robinson-Patman Act, 15 U.S.C. Sec. 13 (1976) (Section 2 of the Clayton Act, amended by the Robinson-Patman Act of 1936, 49 Stat. 1526), (and similar proscriptions deriving from other antitrust statutes) would be applied to royalty structures, in which case the problems raised by Baxter concerning the difficulty of defining when royalties are discriminatory would have to be faced. His analysis goes a long way in dealing with this difficulty. See Baxter, supra note 106, at 281-87.

Another difficult issue concerns the problem of providing disproportionately high rewards, which as discussed in subsection II-A-3 can be bad patent policy independent of how the analysis fares under the antitrust laws.[265] Price discrimination may even permit patentees to recover more than the total economic surplus generated by their invention without any disguised cartelization to the extent that discriminatory practices are permitted by patentees but forbidden to others.[266] It may be that the appropriate solution in regard to the objective of setting an appropriate reward would be to permit discrimination since it is one of the most efficient means of patent exploitation (has a high ratio) and to be sure that the patent life is adjusted accordingly.[267]

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265. The connection between the possible need for limiting the total reward and the argument that transfers are an efficient way to award licensees can be seen by reviewing the analysis of the latter. The claim was that _for a given numerator_, the denominator will be less when the reward is achieved through, for example, price discrimination. But the decision to permit restrictions or actions that facilitate price discrimination is not made in a world where the numerator is fixed; permiting price discrimination increases the numerator. This does not of course imply that the result will be undesirable, but it does create the need to consider the appropriate impact of this effect upon the decision.

266. The reason is simply that the patentee's discrimination may reach not only the surplus generated by its invention, but also surplus that would have gone to consumers or other producers in the absence of its invention. It may not appear at first glance that this is possible. But, for example, a patentee with substantial market power before developing an invention may have been forbidden from price discrimination whereas with the patent it may be able to engage in practices that allow it go get the benefits of price discrimination as to the buyer surplus that existed beforehand.

267. To the extent that more price discrimination would result if the courts relaxed the application of the antitrust laws in contexts where restrictions facilitated price discrimination, it would not follow that the patent life should be shortened since it may already be too short right now. And the converse is also possible. See generally Section II-C supra.

Finally, there is the need to consider the usual antitrust inquiries in the event of price discrimination, i.e., whether there are adverse primary or secondary line effects.[268] As to the former,[269] one would not expect to find predatory behavior on the part of a patentee unless there were holders of competing patents[270] or the predation had no connection to the patent. To the extent it is believed that the general proscription of price discrimination is an important deterrent to such predation, and that actual instances of predation are difficult to detect, then the desire to be more permissive toward price discrimination in the patent context would raise the difficulty of determining how discrimination was being employed by a particular patentee. Since the usual distinctions that form the basis for economic discrimination are fields of use and customer groupings, it would be easy to distinguish predation unless competitors' businesses were divided along the same lines that separated users with different valuations. For example, if competitors sold competing patented machines in different regions of the country from each other and the patentee-defendant sold nation-wide, royalties that discriminated among fields of use would be useless in singling out individual competitors unless each competitor's region by chance had its

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268. Among commentators the proscriptions against price discrimination are probably the least popular antitrust proscriptions, **R. Bork**, <u>supra</u> note 133, at 382-401 ("antitrust's least glorious hour"); <u>see, e.g.</u>, **F. Scherer**, <u>supra</u> note 24, at 580-82 ("an extremely imperfect instrument[, i]t is questionable whether the circle of beneficiaries extends much wider than the attorneys who earn sizable fees interpreting its complex provisions"). As a result, many may not find the instant discussion of primary and secondary effects worth reading.

269. <u>See generally</u> Gibbons, <u>Field Restrictions</u>, <u>supra</u> note 107, at 434.

270. <u>See generally</u> Part V <u>supra</u>.

demand concentrated in one or a few fields of use. By contrast, a
territorial discrimination would pose a danger in this context.

Secondary line price discrimination might pose less of a risk because, for
example, discrimination across different fields of use would not have the
effect of offering more favorable treatment to one direct competitor over
another.[271] Secondary line injury would only result if different rates were
charged to firms in direct competition, which could have the usual effect of
"bring[ing] about structural changes in that industry which at best will be
artificial."[272] Baxter applies this analysis to Grand Caillou,[273] but in
the process pays insufficient attention to the relevance of patent policy to
the analysis.[274] He is correct that "[t]he optimum allocation is that which
would prevail if the [invention] were available to each segment
royalty-free,"[275] but that ignores the incentive effect. His emphasis that
the primary objective should be to minimize any distortion in the allocation
of production among firms[276] essentially focuses on one compenent of the

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271. See Gibbons, Field Restrictions, supra note 107, at 433. To the extent
the competitors do in part sell in the same field, they would receive the
same royalty rate as to that use, assuming that there was no further
discrimination between individual licensees or buyers from the patentee.

272. Baxter, supra note 106, at 283.

273. Grand Caillou Packing Co., Trade Reg. Rep. para. 16,927 (1964), aff'd in
part, rev'd in part sub nom. La Peyre v. FTC, 366 F.2d 117 (5th Cir. 1966).

274. See note 106 supra (criticizing Baxter for stating that the "legality of
the seller's monopoly is irrelevant" in this context, Baxter, supra note 106,
at 297).

275. Id. at 291.

276. Id. at 291-93.

monopoly loss that makes up the denominator of the ratio test. He does not consider whether or not the overall effect on the ratio would be desirable.[277] Thus, taking account of the effects of secondary line price discrimination involves two steps: determining whether there are any adverse secondary line effects, which might be possible to infer or negate based upon the nature of the discriminatory structure and the sales patterns of competing firms; and, if there are, determining the net effect of the discriminatory practice on the ratio, an inquiry which may prove more difficult.

B. Permissibility of Practices that Facilitate Price Discrimination

If one conclused from Section A that price discrimination should be permitted, it is necessary to determine whether such permission should be applied to a wide variety of restrictive practices. This is because price discrimination can be accomplished in a variety of ways. This Section will briefly present and analyze those that have been discussed most frequently. The analysis will be confined to the use of the various practices as mechanisms for price discrimination and will not attempt to be complete in that each restrictive practice raises a number of complex issues that arise in the antitrust context even when patents are not involved, and it would take this paper too far afield to deal with those subjects even in a very superficial manner.

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277. This error is very similar to that Baxter makes in analyzing royalties based upon an unpatented end-product. See Section VII-B infra.

1. Price Discrimination Mechanisms Used by Patentees

The most direct mechanism for price discrimination would involve the use of discriminatory royalty rates. For instance, if a patentee thought that heavy users derived more value than light users, it could make its royalty a function of use, which is commonly done. Another technique for accomplishing this purpose would be to tie the use of some related product to the use of the patent, for example, to the sale of a patented machine, and charge a price for the tied product in excess of cost.[278] This excess would serve the function of a royalty. Alternatively, if a patentee thought it possible to recover a greater return on some uses of its invention than on others, it could charge a higher royalty for those uses.[279] Field of use restrictions arguably might be used in accomplishing the latter type of discrimination.[280] The idea would be that it is easier to keep track of how much of each licensee's output is produced in each possible field of use if each licensee is simply confined to one field.

2. Preference for Discriminatory Royalties Without Additional Restrictions

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278. Tying restrictions were held illegal in Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502 (1917).

279. There is a serious problem in defining when a royalty is discriminatory in this and related contexts, an issue analyzed by Baxter at great length. Baxter, _supra_ note 106, at 281-87. However, to the extent that discriminatory royalties are to be permitted, there is no operational need for a precise, nonarbitrary definition.

280. The legality of field of use restrictions was originally established in General Talking Pictures v. Western Elec. Co., 304 U.S. 175 (1938), but has since become a more ambiguous question. See **L. Sullivan**, _supra_ note 102, at 558.

There is only a patent-antitrust conflict in this context to the extent that antitrust law proscribes such practices as tying and the division of fields by competitors. Taking such prohibitions as given, it would seem that tying arrangements, field of use restrictions, and the like should not be permitted in the patent-antitrust context simply because such devices might be used in conjunction with a price discrimination scheme. The reason is simply that discriminatory royalties accomplish the same purpose without the additional restriction. From the perspective of the ratio test, it would seem that permitting such restrictive practices as the vehicle for price discrimination simply increases the denominator and thus decreases the ratio.

Of course, this is not necessarily true, for to the extent that such restrictions are profitable, they will increase the patentee's reward; hence, the effect on the ratio is ambiguous. The greatest danger of field restrictions,[281] as noted previously, is that they could operate to divide the market, and thus permit noncompetitive pricing as discussed in Section IV-B.[282] There is the same danger with territorial restrictions purportedly

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281. For tying restrictions, and other purported motivations for field restrictions, some of the same analysis would apply, depending upon how it was claimed that the patentee profited from the practice.

282. See, e.g., Gibbons, Field Restrictions, supra note 107, at 462. Baxter's analysis of this point, Baxter, supra note 106, at 341, is excellent. In fact, he seems better to understand, and without doubt better articulates, arguments that are equally applicable to price-restrictive licensing (which he also notes) than he did when expressly addressing that topic. Cf. id. at 339, discussed at page 78 supra.

used for the purpose of facilitating price discrimination.[283] Analysis along

the lines suggested in Part IV, which was directed at price restrictions but

applied largely to territorial restrictions as well, would thus be

appropriate.[284]

    To deal with this problem, Baxter proposes that patentees be required to

offer nonexclusive licenses on equal terms with all prior licenses

offered.[285] Thus, in any field in which a license was offered, the patentee

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283. The use of territoral restrictions as a disguise for cartelization is
noted by **L. Sullivan**, supra note 102, at 534-35, and Gibbons, Territorial
Restrictions, supra note 165, at 905, although not in the context of
discussing their possible use to facilitate price discrimination.

284. This would include the analysis of why such a restriction on competition
is likely to have a poor ratio, as well as the analysis of purported
justifications. In the latter regard, field restrictions, like territorial
restrictions, might be defended in some contexts as facilitating product
development and promotion along the lines suggested by the resale price
maintenance argument. To the extent that were true, one would then confront
the question of how well courts could distinguish the good uses from the bad,
which raises the issues discussed previously in that context.

285. Baxter, supra note 106, at 345-46. He makes the same proposal to deal
with territorial restrictions. Id. at 347. Gibbons concurs in this
proposal, Gibbons, Field Restrictions, supra note 107, at 427, but would also
require, see id., unlike Baxter, supra, at 346, that the patentee offer
licenses in its own field or fields of use. Of course, this, unlike Baxter's
proposal, would require the courts to regulate royalty levels because there
would be no readily available benchmark. Gibbons never explains either the
motivation of the patentee to keep certain fields to itself in the first
place, see Gibbons, supra, at 473 (evidencing a misunderstanding of the
patentee's self-interest in permitting licensees to achieve monopoly
profits), or why such a result would be inconsistent with either patent
policy or a proper resolution of any patent-antitrust conflict. So long as
the patentee can control the royalty level for licensees operating in its own
field, there would seem to be no great reason for the patentee to keep sales
to itself. See generally Section IV-A supra (market protection theory for
price-restricted licensing). On the other hand, aside from the substantial
administrative difficulties, there may be little danger in Gibbons addition
to Baxter's proposal.

would have to offer all comers a license at the same royalty rate.[286] Since the only licenses required to be offered would be on terms already established by the patentee, such a proposal would not involve the courts in valuations that they may find difficult or distasteful. This approach permits the field restriction in the event it is necessary to facilitate price discrimination while avoiding the dangers of market division.[287]

For example, if there were a tacit agreement that no firm would demand a license in another's field, such protection would be to no avail. Moreover, any firm violating such a tacit agreement could face retaliation from others who could then acquire licenses for its field. In the end, there may be less reason to fear cartelization through field and territorial restrictions than through price restrictions because the former two methods will tend to be disruptive of an established industry where investments, customer relations, and the like have long been in place.[288] Where fields of use are first being

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286. Unless the patentee were attempting to create a cartel, or encourage product development, see note 284 supra, it would be in its interest to license a number of firms in each field so that they would maximize sales. See Turner, supra note 70, at 471 (making this point without noting the product development possibility). Thus, as in Part IV, observation of particular behavior, in this case exclusive field or territorial licensing, limits the range of possible explanations but does not necessarily lead to an automatic resolution of the issue.

287. This compromise does not preserve the possibility of achieving the benefits similar to those attributed to resale price maintenance, see 284 supra, which depend upon the exclusivity of the license.

288. See the discussion in note 210 supra and in Gibbons, Field Restrictions, supra note 107, at 462.

289. See id. That specialization already exists does not imply that field restrictions would not reinforce such divisions where, for example, but for the restrictive arrangement firms in each field feared entry from firms in related fields.

developed, however, or where lines of specialization[289] or regions of operation[290] are already largely established, the danger would be greater.

One difficulty in applying this approach which distinguishes direct price discrimination from additional restrictions is the danger that pure royalty schemes implicitly incorporate various additional restrictions. For example, if each licensee were charged an exorbitant royalty in all but one field of use, and that one field was different for each licensee, the patentee would have accomplished the result of a field-restricted license. This particular arrangement would be easy to detect, for if all the patentee had in mind were price discrimination, the royalty rate in each field would be the same for all licensees.

Finally, the ability to separate the price discrimination rationale from the consideration of these restrictions assumes that the less restrictive alternative of discriminatory royalty rates is equally effective. Yet it may be that restrictions facilitate monitoring.[291] In general, this argument does not seem overpowering, for it often will not be difficult to monitor another firm's sales of different products, especially with privileged access

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290. The analysis from the preceding footnote is equally applicable here, except that the reference to related fields would be changed to neighboring territories.

291. See, e.g., L. Sullivan, supra note 102, at 557; Markovits, Tie-Ins and Reciprocity: A Functional, Legal, and Policy Analysis, 58 Tex. L. Rev. 1363, 1380 (1980).

292. See generally, Kaplow, supra note 142. Such information is also publicly available in many instances. Of course, with an added incentive to cheat, it is possible that the such statistics would no longer be as reliable.

to its records.[292] It is also not obvious that restrictions would bring a substantial improvement. With field restrictions, it is still necessary to monitor the output in the authorized fields, assuming that royalties are a function of output, as is often the case.[293] With customer restrictions, there is again still the need to measure quantity, and also to ensure that the restriction is not being violated. With a tying arrangement, the patentee must be sure that the licensee is not buying any of the tied product elsewhere, and often the easiest way to do that would be to compare purchases with production and sales records, which would have been sufficient to set the royalty directly.[294]

Thus, although there may be cases where metering would be difficult without resort to restrictive practices, there does not seem to be a compelling need for reliance on such provisions in most circumstances. On the other hand, to the extent one agrees with Bowman that there is rarely, if ever, any harm to such restrictive practices, one might allow them in this context in any

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293. If royalties were a function of profits, field restrictions would eliminate the need for careful accounting checks only if the licensee produced nothing other than the licensed product. Otherwise, profits would have to be accounted for and traced to the licensed product in any event. And there is also the problem of the manipulability of the accounting measures of profits.

294. **W. Bowman**, supra note 108, at 103-04, defends the use of tying arrangements as metering devices but does not demonstrate that effective metering would not have been possible in any event. See generally Kaplow, supra note 142.

In the case of a tying arrangement where it is optimal to set a high price on the patented product and a below-market price on the tied product -- i.e., when heavy users are the low value users -- there would be no need to fear such evasion, although there would arise the opposite problem of excessive purchases of the subsidized tied product for resale to others.

event. If one were inclined toward the latter approach, or believed that discriminatory royalty schemes were difficult to enforce without restrictive practices, there would be a need to consider the danger of disguised cartelization.[295]

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295. There is also the danger that any form of monitoring the sales activities of competitors, directly or indirectly, would be of assistance in facilitating collusive behavior. See generally Stigler, A Theory of Oligopoly, 72 **J. Pol. Econ.** 44 (1964) (discussing how the inability to detect cheating causes cartels to break down).

VII. Applications: Patentee Control of Unpatented End-Product

An issue that often arises in patent-antitrust litigation concerns the degree to which restrictions imposed by the patentee may be related to unpatented processes, products, or services. For example, the patentee may attempt to tie other products to the sale of its patented product, or in some way to control the unpatented output produced by its patented process. The most typical arguments offered are that such restrictions are beyond the scope of the patent, a view which has prevailed in some contexts,[296] or, on the other side of the issue, that such restrictions merely permit the patentee to receive the full reward attributable to its invention.[297] This Part will focus upon one particular arrangement, charging royalties based upon sales of an unpatented end-product when the patent only covers one particular input; this arrangement will be described more fully in Section A. The analysis is directly applicable to the use of other restrictions when aimed at the same purposes described below. I emphasize this example primarily because it has been the focus of extensive commentary. The arguments for and against prohibition of such restrictions are associated with Baxter and Bowman, respectively. This Part will consider each of their

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296. See, e.g., Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502, 516-18 (1917) (tying arrangements); Brulotte v. Thys Co., 379 U.S. 29, 33 (1964) (royalty obligation extending beyond life of patent).

297. This roughly is Bowman's position. See Section C infra.

justifications, Sections B and C, and then indicate in Section D how the controversy can be better understood and resolved through application of the ratio test.

A. The Example: Royalties Based on Sales of an Unpatented End-Product

To understand the arguments on both sides, it is necessary to develop the example in more detail. The scenario each envisions is one where the patentee licenses[298] its invention which is used in the manufacture of one or more end-products which are not themselves subject to patent protection.[299] To the extent that the patented input can only be used in a fixed proportion to output, e.g., one and only one patented bottom need be attached to each bucket produced, then the choice between an input-based and output-based royalty is immaterial, since there is a one-to-one relationship between the two.[300] Thus, the dispute focuses on the more frequent case where there is some potential for varying the amount of the patented input.[301] For example, if a fertilizer were patented, it may be possible for

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298. A sale (assignment), where payments depended upon the future business of the buyer, would raise precisely the same issue.

299. If the patentee also had a patent covering the end-product, all would concede that it would be permissible to charge a royalty based upon sales of that product.

300. See F. Scherer, supra note 24, at 301-02 & n.12; W. Bowman, supra note 108, at 70-74.

301. This is almost always possible, although such changes may change the end-product somewhat. For example, if the inside coating for a television screen were patented, it would be possible to decrease the size of the screen. As the price per unit of the coating (or the royalty on it use) increased, one would expect smaller screens to be produced, which is all that is necessary for the analysis in the text to be applicable.

farmers to substitute additional land, other fertilizers, different crop rotation practices, increased pesticide use, etc. for some of the patented fertilizer in order to maintain production levels if the royalty for using the patented fertilizer were increased.

It is this potential for substitution that gives the patentee an incentive to base royalties directly on the sales of the end-product. When the royalty is based upon use of the input, the user of the input can decrease royalty payments by changing its production mix to decrease reliance on the input.[302] However, if the royalty is based upon the amount of output produced, regardless of how much or how little of the patented input is used, the producer will determine its input mix based upon the actual cost of each input, regardless of the royalty level.[303] Thus, an output-based royalty

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302. The response of increasing the royalty rate does not fully avoid this problem, because any increase in the royalty for use of the input will cause a further reduction in its use. The patentee can always profit more if it can base its royalty on the end-product, so long as there is any degree of input substitutability. This is because for any given royalty based on the input, the corresponding royalty (i.e., the existing input royalty multiplied by the average amount of input used for each unit of output) based on the output would by definition earn the same per unit of output, and, because the producer will change its production mix to a more efficient combination of inputs which will lower its costs, output will be higher.

303. Since royalty levels will affect the amount of output, there could be some indirect influence upon the input mix since the optimal input combination may vary as output changes. Such variations are not, however, distortions in production efficiency.

304. As noted previously, other mechanisms could be used to accomplish similar purposes. See, e.g., Baxter, supra note 106, at 301. A tying arrangement that required the producer to buy all its inputs, in predetermined proportions, would have the same effect, although this might both be more cumbersome for the patentee to arrange and would require that the patentee be intimately familiar with each licensee's production technology, including how it should respond to short-term fluctuations. Thus, as discussed in the price discrimination context, see subsection VI-B-2

avoids substitution away from the input covered by the patent.[304] First, this should permit the patentee to derive more profit from the deal, just as any firm's market power would increase if substitution were not an option for buyers. At the same time, the producer using the patented product would be producing with a more efficient input mix. On the other hand, it is possible that the net restriction on the output of the end-product is greater. The dispute between Baxter and Bowman primarily concerns how this set of effects should be evaluated.

B. Baxter's Argument

Baxter characterizes end-product restriction as a situation where the patentee has extended its monopoly of the patented input to the unpatented end-product.[305] Because Baxter sees greater output restriction as the result and believes that this loss will outweigh any benefit from a more efficient mix since all inputs are underutilized when output is diminished,[306] he concludes that end-product restrictions should be disallowed.

It is not necessary to disagree with Baxter's conclusions regarding the

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supra, the less restrictive alternative of end-product royalties seems preferable, especially since the less restrictive alternative here seems even better suited to the task. Vertical integration is another option to prevent input substitution, although again it seems far more restrictive, and may be an option for only a few patentees since the problem is fully avoided only if the integration were to cover all producers of the end-product that would otherwise be licensed. Baxter applies his analysis of end-product based royalties to price and output restrictions as well. Baxter, supra, at 330-31.

305. See, e.g., Baxter, supra note 106, at 302, 314, 353.

306. See id. at 303-05.

economic effects[307] to be troubled by his chain of logic. As was the case with Baxter's comparability approach generally,[308] this argument essentially focuses on the denominator. His point is simply that the monopoly loss will be greater with the end-product based royalty than without, so it should be prohibited. However, he concedes that the reward will also be greater, so even from his perspective, he has not ruled out the possibility that the ratio will be greater, or at least about the same, if the restriction is permitted.

C. Bowman's Argument

Bowman's analysis emphasizes the benefit in avoiding the inefficient use of inputs that derives from permitting the end-product based royalty.[309] He explicitly notes, as proved through examples, that the output under an end-product based royalty may be higher or lower than when royalties can only be based upon use of the patented input.[310] Of course, if output were higher, Baxter's argument based upon net inefficiency would turn against him, although the general objection that the reward would be excessive still remains to be considered.[311] However, in the event that output would indeed be restricted, Bowman does not attempt to contradict Baxter's claim that the

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307. The actual effects are described in Section D infra.

308. See Section III-D supra.

309. See W. Bowman, supra note 108, at 76-88.

310. See id. Posner and Easterbrook incorrectly claim, without analysis or empirical support, that the output restriction with end-product royalties is smaller. See R. Posner & F. Easterbrook, supra note 167, at 817.

311. See note 324 infra.

net effect on economic efficiency when the input and output effects are compared would be adverse.[312]

Bowman´s attack comes from a somewhat different angle. He emphasizes that "no payment can be extracted by the patentee which is not ascribable to the competitive superiority afforded by the patented resources without which the consumers would be even worse off."[313] This argument applies Bowman´s competitive superiority approach, and is subject to the same criticisms developed in Section III-C. Moreover, it is clear that Bowman is making the wrong comparison, for the quoted argument demonstrates that end-product based royalties are better than if there had never been the invention in the first place, not that they are better than if end-product royalties were prohibited, leaving the option of royalties based directly on use of the

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312. It is obvious at this point that at least sometimes Baxter would be wrong, for if the output effect were zero, there would be a net gain through reduction in input inefficiency, and that gain could not be exceeded for at least some small range of output reduction.

313. **W. Bowman**, supra note 108, at 88. See also id. at 101 ("exploiting the full advantage his patent affords users").

314. It is puzzling that Bowman should make such a mistake since he accuses Baxter of doing essentially the same thing in analyzing Grand Caillou.

> [Baxter] correctly concludes, given competing licensees, that charging them differently will make for a less socially efficient apportionment of production among them than that which would exist after the patent expired -- the competitive allocation. This, of course, is true of any charge for a patent, discriminatory or not. But, equally important, he slides over another relevant economic question: Is there less efficient apportioning of production with discriminatory royalties, not compared with competition after the patent has expired, but compared with [the] single monopoly price while the patent is in force?

Id. at 110-11. Note how Baxter errs in comparing to the competitive result

patented product.[314]   Bowman's argument is, however, responsive to some of the spirit of Baxter's critique in that his point demonstrates that the patentee has not really gained a monopoly over the unpatented end-product, for it can charge no higher royalty than the value its invention contributes. If it tried, the end-product would simply be produced without the patent.[315]   Also, Bowman's argument can be interpreted as a claim that the resulting reward is not disporportionately large, although the analysis is insufficient to demonstrate this.[316]   Thus, Bowman has in essence made an argument that focuses on the numerator -- patentee reward -- and although he makes arguments concerning the denominator, he does not claim to prove that it would be smaller, or that, if it were bigger, the ratio would have improved rather than become worse.

D. Applying the Ratio Test

This issue concerning the permissibility of end-product based royalties well illustrates the comparison that was developed in Sections III-C and III-D of Baxter's and Bowman's general positions both with each other and with the ratio test. Once again, Baxter and Bowman each emphasize half of the story; combining them gives a far more complete picture, and the ratio

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while Bowman errs in making a comparison to the situation where the patent does not even exist, which parallels their tendencies to favor, respectively, the antitrust and patent sides of the conflict.

315. See id. at 89-93. Although the analysis is at points deceptive, as at pages 89-90 where he twice refers to the concept of elasticity but uses numbers that are something else altogether, the basic argument is correct, as his example demonstrates.

316. This argument is simply an application of the analysis in subsection II-A-3.

test, which itself incorporates the considerations emphasized by each, helps us analyze that picture.

Much of the necessary analysis has already been provided. In Section C, it was noted that if the result of end-product based royalties were to increase output, there would be an unambiguously positive effect.[317] However, based upon analysis of the somewhat analogous action of vertical integration from the input supply stage to the final product stage, it seems that it may more often be true that the result of direct output restriction is that the price paid by consumers will increase and output will fall.[318]

In that event, it was noted that Bowman fails to consider whether the net effect on economic efficiency is positive or negative. The actual result depends upon the particular circumstances.[319] However, despite the

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317. When the denominator is less than zero, the ratio should be regarded as infinite.

318. See F. Scherer, supra note 24, at 302; Warren-Boulton, Vertical Control with Variable Proportions, 82 J. Pol. Econ. 783 (1974).

319. See Warren-Boulton, supra note 318, at 792-96, 799-800. This article analyzed vertical integration, which has similar effects in this context. There is, however, one important difference, which is that noted by Bowman in criticizing Baxter for characterizing the effect of end-product royalties as achieving a monopoly of the end product. See page 131 supra. The point is that if a firm with a monopoly over one input achieved full forward integration, it would have a monopoly at that downstream level and would thus be able to charge the full monopoly price. The patentee charging royalties based upon end-product sales faces the constraint that if the royalty is too high, its input will be foregone altogether. It is conceivable that this added constraint is sufficient to make the net welfare effect positive, but I do not now see any way of proving that would be the result. Moreover, so long as vertical integration did not achieve a monopoly at the downstream level, the other firms would provide the same constraint upon the patentee in that if it raised its price too far, the other firms could profitably operate without using the patented input.

uncertainty concerning whether the denominator of the ratio increases or decreases, the fact that end-product royalties lead to an unambiguous increase in the numerator[320] makes it more plausible that the ratio would increase if such royalty schemes were permitted.[321] Although until further analysis is performed it cannot be stated with certainty that permitting end-product based royalty schemes improves the ratio, or under what range of circumstances they might not,[322] it seems that the argument for permitting them is stronger.[323] Of course, as previously noted, there is also the

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320. See, e.g., Mallel & Nahata, Theory of Vertical Control with Variable Proportions, 88 **J. Pol. Econ.** 1009, 1021-23 (1980); Vernon & Graham, Profitability of Monopolization by Vertical Integration, 79 **J. Pol. Econ.** 924 (1971).

321. The distinction can be seen by considering Scherer's comment that:

> Integration increases the input monopolist's profit both by permitting lower cost production and by broadening its control over prices. Since these two effects have opposite welfare implications, no simple conclusions can be drawn as to whether on balance the vertical extension of monopoly power into a competitive stage makes society better or worse off.

F. Scherer, supra note 24, at 302. In the patent-antitrust context, the increase in the input monopolist's profit, i.e., the patentee's profit, due to lower production costs is additionally valuable because of the incentive effect, and the broadened control is not unambiguous as in the typical antitrust context because the added monopoly profit from this effect rewards the patentee as well. Overall, the first component, lower production costs, is doubly good, and the second is ambigous.

322. If it could be supposed that the adverse output effect has a ratio of reward to monopoly loss similar to the ratio implicit in the patent life, the argument that the ratio for this practice is high is quite strong since the efficiency in input effect would add to the numerator and subtract from the denominator, making the ratio unambiguously greater than the ratio implicit in the patent life.

323. Compare the discussion of the desirability of price discrimination in the patent context in light of uncertainty concerning the output effect, at page 113 supra.

question of whether the overall increase in reward would provide a
disproportionately large incentive in such instances.[324]

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324. _Cf_. page 114 _supra_ (price discrimination). _See generally_ subsection
II-A-3 and Section II-C _supra_. If this was thought to be the case, one
option as always is to, for example, adjust the patent award accordingly and
permit this practice if it indeed is more efficient than other ways that
patentees recoup rewards. _See_ note 322 _supra_. If, alternatively, it were
thought best to prohibit end-product based royalties, there is the problem
that many firms do not need such schemes to accomplish the same results,
which would be the case if, for example, the company was integrated. Compare
the analysis at note 38 and page 111 (price discrimination) _supra_ of the
issue of how to treat patentees who can accomplish the undesirable result
without resort to the forbidden practices.

Conclusion

The arguments offered in discussing the various applications did have some recurring themes, from which one might attempt to formulate a rough approach to patent-antitrust doctrine. The first step would be to determine whether the observed practices are in effect a subterfuge for collusion or other exclusionary conduct. Such practices will clearly fail under the ratio test. If a practice did not fall into the subterfuge category, one would have to engage in a far more complicated analysis in order to apply the ratio test. Given the limits in our understanding of the patent system, decisions deriving from this level would arguably have to be limited to the sort of cost-effectiveness analysis described in subsection II-B-1, wherein some prohibitions are traded for others in an attempt to achieve the current level of reward at the minimum possible cost. However, any other pattern of doctrine -- i.e, one that provided far more or far less aggregate reward, corresponding, for example, to permitting all restrictive practices or permitting none -- could not be decisively criticized since there is no way of knowing whether the current level of reward provided by the combination of patent law and patent-antitrust doctrine is anywhere near the optimal level.[325] If one emerges from all this without losing hope, an approach must

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325. This assumes that the alternative patent-antitrust doctrine would not violate the ratio test. Of course, the extreme regimes that permit all practices or prohibit them meet this caveat by default.

be developed for those cases (which may be all cases) in which the practice involved may have any number of effects, some leading to far lower ratios than others. Perhaps the best than can be offered here is to prohibit such practices when there exists an open-ended potential for substantial loss, unless one has confidence in our ability to determine at moderate cost which of the many possible effects is relevant in any particular instance.

The applications discussed in Parts IV-VII, as well as the summary approach just offered, reaffirm the indications in Part II that any careful attempt to resolve patent-antitrust issues will be far more complex than has previously been realized, which is a rather notable conclusion since the patent-antitrust conflict has long been seen as a most difficult area. It is apparent that previous formulations by courts and commentators are unsatisfactory simply from the fact that most of the issues demonstrated as essential in Part II have been ignored altogether. What remains uncertain is why so much of the problem has been missed. The two most obvious possibilities are that past efforts have been too complacent in analyzing the question and that past analysts have been afraid of what they might find if all the necessary questions had been asked.

Now that the magnitude of the problem has been established, a new range of solutions might seem more attractive. In particular, the urge to transfer this question from the courts to either Congress or an administrative agency due to the technical complexity and inseparable need for political choice in resolving the patent-antitrust conflict may become overwhelming. What is not clear, however, is whether this issue is particularly more problematic in any of these respects than any other issue the courts face. In particular, the

tension between two statutes hardly renders this conflict unique. The antitrust laws have come into conflict with a variety of other laws, with varying results,[326] although these conflicts have received far less attention. There are often conflicts among statutes, and always conflicts among various policies, the latter raising the same sorts of problems as those encountered with the former. Finally, the conflict between patent and antitrust policies should if anything be easier than virtually all other conflicts since the ability to translate the primary competing issues into a "common denominator" is surely greater than one could hope for elsewhere.[327] Moreover, although the state of the art in the economics of antitrust and patent policies seems primitive, it is surely more developed at both the theoretical and empirical levels than is the analysis of a vast array of other issues regularly confronted by the courts.

One of the lessons of any extended inquiry into the legal system is that the system itself never looks the same again after one has emerged from the project. And it also seems that the deeper one's investigation, the greater the difference will be. The willingness to undertake such projects may be affected by whether one is satisfied with the present picture of the system and hopeful or fearful of the new picture that may be found.

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326. See, e.g., Broadcast Music, Inc. v. Columbia Broadcasting System, Inc., 441 U.S. 1 (1979) (copyright law); Fashion Originators' Guild of Amer. v. FTC, 312 U.S. 457 (1941) (common law of unfair trade practices); Parker v. Brown, 317 U.S. 341 (1943) (state statutory law).

327. But see Kaplow, supra note 23, at 1821-26 (and sources cited therein) (sketching some of the reasons why antitrust law can not be viewed in the simple manner suggested here); note 31 supra (indicating another set of such reservations concerning patent policy).

Appendix: Derivation of Optimal Patent Life and Patent-Antitrust Doctrine

This Part of the Appendix will briefly sketch a more formal derivation of the results in Sections II-A through II-C of the paper. The benefits of the patent system net of the direct costs of invention (B) are a function of inventive activity. Inventive activity is in turn a function of the reward or profit (P) provided by the system. The system consists of two components: a patent life (L) and a set of restrictions on exploitation practices (R). These can be expressed as follows:

(1) $P = P(L,R)$

(2) $B = B(P(L,R))$.

For convenience of notation, $\underline{R}$ can be thought of a vector with each element (Ri) corresponding to each possible restriction on patent exploitation that might be imposed. $\underline{Ri}$ denotes the level of a restriction in effect. It takes on a value of zero if the practice is not restricted -- e.g., if price-restricted licensing is permitted, the corresponding $\underline{Ri}$ equals zero. Similarly, it takes on a value of one in the event of complete restriction. For present purposes, it will be helpful to think of the $\underline{Ri}'s$ as continuous

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328. This means that the variable in principle could have any value between zero and one, in addition to the extreme points.

variables.[328] Although there are grounds on which this assumption could be defended,[329] I only offer it here to simplify the exposition. The results will be interpreted explicitly for the case where $\underline{Ri} = 0$ or $\underline{Ri} = 1$.

In a similar fashion, the cost of the patent system (C) can be expressed as follows:

(3) $C = C(L,R)$.

The problem is thus to maximize

(4) $B(P(L,R)) - C(L,R)$.

An interior solution[330] implies that the following first order conditions must be satisfied:

(5) $B'P_L - C_L = 0$, which implies:

(5A) $P_L/C_L = 1/B' = r_L$, and

(6) $B'P_{Ri} - C_{Ri} = 0$, for all $\underline{i}$, which implies:

(6A) $P_{Ri}/C_{Ri} = 1/B' = r_i$, for all $\underline{i}$.[331]

P_L, C_L, P_{Ri}, and C_{Ri} denote the partial derivatives of $\underline{P}$ and $\underline{C}$ with respect

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329. The most persuasive is that courts could permit many practices to intermediate degrees. Another is that the courts could employ a random strategy under which each of two outcomes was chosen with a predetermined probability. See note 87 supra.

330. In addition to the restrictions on the values of the $\underline{Ri}$'s, it can be assumed that $\underline{L}$ must be greater than or equal to zero.

331. Equation 5 is derived by setting the derivative of (4) with respect to $\underline{L}$ equal to zero, and equation 6 by setting the derivative of (4) with respect to $\underline{Ri}$ equal to zero, for all $\underline{i}$.

to $\underline{L}$ and $\underline{Ri}$. The term r_L in equation 5A corresponds to the ratio implicit in the patent life, referred to in Section II-B, and the term r_i in 6A is the ratio for each restriction $\underline{Ri}$. Interpreting these expressions is sufficient to yield most of the results in Sections II-A through II-C of the paper.

From equation (5), it can be seen that the optimal patent life satisfies the condition that $B'P_L = C_L$, which simply means that the marginal benefit of changing the patent life must equal the marginal cost. These expressions must be evaluated for some vector $\underline{R}$ since both $\underline{P}$ and $\underline{C}$ are functions of $\underline{R}$, which indicates the dependence of the optimal patent life on the existing regime regulating patent exploitation.

Similarly, from equations 5(A) and 6(A), it can be seen that the ratio implicit in the patent life (r_L) should be equated with the ratios for each possible restriction $(r_i's)$ since both ratios must equal $1/B'$ at the optimum.[332] But this conclusion must be squared with the notion that the ratios for various restrictions differ. The resolution of this apparent contradiction derives from the fact that each $\underline{Ri}$ is constrained to be between zero and one (i.e., one cannot have more restriction in any dimension than total restriction -- $Ri = 1$ -- or less restriction than none at all -- $Ri = 0$.) If it is reasonable to assume that the ratio for a given restriction on exploitation practice does not vary substantially as one moves from partial to total restriction, it would be most likely that there would be a corner

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332. Similarly, $P_L B'/C_L = 1$, which is the direct implication of marginal benefit equalling marginal cost at the optimum. The B' term in the numerator differentiates this ratio from r_L, as described in the paper at page 28, supra.

solution for that practice -- i.e., Ri = 1 or Ri = 0. [333] Alternatively, if for administrative reasons or limitations of feasibility, only the all-or-nothing choice is available, one would also examine corner solutions.[334]

The ratio test described in Section II-B, which implicitly applied to such corner colutions, can be derived as follows. Consider the case where r_i is less than r_L. From equations 5A and 6A, this implies

(7) $P_{Ri}/C_{Ri} < 1/B'$.

Rearranging terms, and recalling that B' is positive (more profit increases benefit when at the optimum[335]) and C_{Ri} is negative (more restriction decreases social cost of exploitation), yields

(7A) $B'P_{Ri} - C_{Ri} > 0$.

This indicates a positive derivative of (4) with respect to Ri (compare the expression in 7A with equation 6); hence (4) is maximized by setting Ri as high as possible. The optimal solution is thus Ri = 1; i.e., the practice

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333. Of course, if there is an interior solution, it is characterized by the equality of r_i and r_L. If the patent life is simply viewed as one of the restrictions, it can be seen that the same results follow. At the optimum, all ratios equal 1/B'. Since the ratio for the patent life presumably varies substantially depending on the length of the patent life, an interior solution is quite plausible, which corresponds to some patent system being justified. If there is still a corner solution, i.e. L=0, then the patent system should be abolished.

334. The case where only a few intermediate values are feasible would lead to an analogous comparison among those points.

335. See note 50 supra.

should be prohibited. Similarly, if r_i is greater than r_L, the optimal solution is <u>Ri</u> = 0; i.e., the practice should be permitted. That is the test which compares the ratio for each restriction with the ratio implicit in the patent life.[336]

The cost-effectiveness analysis described in Section II-B can be derived by examining equation 4. Since that procedure[337] holds <u>P</u> constant, <u>B</u> is constant. But exchanging restrictions on practices with low ratios for restrictions on practices with high ratios decreases the total cost (C); hence, net social benefits are improved.

Finally, this derivation gives some appreciation for the problem with the idea that reward should be proportional to the value of the patent, which was discussed in subsection II-A-3. It should be noted that the value of the patent, as traditionally understood, does not even appear in the optimization equations directly. It can be implicitly determined as follows. Given the optimum, we must know the value of B', and that value will correspond to some particular value for <u>B</u>, which in turn corresponds to a given quantity of inventive activity, which has an aggregate value. That can in turn be

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336. There still remains the reservation that relates to the fact that changing from Ri = 0 to Ri = 1, or vice versa, is a discrete rather than an infinitesimal change. Since that is the case, it may be that for Ri = 1, the ratio exceeds 1/B' and that for Ri = 0, the ratio is less than 1/B'. (This is because relaxing the restriction -- i.e., moving from Ri = 1 to Ri = 0 -- increases <u>B</u>, and thus decreases B' -- assuming B'' < 0 -- which raises 1/B'. Thus r_{Ri} is compared to a higher r_L when Ri = 0 than when Ri = 1.) If intermediate values for <u>Ri</u> are not possible, then it is simply necessary to compare the overall net social benefits for each configuration of possibilities and choose the one that is best.

337. <u>See</u> page 31 <u>supra</u>.

compared with total reward, which can be determined implicitly from the level of inventive activity and the prevailing system, $\underline{L}$ and $\underline{R}$. Thus, the raw comparison of reward to value of the patent is many steps removed from the marginal conditions for optimality (equations 5 and 6) and the corresponding ratios of marginal reward to marginal loss presented in this paper (equations 5A and 6A).