COSTS OF REGULATION IN COMMERCIAL BANKING:

THE TENTH FEDERAL RESERVE DISTRICT

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PREFACE

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CHAPTER I

INTRODUCTION

The effects of monopoly have long been a concern of the economics profession and the law. The origins of this concern are contained in British common law and in the writings of Smith (42). Both British common law and Smith have tended to condemn monopoly.

Under British common law, agreements by sellers to fix prices have been illegal, at least since 1300. Price fixing is illegal because it tends to work "to the great impoverishment of the people". In addition, restraints of trade were also generally illegal, depending on circumstances. Restraint of trade refers to the freedom of a producer to practice his trade. Although English law condemned specific acts, the word monopoly was not contained in the law until 1602. At this time monopoly was used to describe the patents or public grants for exclusive manufacture granted by Queen Elizabeth. Eventually the law described monopoly as an exclusive grant (by the monarchy) to do something which had been a common right, and the law further declared these monopolies to be illegal, except for special cases (31, pp. 98-99).

Smith (42) also condemned monopoly. Smith's criticism of monopoly consists primarily of two points. First, monopoly prices are invariably higher than the "natural price" (p. 47). The natural price is the one which results from free competition. The second point was that perpetual monopoly (that is, a public grant) excluded potential producers from

entering certain types of business. Both of these points were viewed as a tax on the citizens of a country (p. 593). Smith further argued that since the results of monopoly are different from the natural, i.e., freely competitive, situation society is hurt (p. 494).

Common law concerning monopoly and monopoly practice seemed to be focused on the redistribution of income which results from monopoly. The arguments of Smith also appear to be directed at the income distribution. In other words, Smith and the common law were concerned with the issue of equity. With the development of modern economic theory the concern, at least of the economics profession, shifted to an analysis of efficient resource allocation.

Modern microeconomic theory can easily be used to demonstrate the results of monopoly as discussed by Smith. That is, monopoly (defined here as a single seller) does result in higher prices than would exist under more competitive conditions. But, since higher prices, by themselves, simply imply that a redistribution of income has occurred and since interpersonal comparisons of utility cannot be made, these higher prices do not indicate a cost to society. Instead modern theory examines the value of the final product being produced by a firm relative to the additional cost of the last unit produced (i.e., marginal cost). If society places a higher value on the last unit of a product produced than the additional cost of producing that unit, then society would receive a net gain in satisfaction if additional units were produced.

Under conditions of pure competition prices would tend to be equal to marginal cost. Since a monopolist (assuming the profit maximizing motive) produces output at which price exceeds marginal cost, a misallocation of resources results, which imposes costs on society in the form

of a lower level of economic welfare. In other words if resources could be reallocated from lower valued uses to the higher valued monopolized output society would receive a gain in satisfaction. Of course, since monopolies are assumed to be profit maximizers the reallocation will not take place.

It is generally accepted by the economics profession that monopoly does result in a misallocation of resources, but it is not known with any certainty just how serious the costs of this misallocation are. Knowing the costs of monopoly is important both to the economic profession and to the application of public policy toward monopoly. In the United States there exists a body of state and federal antitrust laws concerned either with monopoly or monopolistic practices. Accurate information about the costs of monopoly would help insure that the application of these laws would result in net benefits to society. Antitrust violations are among the most costly cases tried, often costing several millions of dollars. If the costs of enforcing the antitrust laws exceed the benefits, then these laws do not increase the welfare of society. At the same time, if the benefits of reducing monopoly are greater than the costs, more resources should be devoted to reducing monopoly. Either way efficient public policy cannot be made without some knowledge of the costs of monopoly.

Several researchers have attempted to measure the costs of misallocation of resources[1] due to monopoly in the United States. The first study of this type was undertaken by Harberger (15) in 1954. Harberger did not find the cost of monopoly to be significant relative to national

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[1]A brief summary of some of these studies is presented in Chapter III.

income. Except for a later study in 1964 by Kamerschen (25), other researchers have also found these costs to be small relative to national income.

There have been many criticisms to these studies consisting of theoretical problems and difficulties in data collection.[2] In addition past studies have examined only manufacturing and mining. Financial and service industries have not been analyzed, nor, except for Posner (36), has there been an analysis of monopoly due to government regulation other than general theoretical discussions.

Purpose of Study

The purpose of this study is to examine some of the costs of monopoly which are a result of government regulation. The specific industry to be examined is commercial banking. The analysis is concerned with monopoly power in commercial banking, but since this power is due to government regulation which restricts entry, what is actually being examined is the cost of regulation in commercial banking. Thus there are two purposes of this study: to examine the effects of monopoly in the financial sector of the U.S. economy and to measure some of the costs of government regulation are studied.

The scope of this study is more limited than many of the past monopoly studies. Rather than attempting to measure the costs of regulation for the entire economy, a few specific types of output are examined. This limited objective consists of examining the lending activity of commercial banks and is preferable for two major reasons.

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[2]See Chapter III.

Past studies have combined many distinct products into one by looking at, for example, the profit rates and costs of entire sectors of the economy, e.g., manufacturing and mining. This procedure hides monopoly power by combining monopolized products with competitive ones. Clearly this results in reducing the estimated effects of monopoly power. By examining different loans made by commercial banks the problem of hidden monopoly power is greatly reduced. Secondly, although the results cannot be used to make broad conclusions about the monopoly problem in the United States, the application of public policy (i.e., antitrust or regulation) is made on an industry-by-industry basis which requires data on individual industries.

Organization of the Study

Chapter II of this study presents the basic theoretical analysis used in past research to examine the costs on monopoly. The initial discussion presents the concept of deadweight welfare loss which is a part of the costs of regulation examined. The bulk of Chapter II extends the theoretical analysis to include situations in which government regulation creates monopoly positions. The theoretical discussion presents an argument that the income transfer to monopolists, which has in the past been ignored, results in additional costs to society when regulation creates monopoly. Basically this additional cost is due to competition for monopoly positions in a market. Therefore the costs of monopoly become, in fact, costs of regulation and exceed the deadweight welfare loss. The model presented in this chapter is the basis for the empirical model of Chapter V. In addition to the theory the chapter also described some of the theoretical and practical problems associated with the model which is developed.

Empirical evidence on the costs of monopoly are summarized in Chapter III. Past efforts have looked only at the deadweight welfare loss, therefore only deadweight loss studies are discussed. Certain aspects of two studies are presented in some detail since they form the basis for the empirical model. Also, in this chapter, the theoretical and empirical problems associated with past research are discussed.

Chapter IV expands the theoretical model of Chapter II to incorporate commercial banking. The model in Chapter II is basically applied to a single product firm. Since several different loans will be output, the model must be applied to a multiproduct firm. The first part of Chapter IV develops a model of the multiproduct firm, including a brief discussion of joint and common costs. The simple multiproduct firm model is then applied to commercial banking incorporating aspects of lending activity which differ from the simple model developed in the first part of the chapter. The result is a multiproduct model which is applicable to commercial banking and allows identification of the costs of entry restriction in commercial banking.

The empirical model is presented in Chapter V. This model, based on the theoretical model of Chapter IV, basically consists of two multiple regressions. One regression equation is used to obtain the various demand related variables required by the approaches discussed in Chapter III. The second regression is used to obtain the necessary cost variables. The data used consist of information on the Tenth Federal Reserve District. Also in the chapter is a discussion of some modifications which had to be made because of data problems.

Chapter VI presents the results of the study. The costs of regulation are given both for individual loans and for total lending

activity by banks in the Tenth District. Finally, Chapter VII interprets the importance of the results for public policy which restricts entry into commercial banking and proposes additional refinements which could be made (with better data) and additional areas for future study.

CHAPTER II

COSTS OF REGULATION

In most modern economies, many industries have some regulation or regulations imposed on them by governmental agencies. These regulations are imposed on producers because of some perceived benefits accruing to society. There are many different types of regulation ranging from restrictions on entry into various types of production to specific regulations on methods of production, pricing, and regulations on levels of output. Even though there may be benefits from regulation, there are also certain costs associated with governmental regulation. The following discussion will present a theoretical examination of some of these costs when regulation restricts entry into a particular industry. Although the other types of regulation are not unimportant, this study will not be concerned with their costs.

Consumers' and Producers' Surplus

Traditional analysis of the effects of monopoly have centered on an examination of consumers' and producers' surplus. Therefore, a brief discussion of these concepts is necessary.

The concept of consumers' surplus was originated by Dupuit (18) in 1844 and was defined as the area under the demand curve above the market price. Marshall in effect used the same definition of consumers' surplus, but qualified it with the assumption of a constant marginal utility of

money income. Although there has been a voluminous amount of material written concerning this concept, including at least 27 methods of measurement (25), this study adopts the definition of Marshall and Dupuit. Using the definition that consumers' surplus is the difference between what consumers would be willing to pay for some quantity of a product and what they actually pay, the triangle hfp is consumers' surplus, in Figure 1.

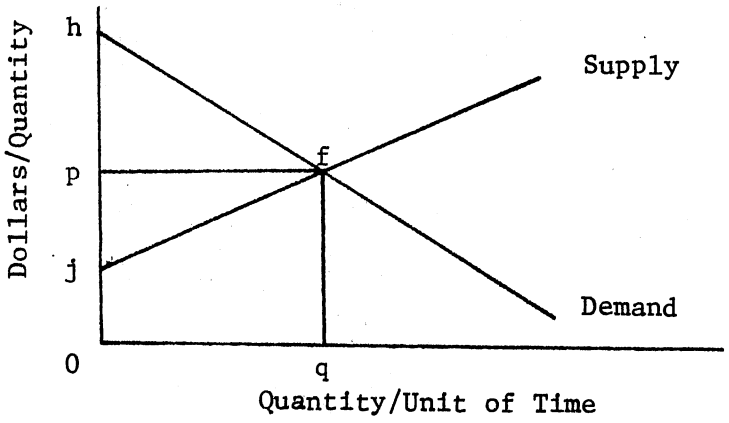

Figure 1. Consumers' and Producers' Surplus

In markets characterized by free entry there is also a benefit analogous to consumers' surplus which accrues to sellers--producers' surplus. Producers' surplus can be represented by the difference between what sellers receive for some quantity sold and what they would have been willing to accept. This producers' surplus is represented in Figure 1 by the triangle pfj.

If there is enforced on the market a price which is higher than the competitive price (that is, higher than marginal cost), there is a loss in welfare for society due to a loss of consumers' surplus. Figure 2 shows supply and demand for good Q and competitive price, P_c, and output, Q_c. If a higher than competitive price, P_m, exists, due, for example, to governmental controls, the sum of the consumers' surplus and producers' surplus areas is reduced. At the price P_m there is a loss of consumers' surplus equal to the area of P_cP_mCD. At the same time there is a loss of producers' surplus of ABD, but a gain of P_cP_mCB. The area P_cP_mCB is a part of the loss of consumers' surplus; however, since it is a transfer from buyers to producers, it does not represent a loss in society's economic welfare. The total social loss of welfare, called deadweight loss, is the area BCD plus ABD. Methods for measuring this deadweight loss were developed by Hotelling (20) for examining any price which exceeds marginal cost. Most analysis has assumed constant costs which eliminates the concept of producers' surplus. This assumption is also made in this paper and all additional discussion will exclude producers' surplus.

There are two additional assumptions in this analysis which are important. First, it is assumed that there are no external costs of benefits associated with production or consumption. If externalities do exist, efficient resource allocation does not result from equating price and marginal cost. Second, it is assumed that there are no problems of second best. If second best problems exist, it is not certain that a social cost exists from price exceeding marginal cost; in such an instance, if price were reduced until it equalled marginal cost it would not be certain that resources would be more efficiently allocated.

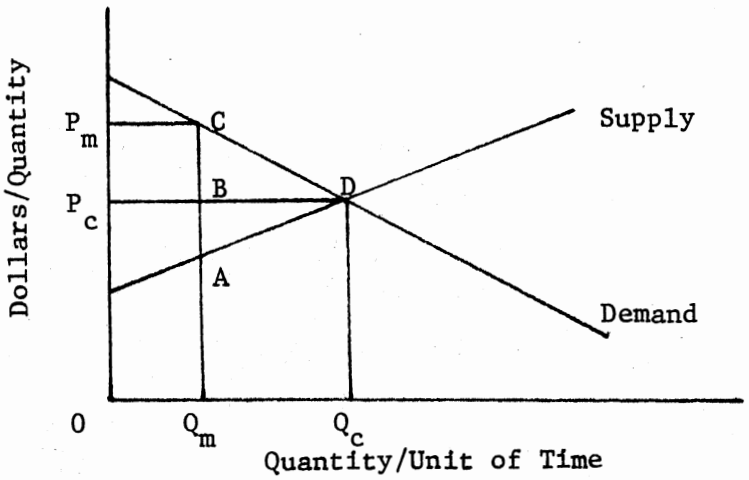

Figure 2. Welfare Loss

Costs of Monopoly Creation

As shown in the preceding discussion, there is a deadweight loss of consumers' surplus which results from any price which exceeds the marginal cost of production (again assuming no externalities and no problems of second best). Since the profit maximizing motive is assumed to explain output behavior of the perfectly competitive firm, the short run supply curve is the sum of the marginal cost curves of the firms in a perfectly competitive industry; and, therefore, there will not be any deadweight consumers' surplus loss either in the short run or in the long run (assuming perfectly competitive factor markets). However, even in a perfectly competitive industry there may be, in the short run, a transfer from buyers to sellers because of an increase in demand or an improvement in technology, assuming constant resource prices. This transfer in perfect competition does not result in a net loss to society since it is only a transfer. But, the transfer does result in an

eventual benefit to society. The transfer is also a loss of consumers' surplus which represents payments by buyers which exceed the opportunity cost of producing. This transfer is, of course, simply an economic profit which will be eliminated as new plants are placed into production, increasing supply, and therefore driving price down until all economic profits are eliminated. With constant resource prices, society then would be paying the same price per unit but consuming a larger quantity. Competition for the transfer, then, results in additional resources being used to produce the product, thereby increasing output and eliminating the transfer.

Suppose that instead of a perfectly competitive industry, a particular industry has characteristics which are not consistent with a perfectly competitive industry. If an industry is characterized by natural monopoly, or at least substantial economies of scale, some firms are forced out of the industry. As firms leave the industry, at some point the remaining firms will each face a downward sloping demand or average revenue relationship. Once this occurs marginal cost and price will not be equal. The situation, of course, is one in which price exceeds marginal cost.

The situation resulting from an economies of scale entry barrier is likely to be one in which there is a deadweight welfare loss and a transfer from buyers to sellers. But if prices are held at the expected average cost of new entrants, new entry will not occur. This limit pricing coupled with the presence of substantial economies of scale will not allow a new firm to achieve the necessary output levels required to be competitive with existing firms unless there is an increase in demand for the product being produced.

To summarize these results, under market conditions involving substantial economies of scale, there is a net reduction in aggregate welfare which is equal to the deadweight loss of consumers' surplus. There is also a transfer of income from buyers to sellers which will not be eliminated by competition; this transfer does not represent a net loss to society.

Do the above conclusions concerning perfect competition and situations of scale economy entry barriers also apply when entry into an industry is restricted by regulations imposed by a government? The following discussion will attempt to show that when entry is restricted by governmental activity the transfer will result in a net loss to society in addition to the deadweight consumers' surplus loss. This additional loss is due to competition for the transfer.

Various economists have discussed the effects of a transfer which is the result of government entry restrictions or other regulations. It will be useful for the purposes of this study to summarize the discussion of several of these individuals.

One of the first and more general discussions is that of Tullock (45). Tullock begins his analysis with a standard tariff model (using supply and demand), and points out that the income transfer, which traditionally has been ignored, results in resource use beyond that which is required to produce the product on which the tariff is levied. If the subject is looked at in a dynamic sense, it is clear that tariffs are imposed after domestic producers have exerted influence on governmental policy makers. Domestic producers would not be expected to undertake this type of activity unless some gain were expected, that is, producers would be expected to use resources up to the point that the

expected "marginal return on the last dollar spent was equal to its likely return producing the transfer". At the same time others may be using resources in an attempt to stop the imposition of the tariff. Both of these expenditures are wasted from society's viewpoint since their function is to achieve or prevent an income transfer (p. 228).

A similar analysis was provided by Krueger (27) also in reference to international trade. Krueger's discussion used the concept of rent rather than income transfers. Rent is defined as the "surplus of earnings over what can be earned in the best alternative" (44, p. 106). Except for this difference in terminology, Krueger's (27, pp. 291-293) analysis differed little from that of Tullock's, except for some specific examples of the form that rent competition would take under different types of quota restrictions. In addition, while Tullock did not attempt to measure the value of the transfer or rent, Krueger provides estimates of the size of rents for India and Turkey (p. 294). As implied by Tullock (45), Krueger (27, p. 301) also argues that the value of rents measures the costs of resources used in rent seeking.

A study by Douglas and Miller (9) directly examined rent competition in a regulated industry. Their study differs from Krueger and Tullock by emphasizing competition by firms within an industry for existing rents. The combination of restricted entry and price regulation resulted in the creation of rents in the airlines industry. The most important form of competition for these rents is more frequent departures and arrivals. This type of competition increases costs to firms in the industry, thereby tending to eliminate any rents.

If the potential rents under airline regulation are entirely eliminated, and there is evidence that in airlines this is the case (8, p. 662),

then are the resources used in competing and eliminating the rent wasted? There is no clear-cut answer to this question. To the degree that the resulting price and scheduling combinations differ from the free market solution, then there is a social cost. At the same time, to the degree that rent competition more closely approximates the free market solution, there is a social benefit not a cost. This is the basic difference between the analysis of Douglas and Miller (9) and that of Krueger (27) or Tullock (45). Rent competition results in a social cost according to Krueger and Tullock, but in some cases that competition may result in some benefits to society.

The theoretical arguments and empirical evidence do support the existence of competition for the monopoly transfer or rent which results from government restrictions. Firms can be expected to use resources to obtain the transfer as long as the marginal expenditure is less than the marginal return. The airlines industry provides a good example in which the actual value of resources used in competing are directly measurable. In many industries it is not possible to measure these costs directly, hence Krueger and Tullock both use the size of the transfer as a proxy for these costs.

Posner (36) has developed a model of the social costs of monopoly. The present study's method of measurement is based on Posner's paper, and, therefore, his theoretical argument and method of measurement are discussed in some detail.

Posner initially discussed the effects of the creation of a transfer and a deadweight welfare loss due to price exceeding marginal cost. The simple model he presented is identical (except for a constant marginal and average cost) to that which was presented in this study and also

discussed by Tullock (45), including the resulting competition for the transfer. His estimate of the social costs of monopoly consists of the sum of the transfer (as a proxy for resource use in competing for the transfer) and the deadweight welfare loss. The main contribution of his paper, other than the model, is a discussion of the assumptions or conditions which are critical if the transfer is to result in a social cost (36, pp. 809-810).

Posner's first critical assumption is that obtaining a monopoly is a competitive activity (pp. 809-810). This assumption is a basic assumption of economic theory; in other words, there is competition for any scarce resource. Not only is this an assumption of theory, but it is also easily observable that individuals compete for scarce resources whether those resources are land, raw materials, labor, or capital. In this case the scarce resource is a monopoly position. Competition for a monopoly position can be seen in several instances. In addition to those discussed by Tullock (45), Krueger (27), and Douglas and Miller (9), individuals expend resources to obtain patents, television licenses or attempt to form cartels (36, p. 809). There does not appear to be any reason to assume that competition does not occur for monopoly positions, and many examples of this type of competitive activity do exist.

His second assumption is that the long run supply of inputs used in obtaining a monopoly is perfectly elastic and therefore does not contain any rents (pp. 809-811). The importance of this assumption is that if rents do exist, then at least some of the costs of monopolizing are also simply income transfers. In other words, that part of the value of resources used to compete for the monopoly position which is

a rent going to resource owners does not represent additional resource use. Over the long run this assumption is not necessary. If rents for monopolizing resources do exist, individuals would be expected to compete for those rents, so that once those rents are bid away the resources used are wasted (pp. 810-811).

His last assumption, which is a critical one, is that no socially valuable by-products (for example, higher quality service) result from rent competition (pp. 810-811). Posner simply ignored this possibility but admitted it could occur and referred to the rent competition in the airlines industry. Except for the Douglas and Miller (9) paper, there is no evidence concerning the useful by-products which may result. However, there is an important difference between competing for a monopoly position and competing within an industry for existing rents. Posner in his paper confused these two distinct situations.

Suppose that the number of firms in an industry is largely fixed by government restrictions, as in airlines, and that rents do exist. In this case firms will compete among themselves for these rents. As indicated by Douglas and Miller (9, p. 667) this competition may move the industry towards the market solution of a more competitive industry and therefore may not be socially wasteful. Any analysis which estimates existing industry costs will include the cost of these useful by-products, since the cost of this competition is included in the costs of the firms. Of course, this results in possible overestimation of the value of any by-products. In any case, socially valuable products or services resulting from competition are not necessarily ignored in an empirical study.

In contrast to competition within an industry, competing for a monopoly position will not result in socially valuable products or services. This case involves potential firms and the resources used are to obtain the right to produce. The value of these resources (for example, legal fees, consultants, studies, travel expenses, and lobbyists) will not be included in the operating firms' costs and are not related to the activity of production itself; hence, they are wasted. Even if certain services were proposed by a potential firm (services not presently offered by the industry), until they are produced no benefits result; and when they are produced, their cost would be included in the firm's costs.

As listed above, the three assumptions of Posner (36) appear to be reasonable. To summarize, the first assumption is nothing more than an extension of both theory and emperical research concerning the competition for any scarce resource. The second assumption involves assuming the markets for inputs into the monopolizing activity are in a long run equilibrium in which any rents have been eliminated. While at any point in time these rents accruing to resources may exist, the size of the rents represents the value of resources which will be wasted in bidding for the rents; therefore, including the value of these rents is justified. The final assumption is valid because potential new firms obviously cannot create useful by-products (except for information flows) since they are not yet producing. At the same time, socially useful products which result from competition by existing firms are not necessarily ignored since the costs of these products are included in firms' costs.

There are two additional assumptions which Posner does not explicitly discuss. The first is that potential monopolists have perfect knowledge concerning the size of the rents to be earned. This assumption is not necessary from the viewpoint of potential firms, since their behavior is based on the expected return of the monopoly right. However, if the size of the transfer is to be used as a proxy for resource use, the perfect knowledge assumption is necessary. It must also be assumed that resource markets, particularly those for inputs into monopolizing, work efficiently. If there are serious immobilities in resource markets, then some of the existing rent may not represent resource use. Of course, the longer the time period analyzed, the more likely it is that these two assumptions will in fact be accurate, since in the long run resources will tend to move into monopolizing activities and potential firms would have additional time in which to adjust their estimates of potential profits and, therefore, resource use.

The costs examined by Posner (36) are shown in Figure 3. In this diagram P_m and P_c are the monopoly and competitive prices, respectively; Q_m and Q_c are monopoly and competitive outputs. The total social cost of regulation is the sum of the deadweight welfare loss and what this study will call the transfer cost (i.e., the transfer of consumers' surplus which represents resources used to obtain the monopoly rents). The deadweight loss is the triangle W and the transfer cost is the rectangle T. The deadweight loss can be calculated using:

$$W = \frac{1}{2} (\Delta P)(\Delta Q). \qquad (1)$$

In equation 1, ΔP is the absolute value of the difference between the monopoly and competitive prices (i.e., $P_m - P_c$) and ΔQ is the absolute

value of the difference between the monopoly and competitive outputs (i.e., $Q_m - Q_c$). The transfer cost is calculated using:

$$T = \Delta P(Q_c - \Delta Q). \qquad (2)$$

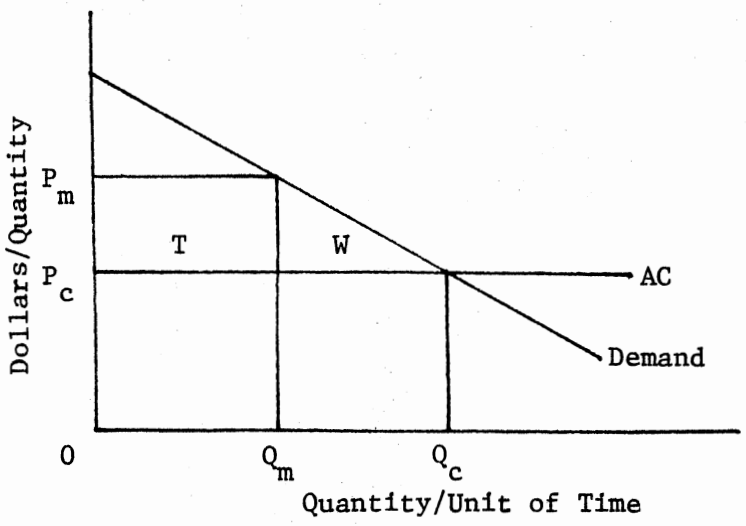

Figure 3. Deadweight Loss and Transfer Cost

Posner derives two relationships relating the deadweight loss and the transfer cost, depending on available data.

The first case is relevant when the deadweight loss, price elasticity of demand, and monopoly price increase are available and the price elasticity is assumed constant, i.e., non-linear demand. The second case is useful when the monopoly price increase, the monopoly output, and the price elasticity of demand at the monopoly price is known, and

the demand curve is assumed to be linear (36, pp. 813-815). The nature of this study requires the use of the second case, so the derivation of the relationship for non-linear demand is not given.

For case two, begin with the inverse of the slope of the demand curve:

$$\Delta Q/\Delta P = (\Delta Q/\Delta P)(P_m/P_m)(Q_m/Q_m)$$

$$\Delta Q/\Delta P = (E)(Q_m/P_m). \qquad (3)$$

In equation 3, ΔQ, ΔP, Q_m and P_m are the same as defined earlier, and E is the absolute value of the price elasticity of demand at the monopoly price. This equationccan be used to obtain an expression for ΔQ. Using the ratio of equation 1 to equation 2, the relationship between the deadweight loss and the transfer cost can be derived as follows:

$$W/T = 1/2\ (\Delta P)(\Delta Q)/(\Delta P)Q_m.$$

From equation 3, $\Delta Q = (\Delta P/P_m)(E)(Q_m)$; substituting this expression for ΔQ into W/T:

$$W/T = 1/2\ (\Delta P)(\Delta P/P_m)(E)(Q_m)/(\Delta P)Q_m$$

$$W/T = 1/2\ (\Delta P/P_m)E$$

$$W/T = 1/2\ \left(\frac{P_m - P_c}{P_m}\right)E$$

$$W/T = \left(E - \frac{P_c}{P_m}E\right)/2$$

$$W/T = E(1 - (P_c/P_m))/2.$$

Letting $P_c/P_m = k$,

$$W/T = E(1 - k)/2. \quad (34, p. 815) \qquad (4)$$

If either W or T can be calculated, then the other can be obtained using equation 4. The deadweight loss can be calculated using equation 1 if the change in price and quantity due to a monopoly position are known. Alternatively, if the change in price and the monopoly output are known the transfer cost can be obtained using equation 2. Once either W or T are estimated, then if the price elasticity of demand (E) and the competitive-monopoly price ratio ($P_c/P_m = k$) are known then equation 4 can be used to estimate the remaining cost. The sum of T and W then would be the total social cost of monopoly.

Posner's use of the deadweight loss triangle as a cost of monopoly is largely accepted both in economic theory and in empirical research on the subject.[1] However, the use of the transfer as a proxy of resource use involves both theoretical and empirical difficulties. These difficulties limit the usefulness of the transfer but do not negate its use. Therefore, these problems are discussed below.

The analysis of Posner has been criticized by Siegfried (40) on several points. Siegfried does not believe that the profits triangle provides a useful guide to the social costs of rent competition. These monopoly profits, as discussed by Tullock (45), and by Siegfried (40), result in wasted resources (1) used by potential entrants to attain the profits, (2) used by established firms to protect profits, and (3) used by consumers to eliminate the monopoly power.

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[1]The results of research on the deadweight loss are summarized in Chapter III.

Siegfried (40, p. 692) stated that the transfer rectangle of Posner's is relevant only to established monopolists, since it is what would be lost by those firms if they lose their monopoly positions. Although potential monopolists and consumers would be willing to spend up to their post-entry gain, Siegfried argued that the rectangle does not accurately measure the value of the resources used in these efforts. He then suggested two reasons why the profit rectangle is even a deficient measure of actions by established firms to protect their positions. The value of any resources used to protect a monopoly position would be included in the firm's cost curves and so would not be included in the profit rectangle. In addition, established firms would only spend enough resources to protect their position, which may be less than the area of the rectangle. The total value of resources used would depend on expectations about the efforts of potential entrants. These considerations involve decision making under uncertainty and risk by both existing firms and by potential entrants. Because of this dymanic nature, Siegfried (40, p. 693) concluded that the use of the transfer rectangle is "very" rough.

Siegfried seems to be correct in this view, for example, in the case of potential entrants, the transfer rectangle is actually an underestimate of actual resource use. As was discussed by Tullock (45, p. 232), an estimate of the rectangle does not include the value of resources used by potential entrants who failed in their attempts.

The points made by Siegfried concerning the expenditures by established firms appear completely valid, making the profit rectangle a poor measure of resource use by these firms. The fact that these costs are included in the firm's cost curves would also result in an

underestimate of resource use by potential entrants if potential firms do not use industry profits as the entire expected gain. That is, if potential firms estimate the potential transfer exclusive of the cost of protecting their monopoly, then an estimate of existing profits would underestimate resources used to become a monopoly.

As noted above, the profit rectangle may actually underestimate the social cost from potential entrants depending on the estimating techniques of potential firms. Thus, the profit rectangle is only a rough guide to actual wasted resources because it does not adequately take into account resources used by potential entrants who fail, established firms protecting their position, or expenditures by consumer groups to eliminate the monopoly position. Therefore, since estimation of the profit rectangle would tend to ignore existing firms' expenditures, consumer expendtirues and entry attempts which fail, at worst the rectangle is a low estimate of actual resource use.

There is one final difficulty with the use of the profit rectangle which is not discussed by Siegfried (38), although it is mentioned in a footnote by Posner (36, p. 809). The difficulty is, in this rather simple analysis, that there is an implicit assumption that the monopoly profits exist for only one period. Within this model, firms are actually competing for a one period transfer. More realistically the competition for a monopoly position by potential entrants could be looked at as an attempt to capture a flow of net revenue over time, and any single period estimate would therefore underestimate actual resources used. This means that the estimated transfer for a single period may represent the value of only a part of the resources used to achieve the monopoly position. Clearly there is a problem in placing a single value on the

cost of the monopolizing resources. A potential monopolist would use resources up to the present value of the expected net revenue flow. Calculating this present value would present several difficulties. First, and perhaps easiest to handle, is determining a valid discount rate. Second, there is the risk that any new firm may fail. Finally, a firm must have some estimate of the length of time in which the market power of its position will not be diminished. This time period would be determined by the possibility of additional entry, particularly if there is increasing demand, and, in the case of regulated entry, the possibility of governmental policy changes allowing easier entry. Even though this single period problem would result in a transfer estimate which is not accurate, it is not likely to result in an overestimate. Therefore if a study, such as this one, uses a one period estimate it can only be used as an indicator of the size of potential profit and the monopolizing effort; but it would be a low estimate.

Summary

The chapter has presented an argument that if a monopoly position exists, there will be a welfare loss to society equal to the deadweight loss of consumers' surplus. This loss of consumer surplus exists regardless of the source of the monopoly power. If a monopoly position exists because of barriers not related to economies of scale, then there will be additional costs of monopoly due to potential firms attempting to enter the industry, existing firms protecting their position, and by consumers attemtping to eliminate the monopoly positions. Although there are difficulties in using the transfer from buyers to the monopolists as a measure of resources used to achieve a monopoly, the

transfer most likely would provide a low estimate for four reasons: (1) the transfer does not accurately represent efforts of existing firms; (2) the transfer does not accurately represent efforts by consumers; (3) potential entrants who fail in their attempt are ignored, and; (4) this method of measurement is for a single period model and does not reflect the fact that it is a flow of net revenue that potential firms would be attempting to obtain.

There are, then, two sources of the social costs due to a monopoly; in the past only one of these has been investigated by most researchers. Usually only the deadweight welfare loss has been examined by those concerned with the monopoly question. The next chapter summarizes the results of these efforts.

CHAPTER III

COST OF MONOPOLY: EMPIRICAL EVIDENCE

As discussed in the preceding chapter, monopoly, particularly if it is due to government entry restrictions, results in a social cost in the form of a deadweight loss of consumers' surplus and from resources wasted in efforts to obtain the revenue transfer from buyers to a monopolist by achieving a monopoly right. In the past there have been several attempts to measure the deadweight loss due to monopoly power. It is useful to review some of these studies in order to see how this technique has been employed, to examine the different methods used, and to examine the problems with measuring the deadweight loss. The transfer has generally been ignored since it was considered to affect equity but not the efficient allocation of resources.

Welfare Loss Studies

The first attempt to measure welfare loss due to monopoly was a study by Harberger (15) in 1954. He used a sample of 73 industries from 1924 to 1928. This particular time period was chosen because of a relatively stable economic structure with no violent demand shifts and because accounting values of capital were close to actual values. Another reason for the use of this time period was an existing study which provided profit estimates for the 73 industries (p. 79). In order to obtain a normal rate of return Harberger calculated an average rate of

return for each industry over the five-year period. A price elasticity of demand of unity was assumed by Harberger.

Based on the profit estimates and on the assumed unit elasticity, Harberger (15, p. 82) estimated the cost of monopoly (i.e., the dead-weight loss) at 59 million dollars, or less than one-tenth of 1 percent of national income. In 1954 prices, this loss amounted to $1.50 per capita. Harberger stressed that in his attempt to estimate this loss, efforts were made to overstate its size.

Harberger's study was criticized by Stigler (43) on two basic points. Stigler argued that firms with monopoly would not operate where marginal revenue was zero, that is, where price elasticity of demand is one. He also questioned the accuracy of the profit data used by Harberger. Because of these two points, the welfare loss estimate by Harberger was too low.

In response to these criticisms of Stigler, Schwartzman (38) attempted to measure the welfare loss for 1954 using Harberger's model but with better profit data and with different price elasticities. Using his profit data, and price elasticity of one and two, he also found the welfare loss to be less than one-tenth of 1 percent of national income.

These low estimates of the welfare loss due to monopoly were, to many economists, surprising. Another attempt to measure this loss was made by Kamerschen (24), using data for 1956-57 to 1960-61. He argued that more recent data and better statistical techniques would provide a better estimate of the loss. In addition, Kamerschen attempted to estimate the price elasticities of demand rather than assuming them. Before looking at Kamerschen's findings, it is useful to examine his

method of estimating the price elasticities, since his method is used in the present study.

The method for estimating the price elasticity of demand begins from the basic price theory relationship between marginal revenue and price:

$$MR = P(1 - 1/E_d).$$

In this equation MR is marginal revenue, P is price and E_d is the absolute value of the price elasticity of demand. By solving the above equation for E_d the following is obtained:

$$E_d = P/(P - MR).$$

Assuming industry profit maximization, i.e., MR = MC, where MC is marginal cost, the equation becomes:

$$E_d = P/(P - MC). \qquad (5)$$

Therefore, if firm and industry profit maximization is assumed and if an estimate for price and marginal cost can be obtained, the price elasticity of demand can be estimated using equation 5.

Kamerschen (24), using unit elasticity, found the loss estimate to be 1.9 percent of national income which is substantially larger than Harberger (15) or Schwartzman (38) obtained. Using his elasticity estimates the welfare loss was 5.4 to 6.2 percent of national income. Kamerschen (24) concluded from his study that the welfare effects of monopoly are significant.

A somewhat different approach was attempted by Bell (2) in 1973. Using concentration ratios as an indicator of monopoly power, he found

that the more monopolized an industry is the higher profit rates and wage rates. He assumed that monopolies share their gains with workers and, therefore, some of the welfare loss is hidden in higher wages. Assuming a price elasticity of demand of 1.5, Bell found the welfare loss due to monopoly profits to be .0394 percent of total manufacturing revenue. The additional loss due to higher wages was .604 percent of total manufacturing revenue. With a loss estimate of about 1 percent of total manufacturing revenue, then the loss is less than 1 percent of national income.

In 1973, using Fortune 500 data for each year from 1956 through 1969, Worcester (47) presented a "maximum defensible" estimate of welfare loss due to monopoly. He assumed for each market that the price elasticity of demand was two. Allowances were also made for welfare effects which were not directly observable from the data. One adjustment was made to account for monopoly pricing of inputs. If inputs are priced monopolistically but final products are competitively priced, there is not necessarily an increase in the welfare loss. However, when there is monopoly pricing of inputs and final products, there is an additional loss caused by the economy operating on a lower transformation curve. Worcester adjusts his estimated welfare loss by a factor of 1.2 to account for higher wages resulting from market power in input markets. A second adjustment is made to lower the estimate of the normal profit. Since the average return for all of the Fortune 500 includes monopoly profits, Worcester used 90 percent of the median return in order to eliminate, or at least reduce, the effects of monopoly profits on the estimate of a normal return. With these adjustments Worcester obtained a welfare loss of .443 to .728 percent of national income, depending on the year examined.

Worcester also found the size of the welfare loss to be falling over the 14-year period. He, therefore, suggested that more effort be aimed at the public sector and the misallocation resulting from such policies as quotas, safety standards, and other programs which are asserted to be in the public interest.

The last study to be discussed is one by Siegfried and Tiemann (41). Their approach will be presented in somewhat more detail since the present study uses their method of calculating the welfare loss due to the monopoly price exceeding marginal cost. The basic assumptions used in their method are: "(1) variable costs are constant; (2) each producer charges the same price and there is no price discrimination; (3) the demand curve is linear in the region of actual output; (4) each producer is operating at lowest possible cost" (p. 191).

Referring to Figure 4, the deadweight loss (W) is the area of triangle ABE, that is:

$$W = 1/2\ (AB)(BE).$$

The vertical distance AB is found by calculating the difference between long run marginal cost and the price, or:

$$AB = (TR/Q_m) - LRMC.$$

In this equation, TR is total revenue, Q_m is observed or monopoly output, and LRMC is long run marginal cost. Since average costs are assumed to be constant, long run average costs can be substituted for marginal costs. Because the data used were accounting data, an adjustment was made to account for a normal return. Siegfried and Tiemann (41) estimated the normal return as the average rate of return on assets for

all mining and manufacturing times the book value of assets.

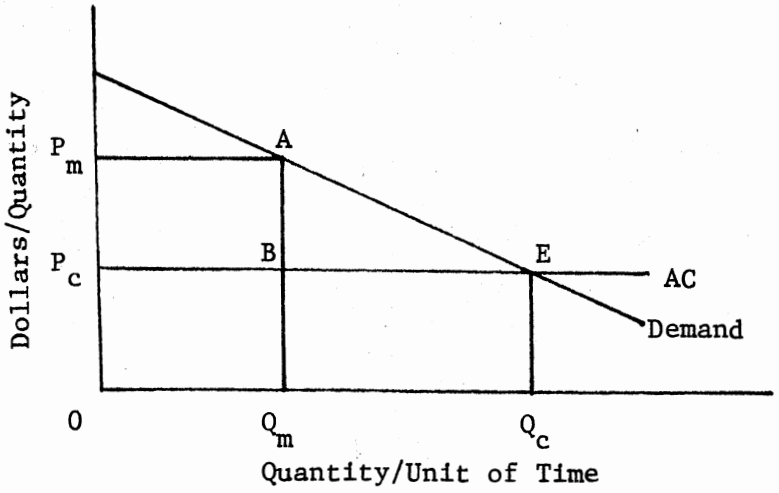

Figure 4. Deadweight Welfare Loss

The distance AB (Figure 4) can now be expressed as:

$$AB = (|TR - LRVC - pA|)/Q_m.$$

The variables in the above equation consist of TR which is total revenue; LRVC, long run variable cost; p, the estimated normal rate of return; and A, the book value of assets. The equation provides an estimate of the economic profit per unit. The absolute value of (TR - LRVC - pA) is used to take into account the misallocation of resources which results from too few resources in those industries with greater than a normal return and too many resources where the return is less than a normal return

(41, p. 192). From the data Q_m is not directly observable; therefore, the expression (Q_m) is multiplied by P_m/P_m giving:

$$AB = (|TR - LRVC - pA|)/(TR/P_m). \tag{6}$$

The distance BE (Figure 4) is given by:

$$BE = AB(dQ/dP).$$

In this expression dQ/dP is the inverse of the slope of the demand curve. By multiplying by (P_m/P_m) and (Q_m/Q_m), and recognizing the price elasticity of demand (E) to be $(dQ/dP)(P_m/Q_m)$, the following expression for BE is obtained:

$$BE = AB(Q_m/P_m)E. \tag{7}$$

Combining equations 6 and 7 the welfare loss equation becomes:

$$W = 1/2\ (|TR - LRVC - pA|/TR)^2(TR)E. \tag{8}$$

With equation 8, it is not necessary to know specific prices or levels of output, which validates the use of accounting data from which prices and outputs cannot be obtained.

Siegfried and Tiemann (41) used observations from IRS minor industries for 1963, which correspond fairly well to SIC three-digit industries. Assuming a price elasticity for all industries of unity, the welfare loss estimate for mining and manufacturing was .0734 percent of national income. This is consistent with the result of other researchers except for Kamerschen.

Evaluation of Welfare Loss Studies

There are several problems associated with welfare loss studies. These criticisms are summarized by Scherer (37, pp. 402-415).

First, these studies depend upon the assumed price elasticities, which except for Kamerschen are in the range of one to two. As equation 8 would indicate, to the extent that in the long run substitution would result in larger elasticities, the welfare loss estimates are biased downward for a given difference between the competitive price and the monopoly price. In addition, if firms are profit maximizers and if they in fact have monopoly power, they would not operate in that portion of the demand curve with a price elasticity of 1 or lower, since this implies zero or negative marginal cost.

Second, the studies are all for manufacturing or manufacturing and mining. This results in two problems. Since the average rate of return tends to be lower in agriculture, retailing, and services, use of the average return in manufacturing biases the normal return upward when the results are expanded to include the entire economy (biasing the welfare loss downward). Also, using this average return for manufacturing understates the monopoly price distortions in manufacturing.

Third, use of SIC two-digit industries and even the use of three- and four-digit industries tends to hide monopoly power. It does this by hiding monopoly returns for a specific product or product line in broadly defined industry averages. A related problem is that because the type of inputs used is a factor in determining a SIC code, firms producing products which are substitutes may be listed in different industries, for example, mobile homes (SIC 3791) and modular homes (SIC 2433). This could bias the results either way, but most likely it

biases results downward since the data for firms with monopoly power in a particular final product market may record only a part of that firm's activity in that market, thereby dispersing their monopoly power in the data.

Fourth, some monopoly gains may have been capitalized as costs, particularly when assets change hands in a merger. Obviously this leads to what would have been monopoly profit being recorded as cost.

Scherer (37, p. 404) argues that if the above distortions are considered, the range for welfare loss is in the range of .5 to 2 percent of gross national product. His "best-guess" is 1.05 percent.

A final issue concerning these welfare loss estimates is that of *X*-inefficiency (28). Because of the lack of competitive pressure, firms with a high degree of monopoly power would tend to tolerate inefficiency and waste (X-inefficiency), so that a monopoly would tend to operate above the technically possible cost curves. But, welfare loss studies estimate actual cost, not competitive cost. Therefore, cost is biased upward, leading to an understatement of welfare loss. Scherer (37, p. 405) believes that this could account for as much as 10 percent of costs.

The present study of commercial banking will attempt to avoid three of the problems with previous welfare loss studies. First, the price elasticity of demand will not be assumed. Rather an attempt is made to estimate the price elasticity using regression techniques. This, of course, has its own problems, to be discussed later; however, an estimate made from industry data should be preferable to an assumption. Simply assigning, by assumption, a particular elasticity coefficient to several different products may be justifiable if the purpose is to examine the

different results as an indicator of the relative magnitudes involved; but it is questionable to imply that an assumed elasticity coefficient is in fact the actual coefficient and, therefore, allowing an accurate estimate of actual welfare loss. If a valid estimating technique is used, an elasticity coefficient estimated from data is more likely to reflect actual elasticities.

As Scherer pointed out, past studies have ignored industries other than those in the manufacturing and mining sectors. Although commercial banking is only one part of the financial services sector, it is an important part; and a study of commercial banking can contribute to analysis of the monopoly problem and to the analysis of industries which are characterized by production relationships which are not as simple as most manufacturing.

Finally, by examining the lending activity of commercial banks, the problem of hidden monopoly power (e.g., use of SIC codes) is reduced. Admittedly this narrow approach will not lend itself to broad conclusions about the aggregate effects of monopoly; however, on balance the results may be more useful, since they will refer to a particular set of identifiable products. The use of commercial banking also is an attempt to evaluate the suggestion by Worcester that misallocations by public sector activity are important and should receive more attention.

CHAPTER IV

COST OF REGULATION: COMMERCIAL BANKING

The two preceding chapters have presented the basic underlying theory concerning the costs of monopoly and a summary of previous empirical studies of the problem. The present study is an effort to examine the welfare loss due to regulated entry into commercial banking. Since regulation in commercial banking restricts entry, both the deadweight welfare loss and the competition for monopoly rents are important. This chapter will develop a theroetical approach to commercial banking. Since commercial banks are multiproduct firms, there are problems of identifying the relevant outputs. These problems will be discussed including the different approaches taken by other researchers.

The Multiproduct Firm

The industry to be examined in this study is commercial banking. As will be shown in this chapter, banks are multiproduct firms. The multiproduct firm can be characterized as using two general methods of production. First, the various products may be produced using completely different types of production functions, for example, a conglomerate firm. Second, the different products may involve techniques involving either joint costs or common costs. The products or services produced by a commercial bank are characterized, as will be shown, by common

costs. Therefore, a brief discussion of both joint and common costs is useful.

Joint production occurs when products can be produced only in fixed proportions such that none of the products has a separate cost function (23). Where joint production occurs there is no way to attribute part of production costs to one of the products and other parts to remaining products.[1] The economic product, that is the unit of production, is the combined output of the various products. Even though buyers may view the products as separate, the cost functions (marginal, average and total) are relevant to the joint or combined output. Clearly, the outputs of commercial banks are not joint. A bank does not have to make various types of loans in fixed proportion, but the various loans are made using the same basic resources, therefore these costs are common.

When the same resources are used to produce different products and when the production of one product uses capacity which would be used to produce other products, their costs are common (23, p. 78). In other words, when it is possible in the short run to shift capital, labor and raw materials from producing one product to producing another, the costs of the various products are said to be common. Since the same resources are used to produce different products, it may appear, as with joint costs, that costs cannot be attributed causally to each product. However, this is not true. If the proportions of the products produced can be varied, then the products have separate marginal costs (21, p. 79). The

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[1]Kahn (23) does demonstrate that separate supply functions based on opportunity cost can be derived. However, these supply functions are obtained using demand for the separate joint products and the joint productions costs; the costs of production are not allocated to each product.

following model shows that it is possible to separate the marginal costs of producing several products where the costs are common.

The analysis of this paper is based on an adaptation of Clemens' (8) multiproduct firm model. Assume the firm can produce a variety of products and that the firm's resources are mobile between products. It is also assumed that demands are not related. The model is presented in Figure 5, assuming three different products and a continuous marginal cost curve which is the same for each product. In other words, all costs are common in this model.

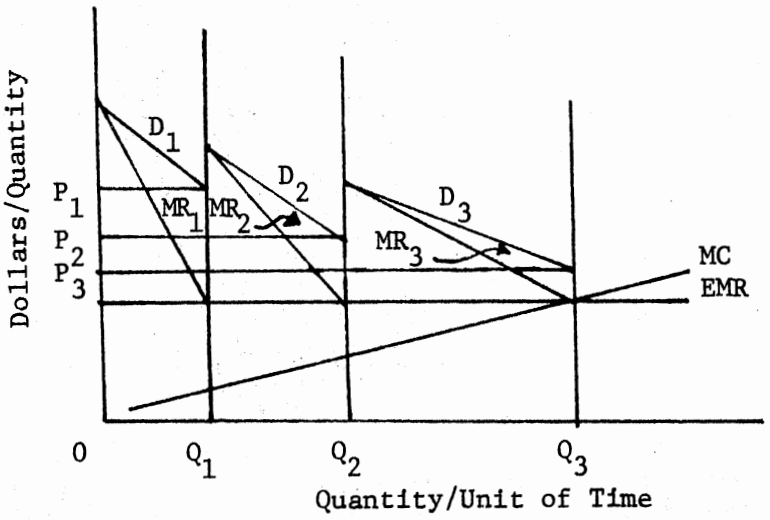

Figure 5. Multiproduct Firm

For purposes of analysis the demand functions are ranked from left to right according to profitability. Profits will be maximized when outputs in the three markets are distributed such that marginal revenue

in each of the markets equals marginal cost. This value of marginal cost and therefore marginal revenue (indicated by EMR for equal marginal revenue) is determined by the least profitable market. The output of each product has its own origin at the output of the preceding product. For example, the output of product one is Q_1; of product two is $Q_2 - Q_1$; of product three $Q_3 - Q_2$.

The common cost nature of this model can be seen by assuming a new product can be produced whose profitability is greater than the least profitable current alternative. This would result in a reduction in the output levels of all the current products and the marginal cost of producing the new alternative can be related directly to that product. At the same time marginal revenue would be raised in all of the markets. As one can visualize, this process could result in a raising of marginal revenue until the least profitable product was squeezed out of the product line (8, p. 270). This same result would occur if marginal cost was to increase. For example, in the context of this study, rising interest rates, due, for example, to restrictive monetary policy, would result in a decrease in available loans for less profitable types of loan activity.

Applying this model to the cost of regulation model of Posner, assume that there is constant marginal cost and average cost. Suppose also that there are only two common products. Figure 6 shows the transfer cost and deadweight loss for each product. In this figure, OA is the monopoly output of product 1; OB is the competitive output of product 1. If product 1 is monopolized the monopoly output of product 2 is AC; BD is the competitive output if product 1 is also competitive. The monopoly prices of products 1 and 2 respectively are E and F, while

G is the competitive price for each. If both products are monopolized, the transfer cost for product 1 is given by the rectangle GEHI; the transfer cost for product 2 is INKL. The deadweight loss for product 1 is IHJ; for 2 it is LKM.

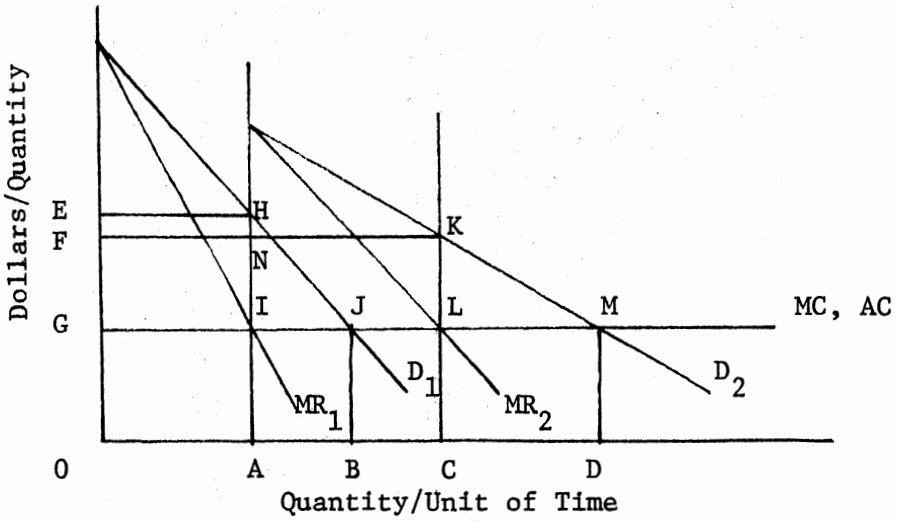

Figure 6. Multiproduct Firm and Welfare Loss

If the restricted entry applies to both products produced, the cost of this restricted entry is the sum of the transfer cost for each product and the deadweight loss for each. Of course, the model could also be used to examine situations which involve some but not all products being sold under conditions of monopoly.

Commercial Banking

If banks are to be studied, the output of banks must be defined and measured. Three major problems exist in defining and measuring bank output. First, since bank output is, regardless of the particular definition, a combination of various services (such as deposits, loans, accounting services, maintaining investment portfolios, and protection of valuables), simply measuring any particular service becomes difficult. Second, the multiproduct nature of banking involves examining the relationships between various outputs, and it must be determined whether costs are common or joint. Finally, some of the outputs of banks represent inputs into other outputs of banks depending on the definition of output. This last problem is extremely important in any study of banking and depends largely on the scope of a study.

There are three approaches to determining inputs and outputs (30). One of these treats banks as producers of financial intermediation services and inputs are then labor and capita; outputs are deposits, loans and other financial services. A second approach is a macroeconomic one in which the banking system's role in economic activity is stressed and loans and investments are inputs, and deposits are outputs. Finally, from a microeconomic viewpoint, that is, concentrating on a bank as an individual producing unit, deposits are inputs while loans and investments are outputs.

Considering the outputs of banks to be financial intermediation was the method of output definition used by four researchers. One of the earliest discussions was by Chandler (7) in 1938. Chandler included as output: bank loans, deposits and other banking services (p. 1). He

did not attempt to justify this view of output, nor was his paper an empirical study. The purpose of Chandler's study was simply to explain why banking cannot be analyzed using the assumptions of the competitive model. Benston (6) and Bell and Murphy (3) used both assets and liabilities in their studies of bank costs. They also did not attempt to justify their view of bank output as financial intermediation.

A macroeconomic approach to defining bank output was used by Schweiger and McGee (39) in their study of banking costs and performances. They identified bank size and banking cost in terms of total deposits and therefore defined output as total deposits.

Treating the commercial bank in a traditional microeconomic sense was used in the first study using empirical data and was, according to Bell and Murphy (3, p. 5), done in 1954 by Alhadeff (1). Alhadeff defined output as total earning assets and used expenses as a proportion of investments and loans to measure unit costs. Both Gramley (12) and Greenbaum (13) used earning assets to measure output, also taking a microeconomic approach. Greenbaum also weighted assets by the average interest rate in each category of assets.

All of the above studies except for Benston (6), and Bell and Murphy (3), used accounting data on assets or assets and liabilities to measure output. The use of this type of data is not consistent with economic theory. That is, the theory of the firm examines the rate of output from a firm and is therefore concerned with a flow concept. However, assets and liabilities are measures of a stock, that is, most of the size of any particular asset is a result of past activity, not related to the present. Therefore, studies which use a stock concept when what is required is a flow concept may obtain poor results.

Benston, and Bell and Murphy, attempted to avoid this problem by defining output as an account and by using the average number of accounts processed in each output category, thereby using a flow rather than a stock. Their use of the number of accounts has one other advantage in that much of the costs of a unit of output, whether it be a loan or a deposit, are not a function of the dollar amount but instead these costs are simply a result of processing another account. (If data on assets and liabilities could be obtained weekly or monthly a flow measure could be developed by looking at differences from one period to the next; however, as is discussed later, data of this type are not available.)

The present study uses assets as a measure of output, even though this means that a stock rather than a flow is used. This introduces a serious problem with the estimating procedures presented in detail in Chapter V basically involve estimating marginal costs and average interest rates from year end balances on various types of loans. However, those year end balances consist of loans made during the year under study and loans made during previous years. Therefore, the estimates obtained may be over or underestimated. The use of an account, as discussed in the preceding paragraph, tends to avoid this stock-flow problem. The use of an account is perhaps justifiable if the object of a study is to examine the nature of the cost functions facing commercial banking. However, an account is inadequate if banking markets are to be studied, that is, both buyers and sellers of bank services. The definition of any product must reflect buyers' preferences. The use of an account does not, in most cases, reflect what it is that buyers are buying from a commercial bank. When an individual obtains a loan he is buying the use of some number of dollars for a specified

period of time. He is not buying an amount. In addition, the number of dollars paid for the use of a loan is related to the size and length of the loan. If, then, any analysis of demand is to be made in commercial banking, the unit of output cannot be considered to be an account. Even though the use of asset information is inconsistent with economic theory, i.e., the use of a stock rather than a flow, given available data asset information best reflects what consumers are buying from a commercial bank.

This study views banks in a microeconomic sense. There are two broad categories of output considered: first, private lending activity; second, non-lending activity. Only private lending activity is considered because it is not likely that commercial banks have monopoly power in the purchase of governmental securities. Governmental securities (treasury securities, U.S. government agency securities, and state and political subdivision securities) are used in allocating cost to the various services, as is non-lending activity. The emphasis is on private lending activity as the primary activity of a bank. In a sense, banks, as such, are not to be studied; instead particular types of loans which banks make are the object. The following loans are defined to be the outputs of commercial banks: (1) loans to financial institutions; (2) loans to purchase or carry securities; (3) loans to farmers; (4) commercial and industrial loans; (5) installment loans; (6) real estate loans; (7) single payment loans; and (8) other loans. As discussed in the next chapter, these particular loan categories are used because data are available under this type of classification. Inputs into this production are capital, labor, deposits and materials.

Economic theory demonstrates the proposition that if entry into an industry is restricted to some level below that which would occur under competition, then it is likely that monopoly power will be created or increased in that industry. The effects on social welfare may be the same regardless of whether entry restriction occurs because of technological factors, actions of existing firms, or regulation. Commercial banking seems to have had relatively restrictive regulation of new entry into banking since the 1935 Banking Act. If this regulation has in fact restricted entry into banking, then one would expect there to be costs to society resulting from monopoly creation. Peltzman (34) has estimated that from 1935 to 1962 there were 2,200 fewer new banks than would have been formed in the absence of regulation. Therefore, it is hypothesized here that creation of monopoly power due to bank regulation has generated social costs.

In order to apply the theory of the social cost of monopoly to commercial banking, assume initially that banks produce a single type of loan R, with constant costs, and that the analysis is for a single period. Demand for loans is a function of the rate of interest. The quantity of loans made is measured as the dollar value of the loans. Since a unit of output is measured as one dollar, demand can also be considered a function of the cent price so that, for example, an interest rate of 5 percent per unit of time is also 5 cents per unit or dollar. Figure 7 shows this demand, average cost, and the cost of regulation. Cost is also shown as a rate of interest. The monopoly rate of interest is r_m; the competitive rate r_c. The average cost is also r_c. The transfer cost and deadweight loss are given by T and W respectively.

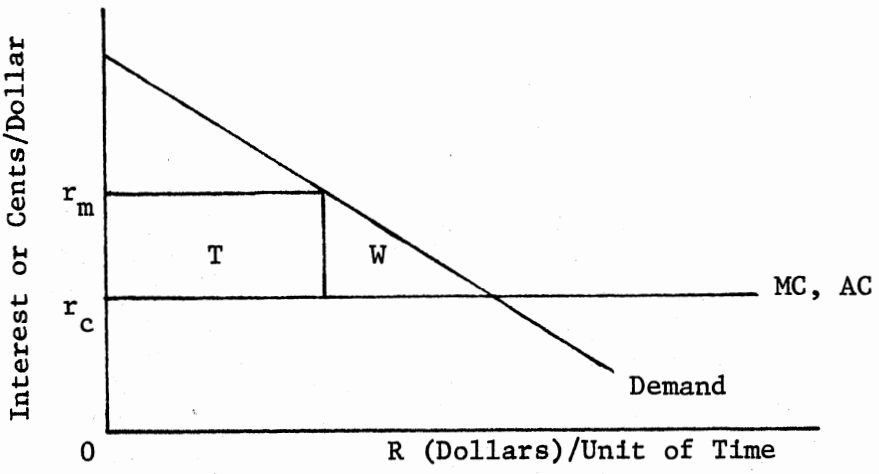

Figure 7. Welfare Loss

Assume now that the firm is a multiproduct bank and that the marginal cost of each type of loan is different. Let the bank be producing loans R_1, R_2, and R_3. Adapting the multiproduct model of Clemens (7), a portion of the bank's cost for making loans is common in that a portion of cost is constant per unit for any of the three outputs but the amount of each output can be varied, and if the output of one is increased the output of the others must be decreased, holding input quantities constant. The primary types of cost being considered are the costs of deposits (primarily interest costs) and costs of certain types of labor inputs. For example, deposits allow a bank to make loans; but regardless of whether the loans are to purchase a new car, a home, or a business firm, the cost of deposits per dollar of loans is constant. However, because of different processing costs and different levels of risk for different types of loans, the marginal cost of each type of loan is different, but assumed constant for each.

Since the cost of deposits is constant regardless of the type of loan made, the only variables affecting types of loans differently are the processing costs (forms, personnel, and credit checks) and the different levels of risk which may exist for different types of loans. The cost of the necessary forms and credit checks clearly would be largely constant per loan of each type. Since the risk factor is primarily applied to types of loans or groups of individuals, it can be expected to be constant. The only substantial problem with this constant cost assumption is that output is measured in units of one dollar in loans. Since loans vary in size and the cost differences are mainly constant per loan, the cost per dollar may vary.

The relevant cost and demand curves are depicted in Figure 8. In Figure 8, AC_c represents common costs while AC_1 is the marginal cost for R_1, AC_2 for R_2, and AC_3 for R_3. Each of these latter three curves includes AC_c. The transfer loss and deadweight loss for each type of loan are shown assuming loans R_1, R_2, and R_3. Demand and marginal revenue curves for each output are D_1, D_2, D_3, and MR_1, MR_2, and MR_3 for R_1, R_2, and R_3 respectively. The cost curves show both the processing and risk costs of each loan plus common costs. Each output has its own origin which begins at the output level of the preceding output. The output of R_1 is OA_1; the output of R_2 is A_1A_2; the output of R_3 is A_2A_3. The respective interest rates are r_1, r_2, and r_3. Total loans are OA_3. It may appear that there is some double counting; however, there is not since zero output for R_1 is at the origin, zero output for R_2 is at A_1, and zero output for R_3 is at A_2. The cost of regulation can be calculated for each of the output measures. Let T_1, T_2, T_3 and W_1, W_2, and W_3 be the transfer cost and deadweight loss respectively for the three

loans. The total social cost of regulation (SC) for these outputs then would be:

$$SC = (T_1 + T_2 + T_3) + (W_1 + W_2 + W_3).$$

That is, the total social cost of regulation is the sum of the transfer cost for each loan plus the sum of the deadweight loss for each loan. This model differs from the basic Clemens (8) model in that marginal revenue is not equal for each type of loan. This difference exists because the basic model assumes all costs are common, while in this adaptation the marginal cost of each type of loan is allowed to vary.

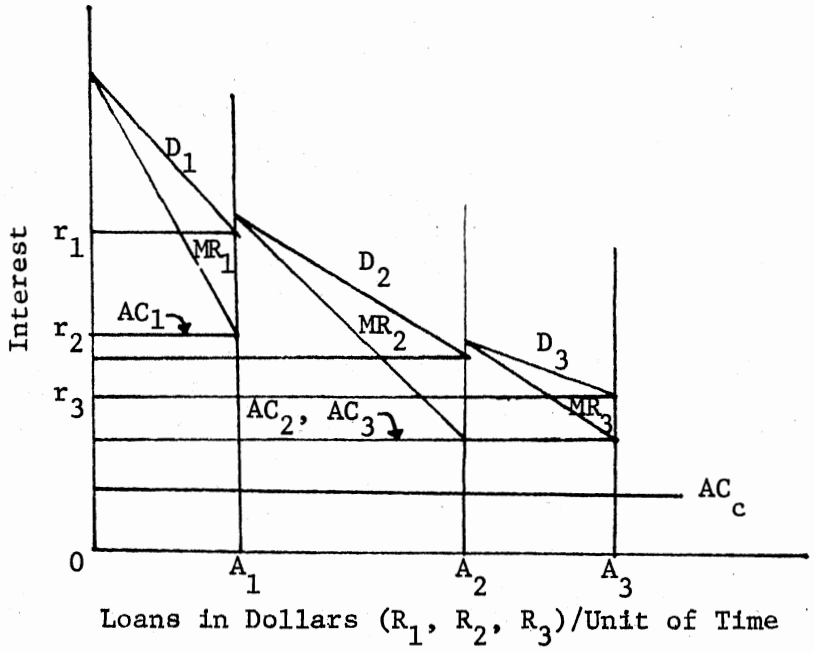

Figure 8. Welfare Loss--Commercial Banking

There are three important costs of regulation which are ignored in this analysis, and, therefore, in this study. One is simply the continuing costs of reporting to regulatory agencies which tends to shift the cost curves upward and would therefore be missed in this analysis. Second, there may be substantial X-inefficiency as a result of regulation. There are two aspects to this X-inefficiency. As discussed in the preceding chapter, the lack of competitive pressure may result in inefficiency and waste. In addition, even though rates of return are not regulated, interest rates for loans and deposits are, which may result in overuse of capital as a method of reducing or hiding profit and, since interest on deposits is regulated, as a method of competing for deposits. This X-inefficiency also tends to result in higher cost curves which cannot be adequately accounted for in this analysis. Finally, the interest regulation of deposits in commercial banking and other financial institutions results in an additional transfer to the banking industry (due to monopoly power through regulation) which is taken into account by the analysis if the supply of deposits is perfectly inelastic with respect to the interest rate paid on those deposits. In other words, if the interest ceiling of deposits alters depositors' decisions concerning present or future consumption (i.e., less than perfect inelasticity) then the analysis will not properly account for the resulting misallocation of resources.

Summary

This chapter has presented a basic analysis of the multiproduct firm as proposed by Clemens (8). The analysis is then applied to commercial banking. The resulting model of commercial banking differs

from that proposed by Clemens because the marginal cost of providing different types of loans is not the same. From this model it is relatively simple to identify the transfer loss and deadweight welfare loss for each type of loan. The next chapter will develop the techniques for estimating the various cost and revenue variables of the multiproduct firm model for commercial banking.

CHAPTER V

EMPIRICAL MODEL

The principle objectives of this study are to obtain estimates of the deadweight welfare loss due to monopoly power in the lending activity of commercial banks and of the transfer of consumers' surplus. As discussed earlier, once the welfare loss or the transfer is obtained the other can be calculated. The deadweight welfare loss will first be estimated using the approach of Siegfried and Tiemann, then the transfer cost will be calculated using the relationship derived by Posner.

The data used in this study were obtained from the Kansas City Federal Reserve Bank, Tenth Federal Reserve District for the years 1971-1975. The data consist of year end balances for the following categories: loans to financial institutions, loans to purchase and carry securities, farm loans, commercial and industrial loans, installment loans, real estate loans, single payment loans, other loans, total assets, operating expenses, interest and fees on loans, treasury securities, U.S. government agency securities, and state and political subdivision securities. Because of disclosure regulations, each observation consists of the above categories for each county (rather than each bank) in the district which had three or more banks. Counties with less than three banks are aggregated into a single observation for each state in the tenth district. The estimates of the deadweight welfare loss and the transfer cost are made for 1975, and consist of 316 observations (counties). The

particular categories used as independent variables (output) for the revenue estimates are the first eight categories listed above, i.e., private loans which were also listed in Chapter IV.

The data do not contain revenue by type of asset or loan, therefore an estimate must be obtained. The technique to estimate revenue for each type of loan will also give the actual or monopoly interest rate. The technique to estimate the marginal cost of each type of loan will also give the competitive interest rate.

Interest Rates, Revenue, and Elasticity

The model used in this study to estimate from asset information the total revenue from different types of loans is one proposed by Hester and Zoellner (17) and also used by Greenbaum (13). Using the reciprocal of square root of the number of banks in each county to weight the equation in order to reduce the effects of heteroskedasticity,[1] the estimating equation is:

$$TR_j/\sqrt{NB_j} = \sum_i r_i R_{ij}/\sqrt{NB_j} + u. \qquad (9)$$

where:

TR_j is total loan revenue for the j^{th} county,

R_{ij} is asset size for the j^{th} county, i^{th} loan,

r_i is the regression coefficient (also interpreted as the interest rate),

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[1] According to Johnston (21, p. 229) grouped data, such as the county data in this study, would be homoskedastic if each group contained the same number of observations. Grouping which consists of an unequal number of observations is therefore a source of heteroskedasticity, hence, the use of the reciprocal of square root of the number of banks in each county (observations) as weights.

NB_j is the number of banks in the j^{th} county, and

u is the error term.

The term $r_i R_{ij}$ in equation 9 is interpreted as the total revenue from a particular type of loan, and there is no intercept term. Once the r_i's are obtained, an estimate of total revenue for the loss equation can be calculated by using total asset size for each output for the entire federal reserve district, i.e., $r_i \sum_i \sum_j R_{ij}$, where $j = 1, \ldots, N$ (where N is the total number of counties in the district). Of course this interest rate, r_i, is the average interest rate.

The price elasticity is to be estimated rather than assumed. Ideally the above regression (equation 9) could be repeated for a period of quarters for the counties in the sample, thereby creating an interest rate series from which the elasticity could be estimated. However, data are not available for revenue information on a quarterly basis; therefore, the following method is used. Five random samples are created from the data for each of the five years, giving a total of 25 samples. For each of these samples, the regression given by equation 9 is run to create an interest rate series. Once these 25 rates are obtained, the following regression is used to obtain the interest elasticities:

$$X_i = a_0 + a_1 Y + a_2 r_i + u. \qquad (10)$$

where:

X_i is total asset size for each type of loan i and for a given year for all the banks in the sample from which each of the 25 r_i's are estimated, and

Y is average per capita income from the district for the year from which each sample is obtained; Y is constant in each sample.

From this regression, equation 10, the estimate of a_2 is the partial derivative of X_1 with respect to r_i. Since the definition of elasticity is $E_r = (\partial X_i/\partial r_i)r_i/\bar{X}_i$, the interest elasticity is simply $a_2 r_i/\bar{X}_i$, where r_i is the estimated interest rate for loan i in 1975, and $\bar{X}_i$ is the average size of loan i for 1975 in the tenth district. This method for determining interest elasticity does involve one serious problem; it is that the estimates of a_2 (i.e., the partial derivatives) are not consistent. The following presents the problem according to Johnston (21), and a solution.

From the regression equation 10, (where Y is the matrix of per capita incomes, and r is the matrix of estimated interest rates) if the estimator a_2 were unbiased, the plim $a_2 = A_2$, where A_2 is the true value. However, because the r_i's are obtained from previous regressions (equation 9), then $r = \tilde{r} + v$, where $\tilde{r}$ is the matrix of true values and v is the matrix of measurement errors. In this case the plim $A_2 = A_2 -$ plim $(r'r/n)^{-1}\sigma_v^2 A_2$, where according to Johnston σ_v^2 is the variance of v, (21, p. 283) so a_2 is not consistent. The following can be used to correct the estimate of a_2.

Let nplim$(r'r/n)^{-1} = c$, (obtained from the $(X'X)^{-1}$ matrix, where $X = (Y,r)$ then, plim $a_2 = A_2(1-c\sigma_v^2)$. Define $a_2 = a_2/(1-c\sigma_v^2)$; so plim a_2 = plim $a_2/(1-c\sigma_v^2)$ = plim $A_2(1-c\sigma_v^2)/(1-c\sigma_v^2) = A_2$. The estimators a_2 can then be adjusted by dividing by $1-c\sigma_v^2$.

The estimating techniques to this point provide the neeessary revenue and demand elements, that is, estimates of total revenue and interest elasticity. All that is needed now are estimates of marginal costs.

Cost Estimates

In estimating the various cost elements of the welfare loss equation, the underlying production is assumed to be one in which output is a function of deposit liabilities, labor input and capital (all other inputs), i.e.,

$$Q_i = f(D, L, K),$$

where:

Q_i is the amount of loans of type i,

D is deposits, demand and time,

L is the labor input, and

K is the capital input.

Output consists of various types of loans. Therefore this approach, as pointed out by Greenbaum (13), generally uses the right hand side of a bank's balance sheet as a measure of input use and earning assets as a measure of bank output.

As with the demand estimates, output is simply defined as loans of various types as they appear on a bank's balance sheet. There are, however, two additions to output for cost purposes. First, the size of government securities is included to allocate costs to this type of activity. Second, because of the problem of defining the output of trust departments, safe deposit boxes and other bank services, a proxy for nonlending activity is used. This proxy is the difference between total operating income and income from loans. This difference is used as a proxy on the assumption that the prices of these activities in a given bank are relatively stable so that income earned can be used as a measure of output. The cost equation to be estimated for 1975 is:

$$TC_j/\sqrt{NB_j} = B_0A_j/\sqrt{NB_j} + \sum_i a_iR_{ij}/\sqrt{NB_j} + gN_j/\sqrt{NB_j} + u. \qquad (11)$$

where:

TC_j is total operating cost for the j^{th} county,

A_j is total assets for the j^{th} county,

R_{ij} is total loans of type i, j^{th} county including government securities,

N_j is nonlending output for the j^{th} county,

B_0, a_i, and g are regression coefficients, and

NB_j is the number of banks in the j^{th} county; used to weight the equation.

Most of the variables in equation 11 are self-explanatory, but comment is required on several of the variables. Although all types of government securities were excluded from the revenue estimates, they must be included in the cost equation in order to allocate operating expense to all the revenue earning activities of commercial banking. The variable N_j, nonlending output, as described in the preceding paragraph, consists of total operating income less the income from loans, including government securities. The term A_j is used to capture any common costs not estimated by the other regression coefficients. The reason for using A_j rather than an intercept term is that the costs of any firm must be related to the purchase of resources; and even though it is common practice to include an intercept, it is difficult to provide a theoretical basis for its inclusion. The following estimates can be identified from equation 11: (1) the cost attributable directly to each type of loan is a_i (average and marginal cost) times the sum of loans of type i for the tenth district, and (2) the cost attributable to common inputs and captured by a_i is $B_0 \sum_j A_i$.

The use of the regression in this manner assumes constant costs, i.e., the absence of scale economies. The existence of economies of scale appears fairly well established; for example, Alhadeff (1), Greenbaum (13), Benston (6), Gramley (12), and Bell and Murphy (3) found scale economies in commercial banking. However, the output definition which they used are not consistent with each other nor with the definition used in this study.

There are several reasons for assuming constant costs in this study. The most obvious reason is the simplicity of the assumption and the fact that the linear regression coefficients can be interpreted as per-unit costs. In addition past research lends support to the constant cost assumption.

Bell and Murphy (3), using an account as output, did find economies of scale to exist. However, except for relatively small banks, as the number of accounts processed increased the additional cost savings fell. In other words, scale economies were not very large except for small banks. They conclude that if "a typical bank were to expand all its activities (functions or products) within its existing facilities by 10 percent, total cost would rise by 9.3 percent . . ." (p. 68). Although output is measured differently from the present study, the general conclusions should hold, particularly in the light of other research on the subject.

Various studies of scale economies in commercial banking were summarized by Greenbaum (14). In addition to the studies already mentioned earlier in this study (1, 6, 12, 13, 17, 39), he also discussed the results of an article by Horvitz (19). Although the definitions

of output used by different researchers are not the same, some conclusions can be made concerning the existence of scale economies.

Economies of scale were found to be important up to total deposits of $5 million by both Alhadeff and Horvitz (14, pp. 466-467). Part this relatively small size costs were fairly constant up to about $500 million in total deposits. Also consistent with Alhadeff and Horvitz are the findings of Benston, who found the "efficiency of operations is not largely a function of bank size" (p. 471). Somewhat different results were obtained by Schweiger and McGee, who found that scale economies exist up to $50 million in deposits (p. 468). Although scale economies apparently exist, the relative importance of these economies is not clear. Greenbaum (14, p. 473) concluded that significant economies can be obtained up to $10 million in assets (p. 473). Since the studies discussed by him use deposits rather than total assets, it is not clear how he arrives at his conclusion.

Based on Greenbaum's conclusion, and since the average Tenth District bank has $22 million in assets in 1975, most banks in the Tenth District, while small, are in the horizontal portion of their cost curves, assuming that there are not additional economies until banks are very large. If this assumption is valid, then there are two considerations which indicate that a constant cost assumption is valid for the Tenth Federal Reserve District. First, since banking markets are relatively small both in geographic area and in terms of loan demand and deposits, whether or not economies of scale exist is not overly important since in terms of plant economies substantial additional cost savings can only be obtained in the larger markets. Therefore, banks face monopoly or oligopoly situations in which per unit costs of

different banks are approximately the same. The particular markets are not large enough to allow a single bank to become dominant based on economies of scale. In a study which crosses individual market boundaries, the existence of scale economies should not seriously bias regression results since many of these markets are not large enough to support a scale which can take advantage of the cost savings. Second, if a large firm is to move into specific local banking markets, it must open branch banks. Several researchers have found that branch banks either have higher costs than similar unit banks (3, 4, 13) or roughly equal costs. This latter conclusion is that of Greenbaum (13), particularly in banks which are not extremely small or large (very small or large branch banks have higher costs). Since Greenbaum's definition of output is closest to the one used in this study, it will be assumed that branch banking (where it exists) has no effect on the cost estimates obtained from this study. Greenbaum also found that if cost curves for banks which were not large or small were estimated, the cost curves were linear (p. 427). The conclusion drawn from the above is that even though markets may have banks of varying scale, the assumption of constant costs does not seriously bias results. Any bias which does result is on the conservative side, that is, overestimating cost and underestimating the cost of regulation.

The welfare loss equation requires, in addition to revenue and price elasticity, long run variable cost and the normal return. Long run variable cost can be estimated for each output i using the relationship below:

$$LRVC_i = (B_0 \sum_j A_j)K_i + a_i \sum_j R_{ij}.$$

where:

$\Sigma_j A_j$ is total assets for the tenth district,

$\Sigma_j R_{ij}$ is total loans of type i for the tenth district,

K_i is $\Sigma_j R_{ij} / \Sigma_i \Sigma_j R_{ij}$, where $\Sigma_i \Sigma_j R_{ij}$ is total loans of all types for the tenth district, and

a_i is the direct cost of each type of loan.

The factor K is introduced to allocate common costs ($B_0 \Sigma_j A_j$) in a proportional manner to each output measure.

The normal rate of return must not be determined. At first it might seem to be contained within $B_0 A$; however, since the accounting data from which total cost is obtained do not contain the return to owners, the normal return must be estimated some other way. This problem is to be solved by determining the average return to commercial banking and adding this to the estimate of LRVC. The estimate will be made by calculating an average of before tax profits as a percentage of total assets for 1971 through 1975 using commercial banks. This cost will be allocated in the same manner as common costs; that is, the normal return for each type of loan is pK_i, where p is the normal return and K_i is the proportionality factor introduced earlier.

Cost of Regulation

The welfare loss equation given previously is:

$$W = 1/2 \left(\left|TR - LRVC - pA\right|\right)/TR^2 E(TR).$$

All of the elements of this equation may be estimated, as explained, for each output measure. The actual equations for each output (loan) i are:

$$w_i = 1/2((TR_i - (B_0 \sum_j A_j) + p \sum_j A_j)K - a_i \sum_j R_{ij})/TR_i)^2 E_i(TR_i).$$

Again K is used to allocate those costs which are common. The estimate of the normal return may be slightly overestimated because of nonlending activity being included is total assets. Total welfare loss is simply the sum of w_i, i.e., $W = \sum_i w_i$.

The cost of monopoly due to the competition of entrants to obtain the potential monopoly profits for each output is:

$$t_i = 2w_i/E_i(1 - k_i).$$

In this equation k_i is r_{ci}/r_{mi}; the competitive price or interest rate divided by the monopoly interest rate for each loan. The estimate of the monopoly interest rate is the regression coefficient obtained from the revenue estimates r_i. The competitive price is obtained from the cost estimates and is:

$$r_{ci} = a_i + B_0K_i + p(\sum_j A_j/\sum_i \sum_j R_{ij})K_i.$$

The first two elements $(a_i + B_0K_i)$ together represent average variable cost; the ratio $p \sum_j A_j/\sum_i \sum_j R_{ij}$ is employed to convert the normal return on assets to per unit of output and K_i is used to allocate the normal return among different outputs. The assumption in this case is, of course, that in the long run under competitive conditions price will equal long run average cost. The estimate of k_i becomes:

$$k_i = ((a_i + B_0K_i + p(\sum_j A_j/\sum_i \sum_j R_{ij})K_i))/r_i.$$

The social cost of monopoly is then the sum of the transfer cost and deadweight loss:

$$SC = \sum_i w_i + \sum_i t_i. \qquad (12)$$

Summary

To summarize the estimating techniques, to obtain the necessary revenue data (interest rates on loans, and total revenue on each type of loan) a linear regression is used with total revenue as the dependent variable and the size of the different types of loans as the independent variable. The regression coefficients obtained are the average interest rates and the product of these rates and respective loan sizes are the revenue obtained from each type of loan. A similar regression is used to obtain the per unit (dollar) cost of loans. The cost regression used operating expenses as the dependent variable and as independent variables the size of the different types of loans, nonlending output, government securities and total assets. Total assets are used to capture any common costs not reflected by the regression coefficients on loans. The regression coefficients from the cost equation are interpreted as per unit (dollar) costs. Once the revenue and cost estimates are obtained, the equation of Siefried and Teimann is used to calculate the deadweight welfare loss and the relationship of Posner's between the transfer and deadweight loss is used to calculate the transfer cost. The sum of the transfer cost and welfare loss is the social cost of regulated entry.

CHAPTER VI

RESULTS

This chapter presents the results of the model developed in the preceding chapters. First, the estimated interest rates on loans and the estimated marginal cost (average cost) on loans are presented. From these estimates elasticities are calculated, and the deadweight welfare loss and the transfer cost are calculated.

As discussed in Chapter V, the data used were obtained from the Tenth Federal Reserve District. Table I contains the district totals for the categories of data needed to make the necessary estimates for 1975.

Interest Rates and Marginal Cost

The results of the regression (equation 9) to determine the average interest rate, i.e., the monopoly interest rate, are presented in Table II. All of the estimates interest rates are significantly different from zero at the .05 level.

Table III contains the results of the regression (equation 11) to estimate long run costs.[1] Only two of these cost estimates present difficulties, i.e., the cost estimates for total assets and for loans to

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[1]Regressions were also performed without assets in the equation and with a vertical intercept. In both cases, several of the estimated coefficients were not significantly greater than zero.

TABLE I

DISTRICT TOTALS*

Operating Expenses	$ 2,879,570
Interest and Fees on Loans	2,146,571
Loans to Financial Institutions	641,462
Loans to Purchase and Carry Securities	509,641
Farm Loans	4,625,268
Commercial and Industrial Loans	7,114,315
Real Estate Loans	4,702,722
Single Payment Loans	1,395,038
Other Loans	390,696
Treasury Securities	4,717,055
U.S. Government Agency Securities	2,133,782
State and Political Subdivision Securities	6,544,218
Installment Loans	4,903,128
Total Loans	24,282,839
Total Assets	49,193,068

*Data in thousands of dollars; number of banks--2,196.

TABLE II

AVERAGE INTEREST RATES--1975*

Equation 9: $TR_j/\sqrt{NB_j} = \sum_i r_i R_{ij}/\sqrt{NB_j} + u$

$R^2 = .99795$

Type of Loan	Interest Rate (r)
Loans to Financial Institutions	.06238237 (4.59)
Loans to Purchase and Carry Securities	.12704934 (10.35)
Farm Loans	.07528429 (39.64)
Commercial and Industrial Loans	.07728364 (24.96)
Installment Loans	.10853908 (21.98)
Real Estate Loans	.08939515 (20.12)
Single Payment Loans	.08065970 (9.03)
Other Loans	.21986737 (6.92)

*Number in parentheses is the value of the t-test.

TABLE III

AVERAGE (MARGINAL) COST PER DOLLAR LOANED--1975*

Equation 11: $TC_j/\sqrt{NB_j} = B_0A_j/\sqrt{NB_j} + \sum_i a_iR_{ij}/\sqrt{NB_j} + gN_j/\sqrt{NB_j} + u$

$R^2 = .997611$

Type of Output	Marginal Cost
Total Assets	-.00068744 (-.11)
Non-lending Output	.85808687 (9.8)
Loans to Financial Institutions	-.05182029 (-2.02)
Farm Loans	.05159532 (8.13)
Loans to Purchase and Carry Securities	.19092648 (9.04)
Commercial and Industrial Loans	.05218382 (5.17)
Installment Loans	.11068485 (10.89)
Real Estate Loans	.09025551 (10.99)
Single Payment Loans	.04489120 (2.36)
Other Loans	.58464681 (11.42)
Treasury Securities	.05249287 (4.93)
U.S. Government Agency Securities	.03501568 (2.96)
State and Local Securities	.03086050 (2.79)

*Number in parentheses is the value of the t test.

financial institutions. Both of these regression coefficients have a negative sign.

The negative sign on total assets may indicate some economies of scale (recall that assets are included to account for common costs not captured by the other variables) which seems probable; however, the value of the t test is very small and indicates that the hypothesis that the coefficient is not significantly different from zero should not be rejected. In addition the size of the coefficient is very small. Because of these considerations the calculations of cost will not include a factor for assets, except for the normal return.

The negative sign on the cost coefficient for loans to financial institutions is also an interesting result. Based on the value of the t test, the hypothesis that the estimate is not different from zero can be rejected at the .05 level, but a negative marginal cost is difficult to interpret. The prime source of this negative marginal cost may be that the data consist of year end data, that is, a stock rather than a flow. This problem may also expain other poor results to be discussed later. The only other explanation would seem to be the reasons such loans are made. Without detailed information concerning the reasons for these loans, analysis is not possible; therefore, loans to financial institutions were dropped from the analysis of this study.

The cost coefficients estimated for the rest of the output measures in Table III are significantly different from zero at the .05 level, and so are interpreted as accurately reflecting the per dollar cost of these loans. There are still some problems with these estimates when compared to the interest rates and these are discussed later in this chapter.

Interest Elasticities

The method for estimating the interest elasticities proposed earlier (pages 54-55) was abandoned. Two attempts were made to create an interest rate series from which elasticities could be estimated. One attempt involved creating ten samples for each of five years (1971-1975) for the tenth district; the second attempt used only five samples for each year. In both cases some of the estimated interest rates were negative and not significant. Since the estimates were positive and significant for 1975 when the entire district was used but not for smaller samples, it would appear that the samples simply were not large enough. Increasing the number of the samples was not done a third time because the number of observations used to obtain the elasticities would have been very small. Again the source of these problems may be due to using stock variables. If flow variables could have been obtained the technique to estimate elasticities may have provided better results.

After the proposed method for estimating elasticities was dropped, the method used by Kamerschen (equation 5) was adopted. Use of this approach requires that it be assumed that not only firm but also industry profit maximization is attained. Although this assumption (actual firm and industry profit maximization) may be questionable, there is no other alternative if estimates of elasticities are to be used rather than assuming elasticities. There are possible adverse effects on the elasticity estimates if firms do not maximize their profits. Recalling equation 5, $E = P/(P - MC)$ and substituting the interest rate for P, the results are: first, if the actual interest rate is below

the profit maximizing rate the elasticity will be overestimated; second, if the actual interest rate is above the profit maximizing rate the elasticity will be underestimated.

The resulting price elasticity estimates using the approach of Kamerschen are shown in Table IV. The price elasticity estimates were not made for four of the eight types of loans used in this study. As previously discussed, loans to financial institutions were dropped because of the negative marginal cost, while the other three loans (loans to purchase and carry securities, installment loans, real estate loans, and other loans) had marginal cost estimates which exceed the interest rate. Although a misallocation of resources also results when marginal cost is less than the interest rate, (the basic welfare loss equation, equation 8, used in this paper is still relevant) price elasticities cannot be estimated using the present method since a profit maximizing firm would not sell at a price which was less than marginal cost.

TABLE IV

INTEREST ELASTICITIES*

Loans to Financial Institutions	omitted; MC is negative
Loans to Purchase and Carry Securities	omitted; MC greater than r
Farm Loans	-3.18
Commercial and Industrial Loans	-3.08
Installment Loans	omitted; MC greater than r
Real Estate Loans	omitted; MC greater than r
Single Payment Loans	-2.25
Other Loans	omitted; MC greater than r

*Elasticity Equation is: $E = r/(r - MC)$.

Two of the loans for which interest elasticities cannot be estimated are not important relative to total loans. These are loans to purchase and carry securities (2.1 percent of tenth district total) and other loans (1.6 percent of tenth district total). A t test was done to see if the estimated marginal cost was significantly different from the estimated interest rate for each loan. In both bases the marginal cost is significantly different from the interest rate ($t = -3.024$ for loans to purchase and carry securities; $t = -7.128$ for other loans). The existence of loans being made below cost is strange; however, these two types of loans are somewhat special categories and may tend to be made as a special service to banking customers. Of course, these strange results may also be due to the use of stock variables in the regression equations. However, without flow variables it simply is not possible to know exactly how the results are affected using stock variables. Although there is no reason to doubt the results on these two loans, except for the stock-flow problem, they will be dropped from further analysis because of the inability to measure the interest elasticities using the present method.

The estimates of marginal cost for real estate and for installment loans are also above the estimated interest rates. The cost of installment loans exceeds the interest rate by .2 percent or .2 cents per dollar. The difference for real estate loans is .08 percent or .08 cents per dollar. The interest rate and marginal cost differences are small and so in a practical sense one could argue that the interest rates are equal to the marginal costs of these loans. In addition, performing a t test on the hypothesis that there is no significant difference between marginal costs and the interest rates is consistent with the existence

of interest rates being equal to marginal cost. That is, for installment loans the test statistic is t = .211; for real estate loans, t = .105. Since the interest and cost estimates are significant and since the above t tests indicate the interest rates are not different from marginal costs and given the complexity of banking costs, particularly in allocating common inputs, it would seem reasonable to conclude that on the average for 1975, banks in the Tenth District intentionally made these two loans at cost.

The existence of loans which are made at cost is not at variance with the theoretical model used in this study; in fact, it is a logical conclusion of the model. The model, i.e., Clemens' (8) multiproduct firm model, shows that as a bank continues to provide loans of less and less profitable types, the interest rate charged will approach the marginal cost of these loans. For example, if profitability ranges from products which are monopolized to those sold under perfectly competitive conditions (zero profit), marginal revenue would equal price and therefore price would equal marginal cost. (In the basic Clemens' model marginal cost and marginal revenue is determined by the least profitable product.) Within any multiproduct firm it can be expected that the price of some products will approach the marginal cost of those products. There are two additional points concerning the making of loans at cost. First, both installment and real estate loans are, according to the regression results, two of the more costly loans made and therefore interest charges are more likely to approach any interest limits placed on loans by state usury laws. Second, the Tenth District is largely rural and so has a large number of rural banks. These rural banks are more likely to be aware of the monopoly grant of their charters and so

are also likely to make loans which may not be profitable but are expected by the public and regulatory agencies. Adding to this tendency is the closer personal relationship between bank managers and individual customers.

There are eight loan categories used in this study. Of these eight, three categories, which account for only 7.5 percent of the district total, have been eliminated from further analysis. These loans are loans to financial institutions (eliminated because of negative marginal cost), and other loans, and loans to purchase and carry securities (eliminated because of the inability to estimate interest elasticities). Therefore the results are relevant to approximately 92.5 percent of total loans made in the Tenth District.

The interest elasticities are presented in Table IV. These elasticities were calculated using the interest rates from Table II and the marginal costs from Table III. Because the interest rate-marginal cost difference is not significantly different from zero, the estimates for installment loans and other loans were not made. The implication is, of course, that there are no social costs associated with these loans. The interest elasticities are -3.18 for farm loans; -3.08 for commercial and industrial loans; -2.25 for single payment loans.

The last datum needed for the welfare loss estimate is the average rate of return on assets for commercial banking. Using Moody's Bank and Financial Manual (31), a five year simple average for 1971 through 1975 was obtained and is .0096 cents per dollar of assets.

Welfare Loss

Using the deadweight welfare loss equation (equation 8) the deadweight welfare loss was calculated and is presented in Table V. Table V includes all the estimated values required for the calculations plus the competitive interest rate with the last row, w_i, being the welfare loss for each of the three types of loans for which an estimate was made.

Recalling that r_i is the monopoly interest rate and r_{ic} the competitive rate, farm loans had a monopoly rate of interest which was 36 percent higher than the competitive rate. A 36 percent higher interest rate is substantial and resulted in a deadweight welfare loss of $1,882,400 or .54 percent of total income from farm loans.

The monopoly interest rate on commercial and industrial loans was 37 percent higher than the competitive rate. The resulting deadweight welfare loss was $4,850,428 or .88 percent of income earned on these loans.

Finally, single payment loans had a monopoly interest rate which was 75 percent higher than the competitive rate. The result of this higher rate was a deadweight welfare loss of $5,193,240 or 4.6 percent of single payment loan income.

The total deadweight welfare loss for the Tenth District in 1975 is $11,926,068. This welfare loss is .56 percent of total income earned on these three types of loans.

Transfer Cost

The transfer cost was calculated using equation 4 and is presented in Table VI. Table VI includes all the information needed to calculate

TABLE V

DEADWEIGHT WELFARE LOSS

Welfare Loss Equation: $w_i = 1/2((TR_i - (p \sum_j A_j)K_i - a_i \sum_j R_{ij})/TR_i)^2 E_i(TR_i)$

	Farm Loans	Commercial and Industrial Loans	Single Payment Loans
r_i	.07528429	.07728364	.08065970
$r_{ic} = a_i + p(\sum_j A_j / \sum_i \sum_j R_{ij})K_i$	.05529	.0578237	.0460542
a_i	.05159532	.05218382	.04489120
$TR_i = r_i \sum_j R_{ij}$	$348,209,600	$549,819,870	$112,523,340
$LRVC_i = a_i \sum_j R_{ij}$	$238,642,090	$371,251,990	$62,624,929
$K_i = \sum_i R_{ij} / \sum_i \sum_j R_{ij}$	.19	.29	.0574
$p \sum_j A_j$	$472,253,450	$472,253,450	$472,253,450
E_i	3.18	3.08	2.25
w_i	$1,882,400	$4,850,428	$5,193,240

TABLE VI

TRANSFER COST

Transfer Cost Equation: $t_i = 2w_i/E_i(1 - k_i)$

	Farm Loans	Commercial and Industrial Loans	Single Payment Loans
w_i	$1,882,400	$4,850,428	$5,193,240
E_i	3.18	3.08	2.25
r_i	.07528429	.07728364	.08065970
$r_{ic} = a_i + p(\Sigma_j A_j/\Sigma_i \Sigma_j R_{ij})K_i$	.05529	.0578237	.0460542
$k = r_{ic}/r_{im}$	.734417	.7482014	.5709691
t_i	$4,553,508	$12,508,525	$10,759,629

the transfer cost for each loan. This transfer cost is given by t_i in the last row of Table VI.

The transfer cost is $4,553,508 for farm loans which is 1.3 percent of income on farm loans. For commercial and industrial loans the transfer cost is $12,508,525 or 2.2 percent of income on these loans. Single payment loans had a transfer cost of $10,759,629 which is 9.5 percent of income on single payment loans.

The total transfer cost is $27,821,662. Therefore, of total income from these three loans of $1,010,552,800, 2.7 percent was a monopoly transfer from borrowers to commercial banks.

Cost of Regulation

The total social cost of regulation is given by equation 12. This cost is simply the sum of the deadweight welfare loss on each loan plus the transfer cost for each loan. The total social cost is $39,747,730 for the year 1975. This loss is 1.8 percent of total interest and fees on all loans and is 4.7 percent of the income earned on the three types of loans for which an interest elasticity was estimated.

This chapter has presented the results of the model used in this study. The most serious problem, with unknown effects, is the use of stock rather than flow variables in the regression equations. If flow variables could have been obtained, not only might the poor results on several types of loans have been avoided, but the results on the other loans may have been better and certainly the results could be presented with more confidence in their accuracy. Even with this problem, a social cost was estimated which is relevant to 92.5 percent of the loans made in the Tenth District in 1975.

CHAPTER VII

CONCLUSIONS

This study has been an attempt to look at some of the social costs associated with restricted entry into commercial banking. The results were presented in Chapter VI. These results are interpreted below and their implications for public policy are discussed. In addition, possible avenues for further research on commercial banking and other sicuations of restricted entry are examined.

Interpretation of the cost of regulation of commercial banking in the Tenth District is somewhat complex. Although this study did estimate a total social cost, there are two distinct components (i.e., deadweight welfare loss and transfer cost) which must be discussed separately since these two types of costs have different effects on society.

The deadweight welfare loss which totals (11,926,068 (.56 percent of interest and fees on all loans) is relatively easy to interpret. This welfare loss represents the cost in the Tenth District of the misallocation of resources due to the monopoly interest rate exceeding the marginal cost of making particular loans. This loan is, of course, relevant only for 1975. The loss in other years could be higher or lower depending upon demand conditions for different types of loans. Even so it can be said that there was a deadweight welfare loss of $11,926,068 in 1975 in the Tenth District.

The transfer cost is not as easily interpreted. This transfer cost differs from the welfare loss in one important aspect. As discussed in Chapter II the transfer cost is represented by the additional revenue received from monopoly pricing over the life of the monopoly position. Therefore, the size of the transfer in a given year is not particularly important. What is important is the present value of the revenue flow. Firms (banks and potential banks) would be expected to use resources to obtain the flow of additional revenue up to the point that the incremental value of additional resources equaled the expected gain. Therefore, actual resource use in any given year would be determined by the present value of the expected flow of additional revenue (i.e., the transfer). Chapter II presented the three determinants of this expected flow; these were a valid discount rate, the normal risk that the firm may fail, and the time period over which the additional revenue flow would be received. The transfer cost estimated in this study is $27,821,662 for the single year 1975. It, therefore, is best interpreted as an indicator of the magnitude of the actual transfer cost. Clearly the potential size of the transfer cost is not small and may greatly exceed the deadweight welfare loss.

One of the primary reasons for restricted entry into commercial banking was and is the feeling that vigorous competition in commercial banking leads periodically to excessive bank failure and therefore banking panics. Whether or not competition results in panics or whether or not restricted entry reduces the number of panics are not topics of this study. However, if society undertakes a particular policy it should have some knowledge of the results of that policy. As shown in this study, the costs of restricted entry in commercial banking are

not insignificant. These costs for the nation as a whole, based on this study, could easily be several billions of dollars since the 1933 Banking Act. The important consideration for public policy is the costs of having free entry, that is, what are the expected costs of bank failures and bank panics? If the expected costs of failures exceed the costs of regulation, then restricted entry can be justified. However, in fact, the arguments that banking failures and panics should be avoided are typically stated in terms of "need" or the "public interest". There has not been an attempt to compare the costs of restricting entry to the costs of free entry. Although this paper is not a study of alternatives, the results do indicate that restricted entry has imposed substantial costs on society, while at the same time the benefits from this policy are at best rather vague.

Even if there are no costs in terms of additional resource use as a result of the monopoly transfer, the size of the transfer is relevant. Restricted entry will alter the distribution of income from banking customers to bank owners. Since this redistribution is a result of public policy, it is certainly important to know the size of the transfer. Society may or may not wish to redistribute income in order to limit bank failures and panics, but without information concerning the transfer an informed decision cannot be made.

This study indicates substantial costs resulting from restricted entry. Although the benefits from this policy are unknown, the benefits from eliminating restricted entry are, at least, not unknown. The costs indicated in this study could be eliminated at practically zero cost (ignoring costs of bank failures and panics). In fact, the costs of

eliminating restricted entry may be negative since some of the resources used to regulate the banking industry would be reallocated.

Further Research

The research conducted in this study could be improved upon in several ways. Since the data used consisted of information for the Tenth Federal Reserve District, it is not a valid sample for the entire United States. If a sample from all commercial banks in the United States were obtained, the results could then be applied to the entire commercial bank system. Another improvement would be an expansion of the study to include non-bank financial intermediaries, particularly those most heavily regulated such as savings and loan associations. It would also be useful to analyze the results of regulation on resource markets, particularly deposits.

The most important improvement in the methodology would be the use of flow variables in the regressions. In principle the type of flow variables needed and their use is simple. For example, if monthly data on revenue and cost could be obtained, a better estimate of the average interest rates (i.e., the monopoly rates) and marginal costs could be achieved by using the change in the different variables each month and using this change in the regression equations instead of the size of the outstanding loans and costs. While monthly data on cost might not be easy to incorporate into the model, this variation would greatly improve the revenue estimates. That is, more confidence could be placed on the estimated interest rates and the interest elasticities could be estimated without having to assume profit maximization.

The final major change concerns the transfer cost. Again, because this transfer is a revenue flow, the present value of this flow is important. If the model was applied for several years and if the results were correlated with the risk of failure and entry, a better estimate of the expected transfer, and therefore resource use, could be achieved.

Clearly all of the potential costs of commercial bank regulation have not been examined. A relatively minor cost would be the administrative costs. This would include the costs of regulatory agencies and various administrative costs of banks due to record keeping and reporting which is related to regulation. Another area of regulatory costs is the possible inefficient use of capital. Even though the return on banking is not directly regulated, restricted entry combined with restricted input and output prices may result in capital use beyond that which would occur under more competitive conditions. In addition, where a monopoly position exists X-inefficiency is more likely to be a problem.

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