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**Faculty Working Papers**

PRICING OF LIQUIDITY FOR PREFERRED STOCKS ON  
THE NEW YORK STOCK EXCHANGE

Frank K. Reilly, Professor, Department of Finance

#662

**College of Commerce and Business Administration**  
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## Faculty Working Papers

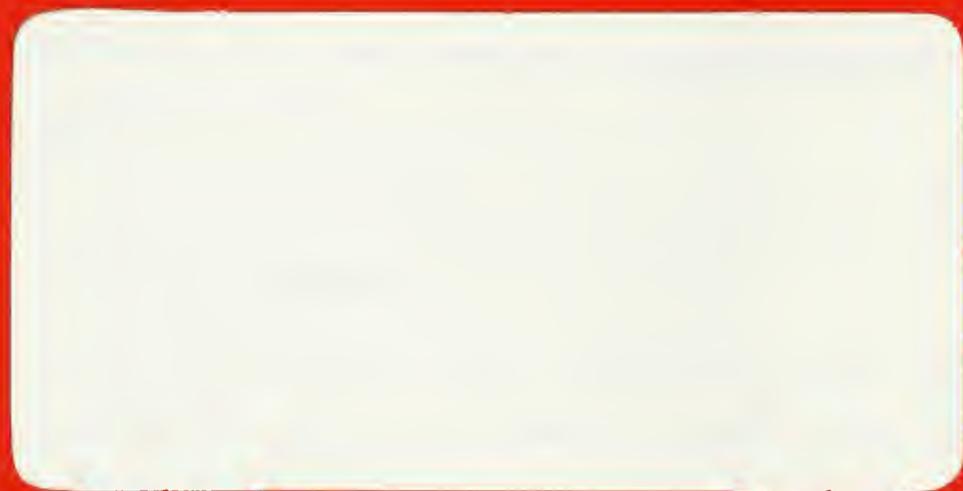
RE-EXAMINING THE WELFARE LOSS DUE TO MONOPOLY

Thomas S. Ulen, Assistant Professor, Department  
of Economics

Edward M. Rice, University of Washington

#670

College of Commerce and Business Administration  
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Summary

Posner and Tullock have offered theoretical reasons for considering the deadweight loss in consumers' and producers' surplus an understatement of the social costs of monopoly. They suggest that competition for rent incurs additional inefficiencies which should also be reckoned as social costs. This paper takes issue with that conclusion and offers a more general theory of the social costs of monopoly. A crucial distinction is drawn between monopoly rights which are guaranteed and enforced by government and those which are not. In the absence of government-guaranteed monopoly rights, competition for rent is shown to be efficient in inducing cost-saving innovation and invention, with consequent social benefits. A model is developed for the alternative situation in which there is competition for a government-guaranteed monopoly right. We find that the greater the differences among the competitors in the productivity of resources expended on securing the monopoly, the smaller will be the social cost of monopoly over and above the deadweight loss..



Until the articles by Tullock (1967) and Posner (1975), the theoretical issue of the damage done by monopoly was not controversial. Tullock proposed and Posner later refined a revision of our notions about monopoly. The thrust of the theoretical point was that the part of consumers' and producers' surplus labeled deadweight loss greatly understated the welfare loss due to monopoly. That part of the reduction in consumers' surplus previously dismissed as being simply an income transfer to the monopolist was held to be an upper-bound on the social costs of resources inefficiently attracted into the monopolized industry.

This new view has powerful implications. For example, if monopoly's costs are far larger than we have heretofore thought, then perhaps the budget of the Antitrust Division and of the FTC should be increased and the fines and other punishments assessed for violating the antitrust statutes should be raised. Cowling and Mueller (1978) estimate the economy-wide monopoly welfare loss at up to 13% using the Posner-Tullock framework and seem to call for precisely this type of solution.

We find the Posner-Tullock reformulation to be potentially helpful but as yet incomplete. The model fails to distinguish forcefully enough between monopoly rights which are guaranteed and enforced by the state and those which are not. Once this crucial distinction is re-introduced a more general theory of the social costs of monopoly can be developed.

In what follows we first show that the failure to distinguish between the different sorts of monopoly leads to some curious policy recommendations. For example, if all competition for rent involves a social cost, the state should prohibit such competition by creating

and enforcing monopolistic property rights for firms which have achieved market shares of, say, 75%. This prescription is, however, precisely the wrong one if it is the case, as we shall show, that only state-enforced monopoly is capable of creating a social cost greater than the traditional deadweight loss.

We next discuss the competition for monopoly rents which are not government-guaranteed. We elaborate on a model developed by Williamson and McGee to argue that this competition usually has important social benefits. In this situation the deadweight loss overstates the social cost of monopoly.

For the case where government does explicitly control the market, we develop a model of the expected return to securing a monopoly and show that the traditional deadweight loss is much closer to the correct social cost of monopoly than is the sum of the deadweight loss and the income transfer to the monopolist. It will be seen that Posner's and Tullock's contention can be construed as a special case of this one part of the more general model.

## II. Some Implications of the New Social Cost Theory

In this section we examine some logical implications of treating the income transfer to the monopolist as a social cost. It will be shown that each of these implications clashes with our understanding of competitive efficiency.

As a first case, imagine an industry which has two firms competing for market dominance. Each firm is making large expenditures on changing technologies and advertising, and after a time one firm emerges with a dominant, 80% market share and high profits. If, now, a second round of

that people would compete to obtain the property rights to the land. The resources expended toward obtaining these rights should exactly equal the value of the land. Thus, the discovery of the land would be fruitless, yielding no social value at all. In fact, any asset newly-found or created would be socially useless, with all value dissipated in attempts to secure rights to it.

An examination of these counter-intuitive implications and their causes clarifies the problems with the Posner-Tullock formulation. In the first case, where government does not intervene in the competitive process, a problem arises directly from the assumption that none of the rent-producing activities has any social value. Just the reverse is true: it is exactly the social value of these activities that creates rents. A firm that obtains a monopoly is likely to do so by outcompeting other firms (i.e., through low prices, better product, etc.). The result of the existence of monopoly rents has been the benefit of the consumer and the society at large--the benefit of the competitive process.<sup>4</sup>

The second and third implications illustrate the fundamental similarity between the Posner-Tullock rectangular loss and the problem of ill-defined property rights. If in Goldberg's example the current monopolist had been granted an exclusive, transferable, and irrevocable right to the monopoly, and if such a right had existed in the first place, none of the rectangular waste would ever exist. It was the unclear definition of this right that caused the original competition for the right. It is the fact that the right is revocable that causes the expenditure on maintaining the right. To prevent waste, this

competition ensues with the dominant firm attempting to gain the remaining 20% of the market, the Posner-Tullock analysis would imply that the competitor and the monopolist, if indeed it becomes that, will have dissipated all monopoly rents in the quest for monopoly.<sup>1</sup>

A prescription for removing this waste is for the government to grant a complete monopoly right very early on in this process! This would remove the waste problem by removing the incentive to dissipate rent. No one should be allowed to compete for this monopoly, once it has been granted, on the grounds that such competition would be socially wasteful. This prescription directly contrasts with that of standard micro theory, which would suggest that competition should be encouraged in this industry.

Another implication of treating the income transfer as a social cost is suggested by Goldberg.<sup>2</sup> Goldberg points out that the monopolizing firm would, according to Posner's logic, expend as much to maintain its monopoly as it had spent to create that monopoly in the first place. Thus, a monopoly once created would be costly to get rid of. The waste created by attempting to remove a monopoly would equal the rectangular loss created in originally setting up the monopoly. The policy prescription here would seem to be, unless the normal welfare loss triangle is very large, to allow the monopoly to continue!<sup>3</sup> There would be a strong presumption that industries with controlled competition, such as trucking, should be maintained in their present state, with no attempt to remove the barriers to entry.

Let us use the Posner-Tullock framework to determine the value of a newly discovered piece of land. The analysis would suggest

new view suggests defining legally-enforceable property rights in market shares greater than, say, 80%. It is only because the monopoly rights are often ill-defined that the Posner welfare loss exists.

The problem with the second and third implications arises from the assumption that the newly created rights are totally communal (or, as Posner states it, there is a perfectly elastic supply of inputs into obtaining the monopoly). In fact, most monopoly rights created are not communal. There are at least some firms with more ready access to the monopoly right than others.<sup>5</sup> It is precisely these firms that fight for the creation of the monopoly. The creation of monopoly where no firm has any advantage is unlikely because of the lack of gain involved.<sup>6</sup>

### III. Social Benefits of Competition for Rent

Any sensible treatment of the welfare effects of monopoly must consider the benefits of rents in inspiring competitive activities. Especially in markets where entry is not controlled by government means, it is the competing for monopoly rents that creates competitive activity. If it could be assured that no such rents could ever exist, much competitive activity would cease. Competition viewed in this dynamic context is vastly different from the "competition" of the static welfare loss model.<sup>7</sup>

This view is not new, but perhaps it could stand some revitalization. Joseph Schumpeter, in his classic work on "Creative Destruction" in Capitalism, Socialism, and Democracy (1942) pointed out that

"... there is no point in appraising the performance of that process [of creative destruction] ex visu of a given point of time; we must judge its performance

over time, as it unfolds through decades or centuries. A system--any system, economic or other--that at every given point of time fully utilizes its possibilities to the best advantage may yet in the long run be inferior to a system that does so at no given point of time, because the latter's failure to do so may be a condition for the level or speed of long-run performance."

The dynamic force of competition is clear in Schumpeter's work. The firm, in an effort to obtain higher profits, endeavors to produce a better product or improve its process of production. The rents this creates encourage other firms to improve themselves in a similar way. This process erodes the economic rents, resulting in consequences that benefit the consumer and society as a whole.

When faced with this view of the competitive process, it becomes clear that static measures may vastly overstate the cost of monopoly. Only in a dynamic framework can the cost of monopoly or benefit of monopoly properly be measured.

Oliver Williamson (1968) and John S. McGee (1971) have described the possible social advantage from monopolization most cogently. Although Williamson's discussion focused on the possible social advantages of merger-induced monopoly, his arguments apply to the wider problem of the social costs of monopoly. McGee's presentation was directed toward the problem here defined.

Assume that in the process of competing for monopoly rents, a firm succeeds in lowering its long-run average costs from  $AC_1$  to  $AC_2$ , as in figure 1.<sup>8</sup> Before the cost-saving was effected, the firm was pricing at long-run average cost and producing  $Q_c$  units of output. As a result of its cost-saving, assume that it gains the power to restrict output to  $Q_m$  and to raise price to  $P_2$ .

The traditional measure of welfare loss due to monopoly counts the deadweight loss (here shaded and marked  $\Delta CS$ ) as the social cost of their monopolization. The crucial point is that the process of competing for the ability to restrict output may well have productive efficiency benefits. The cost-savings (here shaded and marked A) must be deducted from the deadweight loss figure to discover the net effect on society of this monopolization. If  $A > \Delta CS$ , then the net social cost is negative, i.e., the monopolization benefits society. Resources saved in the process are so valuable as to offset the reduction in consumer welfare. If  $A > 0$  and  $A < \Delta CS$ , there is a net social cost to monopoly but less than the cost which the traditional measure would have given. Only when  $A = 0$ , that is, when the cost-savings from competing for monopoly rents are non-existent, will the traditional measure of social cost be accurate.

As the quote from Schumpeter and previous discussion have indicated, productive efficiency is the essence of competition, and competition is likely to be most vigorous when the expected monopoly rents are largest. Thus, there is every reason to believe that cost-savings will result from attempts to monopolize and that, therefore, the traditional deadweight loss exaggerates the social cost of monopoly. This is especially likely where government does not explicitly grant the monopoly license.

#### IV. A Model of Competition for Monopoly

Even where there is no social gain from the competition for the monopoly, the Posner-Tullock rectangle will overstate the welfare loss if monopoly rights are defined. A simple model of the competition for the monopoly right makes this point clear. In fact, such a model shows

that if one firm is much more efficient in obtaining the monopoly than other firms, the amount of the rectangle loss will tend towards zero.<sup>9</sup>

Consider an industry where the government has decided to grant a monopoly license and prohibit entry. Firms will expend resources to gain the monopoly. We will investigate what magnitudes of resources will be expended.

We represent the present value of returns to the license as  $V$ . We suppose there are  $N$  potential bidders for the license and index them by  $i$ . We suppose that resources expended by firm  $i$  are productive in increasing the probability that  $i$  will be awarded the monopoly. Furthermore, resources expended by firms other than  $i$  toward obtaining the monopoly reduce the probability that  $i$  receives the monopoly.

In general form, the probability of firm  $i$ 's obtaining the monopoly,  $\pi_i$ , can be written

$$\pi_i = f_i(R)$$

where  $R = (R_1, \dots, R_N)$  is the vector of resources spent by firms 1 through  $N$  on obtaining the monopoly. By the assumptions above,

$$\frac{\partial f_i}{\partial R_i} > 0 \quad \text{and} \quad \frac{\partial f_i}{\partial R_j} < 0 \quad \text{for } j \neq i.$$

For illustrative purposes we examine a very specific form of the probability relationship. Here, for each  $i$ ,

$$\pi_i = \frac{\alpha_i R_i}{\sum_{j=1}^N \alpha_j R_j}$$

where  $\alpha_i$  is a parameter representing the productivity of firm i's expenditures. Notice that this function satisfies the two conditions above.

Notice also that for any vector R

$$\sum_j \pi_j = 1$$

so the monopoly will be awarded. Furthermore,

$$\frac{\partial^2 \pi_i}{\partial R_i^2} < 0,$$

which corresponds to diminishing marginal productivity (in probability terms) of resources expended on the monopoly.

We shall assume N fixed. The affects of entry will be allowed for by taking limits as N approaches infinity.

By assuming that firms maximize expected profits, we can solve for the optimal firm investment in securing the monopoly. Firm i maximizes

$$\begin{aligned} E(\text{PROFIT}) &= \pi_i V - R_i \\ &= \frac{\alpha_i R_i}{\sum_j \alpha_j R_j} V - R_i \end{aligned}$$

Taking the partial derivative with respect to  $R_i$  and setting it equal to zero, we obtain<sup>10</sup>

$$\frac{(\sum_j R_j) \alpha_i - (R_i \alpha_i) \alpha_i}{(\sum_j R_j)^2} V - 1 = 0$$

Let  $T_i = \sum_{j \neq i} \alpha_j R_j$ . Then

$$\frac{T_i \alpha_i}{(T_i + \alpha_i R_i)^2} = \frac{1}{V}$$

and solving for  $R_i$ ,

$$R_i^* = \frac{T_i}{V \alpha_i} - \frac{T_i}{\alpha_i} \quad (1)$$

Using this result, we can now show that Posner's result obtains in the special case in which  $\alpha_i$  is the same for each firm and  $N$  approaches infinity (free entry). Without loss of generality, set  $\alpha_i = 1$  for all  $i$ , so that

$$R_i = \sqrt{V \sum_{j \neq i} R_j} - \sum_{j \neq i} R_j$$

But, by symmetry  $R_j = R_i$ . Therefore,

$$R_i = \sqrt{V(N-1)R_i} - (N-1)R_i$$

and, solving for  $R_i$

$$R_i = \frac{V(N-1)}{N^2}$$

The total resources wasted in pursuit of the monopoly,  $W$ , will be

$$W = \sum_j R_j = NR_i = \frac{(N-1)}{N} V$$

If  $N$  is a very large number, virtually the entire value of the monopoly will be dissipated. This is the Posner result. His assumption of perfectly elastic supply of inputs to obtaining the monopoly corresponds to the assumption here that  $\alpha_i$  is the same for all of a very large number of firms.

Now suppose that firm 1 has an advantage over all other firms. Suppose for  $i > 1$ ,  $\alpha_i = 1$ , but  $\alpha_1 > 1$ . In this case, by symmetry

$$R_j = R_1 \quad \text{for all } i, j \neq 1$$

Hence,

$$T_1 = (N - 1)R_1 \quad \text{for } i \neq 1,$$

$$\text{and} \quad T_i = (N - 2)R_i + \alpha_1 R_1 \quad \text{for any } i \neq 1$$

From condition (1) above, we obtain

$$T_1 + \alpha_1 R_1 = \sqrt{V(N - 1)R_1 \alpha_1} \quad (2)$$

Hence, since

$$T_i + R_i = T_1 + \alpha_1 R_1 = \sqrt{V(N - 1)R_1 \alpha_1}$$

from (1)

$$\sqrt{[(N - 2)R_i + \alpha_1 R_1]} = \sqrt{V(N - 1)R_1 \alpha_1}$$

$$(N - 2)R_i + \alpha_1 R_1 = (N - 1)R_1 \alpha_1$$

$$R_i = R_1 \frac{\alpha_1}{(N - 1)\alpha_1 - (N - 2)} \quad (3)$$

Substituting back into (2) above and solving for  $R_1$ , gives

$$R_1 = \frac{V}{(2 + \alpha_1) - \frac{N - 2}{N - 1} + \frac{N - 1}{(N - 1)\alpha_1 - (N - 2)}}$$

And as  $N$  gets large,<sup>11</sup>

$$\lim_{N \rightarrow \infty} R_1 = \frac{1}{1 + \alpha_1 + \frac{1}{\alpha_1 - 1}} = \frac{(\alpha_1 - 1)}{\alpha_1^2} V$$

and thus  $\lim_{N \rightarrow \infty} \alpha_1 R_1 = \frac{\alpha_1 - 1}{\alpha_1} V$

From (3),

$$(N - 1)R_i = \frac{(N - 1)R_1 \alpha_1}{(N - 1)\alpha_1 - (N - 2)}$$

and thus

$$\lim_{N \rightarrow \infty} (N - 1)R_i = \frac{\alpha_1 - 1}{\alpha_1} V \frac{1}{\alpha_1 - 1} = \frac{V}{\alpha_1}$$

Hence, the total waste, as N gets large, becomes

$$\lim_{N \rightarrow \infty} W = \lim_{N \rightarrow \infty} (N - 1)R_i + \lim_{N \rightarrow \infty} R_1$$

$$W_L = \lim_{N \rightarrow \infty} W = \frac{V}{\alpha_1} + \frac{\alpha_1 - 1}{\alpha_1^2} V = \left( \frac{2}{\alpha_1} - \frac{1}{\alpha_1^2} \right) V \quad (4)$$

It is easy to see, from condition (4), that the amount wasted will depend on the size of  $\alpha_1$ --i.e., on how much more productive firm 1's expenditures toward capturing the monopoly are. If firm 1 is slightly more efficient,  $\alpha_1$  is not much bigger than one, and almost the whole value of the monopoly is wasted ( $W \approx V$ ). As  $\alpha_1$  gets very large, however, waste goes to zero. Since  $\frac{dW_L}{d\alpha_1} < 0$  and at  $\alpha_1 = 1$ ,  $W = V$ , the loss will never be greater than V but may be much less.

Thus, Posner's argument that the entire monopoly rent will be wasted represents an overestimate of the waste. If any firm has any comparative advantage in securing the monopoly, the welfare loss will be smaller than Posner suggests. The larger this advantage, the smaller the waste.

If one firm has a large advantage in getting the monopoly license (e.g., the chief executive is brother-in-law of the mayor), the waste is likely to be very small.<sup>12</sup> It is the last case that will be the usual case of monopoly creation, since only here is the lobbying to have a monopoly created going to be worth the effort.<sup>13</sup>

## V. Conclusion

We have seen that there is little theoretical reason to adopt strictly the Tullock-Posner model of the social costs of monopoly. Their contention that the income transfer from consumers to the monopolist encourages inefficiencies and should therefore figure as part of the social cost, gives rise to curious public policy conclusions, e.g., that the state should enforce a property right in monopoly so as to discourage wasteful competition.

We have further shown that these curious implications are the result of a failure to distinguish between two different types of monopoly. When a monopoly is secured without assistance from the state, the possibility of earning monopoly rents has socially valuable byproducts in spurring competitive activity such as cost-saving innovations and improved products. For the case where the competition for monopoly ends with a monopoly license is guaranteed by the state, we have developed a model which shows the welfare rectangle loss of monopoly to be a special--and unlikely--case of a more general system of competition. That is, as long as there are differences among firms in the productivity of resources expended on monopoly acquisition, then not all of the income transfer to the monopolist may be counted a social cost. Since

it seems perfectly reasonable that those productivities will differ, Posner's and Tullock's assertion becomes a special case.

There is no doubt of the value of the Posner-Tullock model in drawing our attention to the social effects of competition for monopoly. Our finding is that in the majority of cases there will not be significant waste in the competitive process. Indeed, where the competition for monopoly occurs in a free market, there is every reason to expect social benefits.

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Footnotes

<sup>1</sup>The social costs of the monopoly would include not only the deadweight loss in consumer surplus but the value of the resources used up in securing (and then maintaining) the monopoly.

<sup>2</sup>Victor Goldberg, "Reflections on the Welfare Loss Rectangle," Industrial Organization Review, 4 (1976).

<sup>3</sup>This assumes that the current monopolist had not anticipated any challenge to its monopoly position when first competing for the monopoly, and that the attack on this monopoly does not affect beliefs about future attacks on the monopoly or attacks on any other monopoly. If these assumptions are false, other policy prescriptions may be called for.

<sup>4</sup>See Harold Demsetz, "Economics as a Guide to Antitrust Regulation," Journal of Law and Economics, xix (August, 1976).

<sup>5</sup>This is before any expenditures on obtaining the monopoly. Since all people and firms have unique efficiencies and skills which produce rents, it is unclear why such differentials can not exist in securing monopolies.

<sup>6</sup>George J. Stigler, "Theory of Regulation," Bell Journal of Economics, 2 (Spring, 1971).

<sup>7</sup>Paul J. McNulty, "Economic Theory and the Meaning of Competition," The Quarterly Journal of Economics, 82 (1968).

<sup>8</sup>Note that Posner specifically excludes this possibility in his assumptions.

<sup>9</sup>An additional point in the Posner-Tullock framework bears mentioning. Posner notes that bribes (of, say, government officials)

to obtain or maintain a monopoly turn into social cost in that they spur excess competition to become the payee (official). However, the official's salary may be lower than what it otherwise would have been without any excess competition being created. If that is the case, the rents to being a bribable official are reaped by the public-at-large, with no excess "moving into the area," since the monopoly presumably netted a reduction in welfare. For an estimate of social costs in competition for government favor, see Kreuger (1974). Friedman (1980) offers an interesting theoretical treatment of these issues.

<sup>10</sup>Note that the second order condition is satisfied. Also note that the equilibrium concept used here is one of Nash equilibriums with strategy represented by  $R_i$ . The equilibrium concept is almost irrelevant to the conclusions, however, and is used primarily for illustrative purposes.

<sup>11</sup>This assumption shows the largest possible welfare loss.

<sup>12</sup>This has only been shown here for a very specific model of the probability of getting a license; it will be true in general that any advantage will result in some unwasted rent, and a decisive advantage ( $\pi_i=1$ ) will result in no waste. These results are again independent of the equilibrium concept used, as long as firms are not systematically overoptimistic about obtaining the monopoly.

<sup>13</sup>There will be some resources expended in lobbying, of course. But there is no guarantee that these will waste all rents.

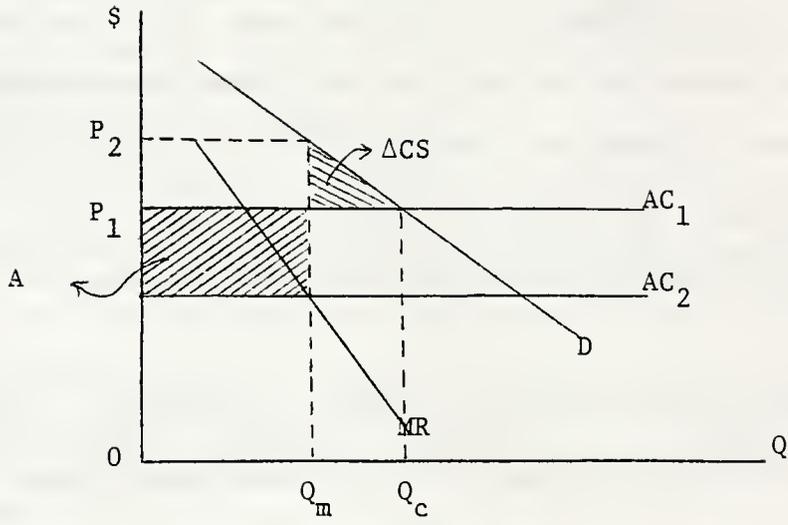


Figure 1

## Faculty Working Papers

AN ANALYSIS OF THE RELATIONSHIP BETWEEN PUBLISHED  
INTERIM ACCOUNTING EARNINGS AND FUTURE INTERIM  
ACCOUNTING EARNINGS

William S. Hopwood, Assistant Professor, Depart-  
ment of Accountancy  
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#671

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Notes

<sup>1</sup>We required the firms to be listed during the entire sample period. The Center for Security Price Research (CRSP) monthly tape was used to select NYSE listed firms. A firm was considered listed if it had monthly stock returns available for the entire sample period.

<sup>2</sup>The absolute percentage error is computed as the average of  $\left| \frac{\text{Actual EPS} - \text{Predicted EPS}}{\text{Actual EPS}} \right|$ . Since this error metric can be explosive when the denominator approaches zero we truncated errors in excess of ten to a value of ten. This operation was done for a very small percentage of the cases.







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