1984

ECONOMIC REVIEW

FEDERAL RESERVE BANK
of CLEVELAND

SPRING

Economic Review
Spring 1984

Economic Review is published quarterly by the Research Department of the Federal Reserve Bank of Cleveland, P.O. Box 6387, Cleveland, OH 44101. Telephone: 216/579-2000. ISSN 0013-0281

Editor: Pat Wren. Assistant editor: Meredith Holmes. Design: Jamie Feldman. Typesetting: Lucy Balazek.

Estimating Infrastructure Needs: Methods and Controversies

by Paul Gary Wyckoff

Economist Paul Gary Wyckoff studies the public sector for the Federal Reserve Bank of Cleveland.

Americans today are reading more and more about the problems of our nation's *infrastructure*—our public capital stock of roads, bridges, sewers, transit systems, and government buildings. Having been hit by back-to-back recessions and high interest rates, many state and local governments have long postponed infrastructure expenditures. Unfortunately, however, studies of the problem have shown that more may be needed than just catching up with a few years of deferred maintenance. For example, the Congressional Budget Office (1983) estimated that it would cost $53 billion per year nationwide to ensure that our highways, transit systems, sewer and water facilities, and airports are, in its words, "adequate." In a widely quoted study, Choate and Walter (1981) stated that, in the next decade, servicing the infrastructure needs of New York City alone would require $40 billion.[1]

At the heart of decisions about funding the nation's infrastructure lies the elusive concept of *capital-stock needs*. Lacking complete information about the desires of their constituents and the consequences of various spending decisions, policymakers have asked researchers and other experts for guidance in determining the "proper" level of each kind of capital stock. In providing this help, the aim of the analyst is modest: to arrive at a benchmark that will enable authorities to begin debate on capital-spending plans, rather than to develop a mathematical formula that will determine the final and optimal allocation of resources in any city.

The problem of setting appropriate policy goals is perhaps most acute in the older cities of the Midwest, where an aging infrastructure and changing demands for public services strain tight government budgets. Presumably, reduced population and slower rates of income growth in these cities might influence the desirable amount of capital spending, but sorting out such influences is difficult.

This article explains the three different types of needs estimates that are available,

1. Here Choate and Walter are summarizing the results of a government study. For details, see Harrison J. Goldin, Deteriorating Infrastructure in Urban and Rural Areas, *Subcommittee on Economic Growth and Stabilization, Joint Economic Committee, 96 Cong. 1 Sess. Washington: U.S. Government Printing Office, 1979, pp. 42-53.*

2. For details about this rating system and for an explanation of the terms used, see Government Accounting Office (GAO) Report B-201433, Better Targeting of Federal Funds Needed to Eliminate Unsafe Bridges, *August 11, 1981, Chapter 4.*

3. Because of the interest in reviving Cleveland's economy, these cities were chosen to provide a basis for comparison with Cleveland. The cities chosen bracket Cleveland in latitude, iongitude, and population. The sample omits some important cities (for example, Indianapolis and Columbus) because of a lack of data on the age of bridges in those cities. This information is required to construct the economic estimates of need below.

including a new approach developed by the author. The strengths and weaknesses of each method are examined, and the different approaches are illustrated with examples of highway needs estimates for ten urban areas in the Midwest. The article concludes with suggestions for the best application for each method.

I. Technical Estimates of Need

The most common type of capital-stock needs estimate is a technical one, involving an extensive review of the quality and quantity of existing public capital. The difference between the actual stock and a benchmark or standard level of performance is labeled the *needs gap*. Although the exact benchmark level used is often not explicit, the level is usually based on either the analyst's subjective determination of the "proper" amount of public capital, or on standards rooted in the opinions of technical experts, such as civil engineers or urban planners.

Table 1 presents a typical example of such a technical estimate of infrastructure needs. To allocate federal funds, the Federal Highway Administration (FHWA) maintains a national bridge inventory in which bridges are rated according to structural and functional adequacy. A bridge is considered as *structurally deficient* if it needs immediate repair. According to FHWA bridge inspectors, immediate repair is necessary if the superstructure, substructure, or culvert is rated by bridge inspectors as being 3 or less (on a scale of 0 through 9, with 0 being the worst) or if the general appraisal or waterway adequacy ratings are 2 or less. A bridge is considered as *functionally obsolete* if its deck geometry, approach, roadway alignment, or load-carrying capacity cannot safely service the road system that it's a part of—more precisely, when bridge inspectors rate the deck geometry, underclearance, approach roadway alignment, overall appraisal, or waterway adequacy 3 or less.[2]

Table 1 Bridge Needs, Determined by Federal Highway Administration
Federal Bridge Inventory, 1980

City	Number of bridges	Structurally deficient, %	Functionally obsolete, %	Total needing repair, %
Buffalo	136	55	4	59
Chicago	464	7	11	18
Cincinnati	215	10	3	13
Cleveland	279	23	0	23
Detroit	412	5	2	7
Louisville	217	1	17	18
Milwaukee	769	27	5	32
Minneapolis	291	27	10	37
Pittsburgh	207	35	4	39
Rochester	102	51	6	57

SOURCE: Peterson et al. (1984), table 5.

Of the bridges that were structurally or functionally inadequate in ten large midwestern cities in 1980, the most serious bridge problems appeared to be in Buffalo and Rochester, where more than one-half of the bridges were rated as deficient.[3] Structural deficiency was a larger problem for bridges in the Midwest than functional obsolescence, but this fact may be inherent in the rating process used by FHWA. When a bridge becomes structurally deficient, it automatically is dropped from the list of functionally obsolete bridges.

Although technical estimates of this type are certainly necessary, especially in allocating budgeted funds among different projects, they have two drawbacks. First, the standards used are arbitrary. For example, why should a bridge become functionally obsolete when the FHWA rates it 3, rather than 2 or 4? Every capital-spending needs estimate contains an element of subjectivity. What the analyst is really doing is presenting one particular set of spending plans as being better than others. Given that the goal of needs estimates is to inform policymakers, the best an analyst can do is base the estimates on a set of values widely held by the clientele group. The analyst then translates those values into a set of benchmark spending plans, quantifying how they compare with actual conditions. The problem with

these technical estimates is that they frequently embody values that may differ from those held by policymakers and hence are of little use to them. To cite another example, the federal government has developed a *sufficiency rating* for each bridge in the FHWA inventory to allocate bridge rehabilitation and reconstruction grants. The structural adequacy and safety of the bridge determine 55 percent of this rating; serviceability and functional obsolescence make up 30 percent; and economic necessity accounts for 15 percent.[4] However, states might prioritize each of these objectives differently, and thus find this system of allocating funds to be of little value. A state vitally interested in economic development, for instance, might weight economic necessity more heavily than 15 percent.

A second disadvantage of technical estimates is that they offer no guidelines for allocating resources when budgets are severely constrained. Many cities, especially those in the Northeast and Midwest, simply lack enough funds to meet their needs, not only for capital spending but also for other needs. Of the nation's 153 cities with a 1970 population greater than 100,000, Bradbury (1982) found 23 cities to be suffering *budgetary fiscal distress* in 1977. Nineteen of these 23 cities were in the Northeast or North Central regions. Moreover, two of these cities, New York and Cleveland, moved from *distress* to *crisis* in the 1970s—that is, they were unable to meet their financial obligations. Lacking appropriate benchmarks for budgeting purposes, the danger is that communities will abandon capital investment planning altogether, pursuing instead a pay-as-you-go or, more accurately, pay-as-it-breaks strategy.

Recognizing that the resources of state and local governments are limited, the federal government has recently made rule changes that, in effect, relax needs standards. For example, the FHWA has ruled that, to receive federal funds, states need not always repair highways (other than freeways) according to standards required for new construction.[5] This departure allows states to minimize expenditures on projects that are less than essential.

II. Average Expenditures as Measures of Need

A second type of benchmark that might be used by policymakers is a simple comparison of their own capital expenditures with those of similar cities. While this approach does not clarify how to allocate funds between different infrastructure projects, it does serve as a rough indicator of the appropriateness of a city's overall capital-spending plan. Figure 1 illustrates a needs estimate in which the highway spending of each urban area in our ten-city sample is compared with the average for the entire sample. It should be emphasized that these estimates are not directly comparable with the technical estimates given in table 1. First, expenditures on the entire highway and road system, not just those on bridges, are being compared. Also, these figures represent annual averages of expenditures between 1965 and 1976 rather than conditions in 1980 (the date of the figures in table 1). Finally, the unit of analysis in figure 1 is not *individual* cities, but the *aggregate* expenditures of all local governments within an urban county. This adjustment reflects the tendency of states to assign responsibility for highways to different levels of government; in some states, counties take more responsibility for this than in others. To maintain comparability, spending must be aggregated over all local governments within a geographic area.

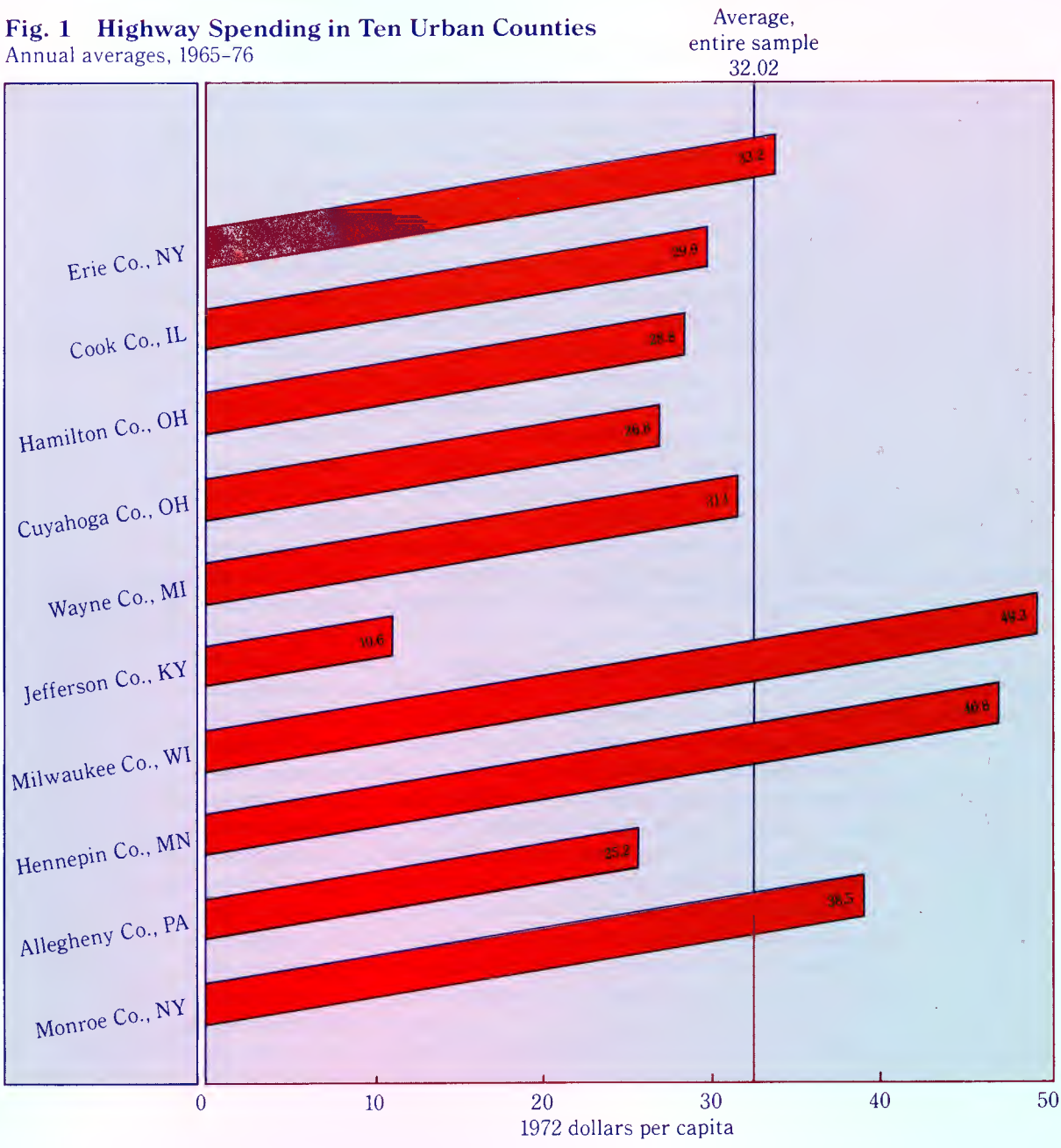
Large disparities exist in highway spending between urban counties. Milwaukee County, WI, spends almost five times as

4. See GAO Report B-201433.

5. See Department of Transportation, Federal Highway Administration, "Design Standards for Highways: Resurfacing, Restoration, and Rehabilitation of Streets and Highways Other than Freeways," Federal Register, *vol. 47, no. 112 (June 10, 1982), pp. 25268-75.*

much per capita as Jefferson County (Louisville), KY. Being the southernmost city in this sample, Louisville may use less salt on its roads than Milwaukee, perhaps accounting for part of the difference. Even among counties with similar climates, however, distinc-

Fig. 1 Highway Spending in Ten Urban Counties
Annual averages, 1965–76



SOURCES: Department of Commerce, Census Bureau, *Local Government Finances in Selected Metropolitan Areas and Large Counties* (annual).

tions persist. Erie County spends only about two-thirds as much as Milwaukee County, despite the fact that Buffalo gets almost twice as much snow per year.[6]

III. Economic Measures of Need

What factors are responsible for disparities of such magnitude? Should we consider them when making a needs estimate? An urban county's land area, for example, probably influences the cost of providing highways—the more dispersed the population, the higher the cost of linking the county by highway. Indeed, the central problem with the average measure of infrastructure needs is that no two cities or counties are exactly alike, and they may differ in ways that affect capital-stock needs. What is required, then, is a method of adjusting the estimates to account for the particular circumstances faced by each jurisdiction. The result would be a third type of capital-stock-needs estimate. This approach might be called an *economic* estimate of capital-stock needs, in the sense that it reflects the characteristics of each area affecting the demand for public capital stock.

A Model of Infrastructure Spending

The mechanics of implementing an economic approach to capital-stock needs are described in Wyckoff (1984). Basically, a two-step methodology was employed. First, a positive model of public capital spending was developed and tested, using highway spending data from 1965 to 1976 for the ten urban counties listed in figure 1. Investment in public capital was modeled as a conscious choice made by public authorities, based on available resources and characteristics of the urban area. We made no particular assumption about the nature of this public-choice mechanism. In other words, the question of what particular group controls a city—voters, a political party, a special interest group, or city workers—was left open.

Our model of infrastructure spending was completed using standard tools from the economic literature on investment, consumer demand, and local public finance. However, we combined these techniques in a unique way. The *desired* level of public capital was taken to be a function of income, the price of public capital (including interest rates), the age and value of the existing capital stock, population, area, and the amount of aid received by the community. The functional form for this relationship was taken from the Almost Ideal Demand System (AIDS), which is well known in the literature on testing the theory of the consumer. *Actual* spending was then related to *desired* stocks through a common stock adjustment function, which simply states that each city spends enough to maintain its capital stock and to eliminate some part of the gap between desired and existing capital stock.

One important problem addressed in Wyckoff (1984) concerns the choice of the unit of analysis for such a study. Use of data that are aggregated over all governments within a geographic area presents a dilemma to those doing econometric research. Previously, researchers could never be sure that aggregate data were representative of individual units. If, instead, they used data for individual units, they avoided this aggregation problem but risked additional error from the above-mentioned nonuniformity in the type and level of services offered by individual governments. Baltimore and St. Louis, for example, have integrated city and county governments, so that these governments have greater responsibilities than the city governments of Detroit or Cleveland. Thus, by using jurisdictions with different levels of responsibility in a cross-section estimation procedure, the researcher risks confusing expenditure differences because of varying levels of responsibility with additional expenditures made by one jurisdiction because of changing circumstances within that city.

6. Statistics on snowfall are from U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States *(1982-83), 103rd ed., Washington: U.S. Government Printing Office, p. 218.*

Fortunately, innovation in modern demand theory has led to the development of functional forms that fit the data well and *aggregate perfectly*—that is, aggregate demand can be shown to be determined by the economic conditions facing the average city in the sample. The AIDS demand functions are generally of this type. Thus, aggregate demand can be utilized without concern about its representativeness. Wyckoff (1984) shows that this property is preserved, even when noneconomic variables such as population, area, and age of the capital stock are introduced into the demand function, as long as the following conditions hold: (1) across time and across counties, the intra-county distributions of city per capita income are proportional, and (2) across cities within each county, age of capital stock, area, and population are independent of income. These assumptions were tested statistically and were not rejected by the data. These results allowed testing of the model with characteristics of the average city in each county, rather than having to know the conditions faced by each jurisdiction in the county.

For two of the independent variables, estimates rather than actual values for the series had to be employed. The value of the capital stock was estimated from data back to 1941, based on the highway spending of the largest cities in each county. On average, the expenditures of these cities contributed about one-half of the spending for the county as a whole. The age of the bridges in the central city of each urban county was utilized as a proxy for the age of the capital stock.

The most significant determinants of highway spending were found to be population, value of the existing capital stock, land area of the jurisdiction, and amount of aid received from higher levels of government. In addition, local decision-makers appeared to be more concerned with repairing and replacing existing capital stock than with building new roads and bridges to meet changed needs in their communities. A larger population necessitated a proportional increase in highway spending, so that, other things being equal, per capita highway expenditures did not vary much across cities of different sizes. And, as expected, the larger the land area, the greater the expenditures on highways. Weaker and less consistent relationships were found between highway spending and per capita income, the price of capital goods, and the age of the capital stock.

Predicted Values as Estimates of Need[7]

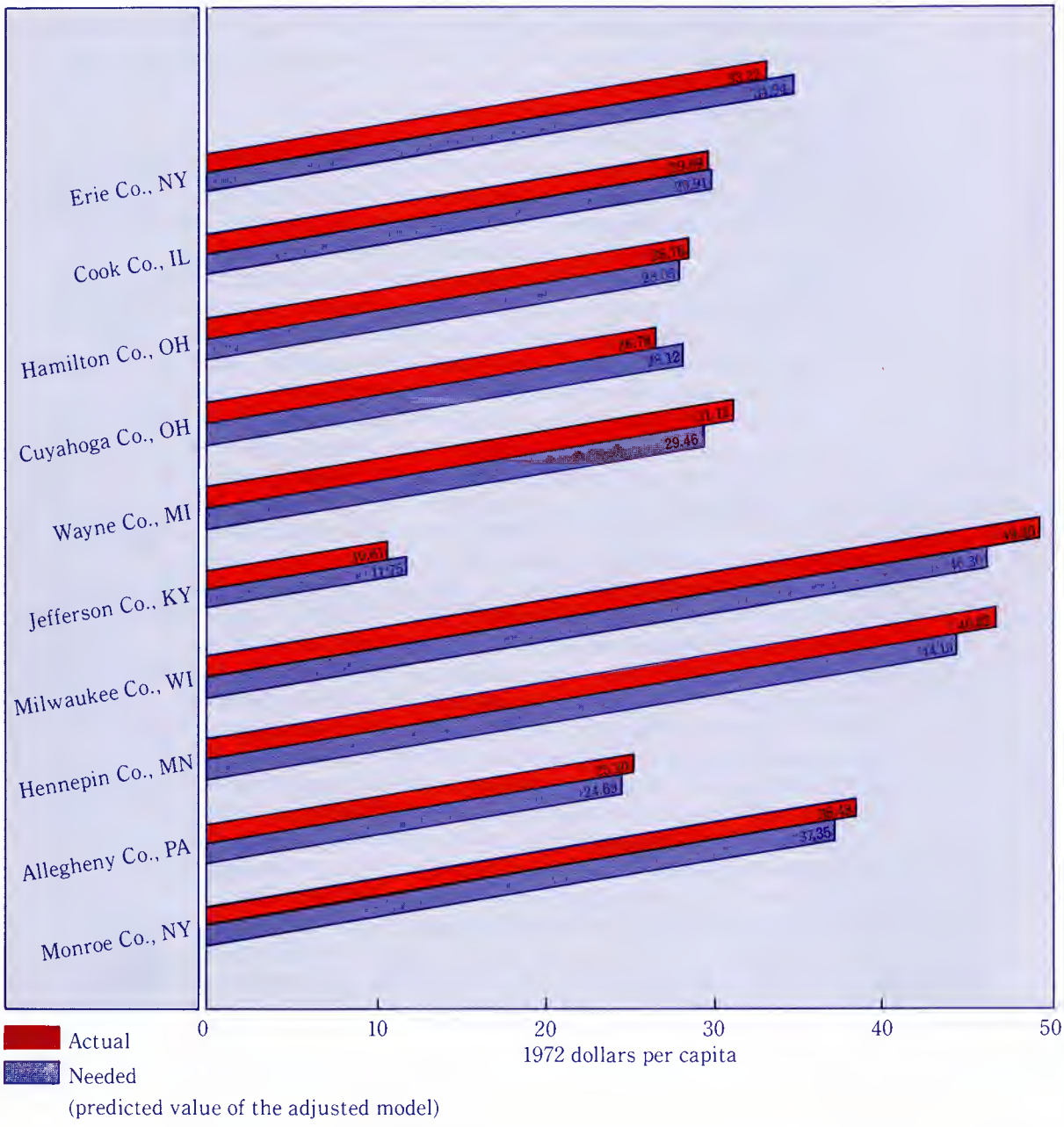
The first step of the analysis resulted in a model that explained how a typical city in the sample reacted to changes in its economic characteristics. The second step compared the actual spending of each individual city with that of a typical city under the same economic conditions. We plugged the individual city's values for the independent variables into the equation estimated in step one, and calculated the estimate of spending that resulted, subject to an adjustment to neutralize the effect of aid on spending. The thinking here is that income, price of capital goods, current capital-goods stock, population, area, and age of capital stock ought to be considered in determining highway needs and were therefore allowed to influence the needs estimate. It might easily be argued, however, that the need for highways is simply independent of the source of financing available to the community. Does a city need more roads simply because the federal or the state government is willing to pay for them? For this reason, in determining needs estimates, each city was assigned an amount of aid equal to the average for all cities in the sample.

The advantage of the resulting estimates is that they are customized for each city in the sample. That is, they reflect each area's particular urban characteristics. These estimates, then, answer a question of importance to policymakers: *what would a typical city in our region do if confronted by circumstances similar to ours?*

7. Since writing this article, it has come to the author's attention that this approach to estimating expenditure needs, with some modification, has been used to estimate intergovernmental grant needs in Europe. See Organization for Economic Cooperation and Development (OECD), Measuring Local Government Expenditure Needs: The Copenhagen Workshop, *Paris, France, 1981.*

In figure 2, the average actual and needed real per capita highway spending are shown for each urban county. The gaps between actual and needed expenditures look small on the chart, but in some cases they represent significant sums of money. It turns out that

Fig. 2 Real Per Capita Expenditures on Highways
Annual averages, 1965–76



the two westernmost areas in our sample—Hennepin County, MN, and Milwaukee County, WI—are farthest above their needs estimates, while two older, industrial, more eastern counties—Erie County, NY, and Cuyahoga County, OH—have the largest capital-spending deficits. To put these numbers in perspective, the Cuyahoga County deficit amounts to about 5 percent of actual expenditures, or approximately $2 million per year. The Milwaukee County surplus, on the other hand, accounts for 6 percent of actual expenditures, or approximately $3 million annually.

These differences can only partly be explained by differences in aid (see table 2). Milwaukee and Hennepin counties do have the second and third highest aid per capita; however, Cuyahoga County receives more than the average amount of aid (sixth highest), and Erie County gets only the third lowest level of aid. Clearly, some of these differences remain to be explained by other factors.

More surprising perhaps is the wide range of per capita needs levels specified by this procedure. Since the highway spending process is dominated by repair and replacement considerations, these levels are determined, to a large extent, by the value of the existing capital stock that must be maintained. Thus, Jefferson County, KY, has the smallest highway spending need of $11.75 per person because of its low per capita income and its small, relatively new capital stock. Milwaukee County, on the other hand, despite having the smallest land area in the sample and a relatively new capital stock, has the largest capital-spending need ($46.50 per person) because of the size of the capital stock that it must maintain. This large variation in highway-spending needs also points up how misleading a simple average expenditure figure can be as a measure of capital-spending needs, since it does not adjust for these differences in maintenance needs.

These new estimates of capital-spending needs are not without controversy. It might be argued that the heavy emphasis in these estimates on repair and replacement indicates myopia on the part of local decision-makers, a blind concern for preserving physical capital rather than serving the needs of their constituents. However, using this argument would necessitate showing how these politicians and administrators consistently misjudged the amount of the public capital required. Although it is easy to argue that one city miscalculated the needs of its citizens, it is much more difficult to show that an entire region under- or over-estimated its capital-stock needs. One of the strengths of this economic approach is that the typical responses of a large group of policymakers constitute the benchmark against which actual expenditures in each area are measured.

Table 2 Average Real Per Capita Aid in Ten Urban Counties, 1965-76[a]

County	State	Major city	Average, 1972 dollars
All counties, all years			18.24
Erie	New York	Buffalo	13.10
Cook	Illinois	Chicago	20.69
Hamilton	Ohio	Cincinnati	19.66
Cuyahoga	Ohio	Cleveland	19.48
Wayne	Michigan	Detroit	28.75
Jefferson	Kentucky	Louisville	9.76
Milwaukee	Wisconsin	Milwaukee	22.85
Hennepin	Minnesota	Minneapolis	22.61
Allegheny	Pennsylvania	Pittsburgh	14.37
Monroe	New York	Rochester	11.11

a. Aid includes general revenue sharing, grants for highways, and direct expenditures of state highway departments on local roads and streets in each urban county.

SOURCES: Department of Commerce, Census Bureau, *Local Government Finances in Selected Metropolitan Areas and Large Counties* (annual); and special releases from the Department of Transportation, Federal Highway Administration.

IV. Conclusion

What kind of infrastructure needs estimate is best? The answer depends on the kind of information that policymakers want. In many cases, the opinion of experts is invaluable, especially in allocating funds among various projects. Increasingly, however, policymakers have become disillusioned with experts' technical estimates, not only because their studies are based on arbitrary standards but also because these estimates fail to recognize the limitations of city budgets.

If officials want a rule of thumb from which to begin budget discussions about overall capital spending, they may want to sample the opinions of their counterparts in similar cities by looking at average expenditure data. This can be very misleading, however, because every city contains special features that are not acknowledged in these comparisons. As an alternative, we have proposed economic estimates of spending needs, in which estimated needs figures are essentially the predicted values of a model that accounts for these special features. In this way, needs estimates can be individualized to reflect the matrix of characteristics peculiar to each local area.

The economic needs approach has two advantages over technical estimates. The cost of an economic needs estimate is only a fraction of the cost of a technical study, since no exhaustive inventory of physical units is necessary. The results also may be of greater interest to policymakers, since arbitrary and sometimes impossible-to-attain needs standards are avoided.

References

Bradbury, Katherine L. "Fiscal Distress in Large U.S. Cities," *New England Economic Review*, Federal Reserve Bank of Boston, November/December 1982, pp. 33–43.

Choate, Pat, and Susan Walter. *America in Ruins: Beyond the Public Works Pork Barrel*, Washington, DC: The Council of State Planning Agencies, 1981.

Congressional Budget Office. *Public Works Infrastructure: Policy Considerations for the 1980s*, Washington, DC: U.S. Government Printing Office, April 1983.

Humphrey, Nan, and Peter Wilson. *Capital Stock Condition in Twenty-eight Cities*. Processed. Washington, DC: The Urban Institute, February 15, 1980.

Peterson, George E., et al. *Guide to Benchmarks of Urban Capital Condition*, Washington, DC: The Urban Institute, in collaboration with Public Technologies, Inc., May 1984.

Wyckoff, Paul Gary. "Economic Estimates of Urban Infrastructure Needs," Federal Reserve Bank of Cleveland, Working Paper 8401, June 1984.

Nonbanking Operations of Bank Holding Companies

by Gary Whalen

Economist Gary Whalen researches banking issues for the Federal Reserve Bank of Cleveland. *June Gates provided research assistance for this article.*

Banking organizations first evidenced a strong desire to move into nonbanking activities in the early 1970s. Ever since, the appropriate types and scale of such activities and the appropriate mode of entry (that is, bank holding company subsidiary vs. bank subsidiary vs. bank) have been hotly debated. Both proponents and opponents of banking expansion into nonbanking areas (banking regulators, in particular) have always been concerned about the likely impact of nonbanking activities on the soundness of directly involved and related banking organizations.[1] In recent years, these concerns have multiplied as bankers contemplate entry into more nontraditional, presumably riskier, fields.

Two diametrically opposed, extreme, expected impact scenarios have been depicted over the years. One view is that engaging in nonbanking activities would permit participating banking organizations to earn returns higher than those obtainable in traditional banking and/or diversify and so reduce their risk.[2] Participating banking organizations, as well as co-affiliates, engaging in such activities would be sufficiently insulated from operating problems encountered when particular nonbanking fields were entered, as long as they did so through separately incorporated subsidiaries.

The opposing view emphasizes the possibility that nonbanking activities could turn out to be less profitable and/or more risky than expected. This could ultimately weaken related banks if their resources had to be used, either because of legal or moral obligations, to support troubled nonbanking companies. Diversification benefits might not materialize if the nonbanking fields entered were closely related to banking.

Empirical evidence on these issues is scant, mixed, and dated.[3] In light of the recent debate about the appropriateness of bank entry into other nontraditional fields, this study explores the extent of involvement of bank holding companies in nonbanking activities and the

1. There also have been concerns voiced about possible conflicts of interest, unfair competition, and undue concentration of resources. It is generally not possible to examine these assertions empirically.

2. Unlike banks, nonbanking subsidiaries of bank holding companies are not generally subject to either intra- or interstate geographic restrictions on office locations.

3. For example, see Curry (1978); Drum (1977); and Karna (1979).

discernible impacts of this involvement on the parent holding companies and their subsidiary banks. The nonrandom sample of holding companies examined consists of the 25 largest bank holding companies in the United States (as of year-end 1982) and 60 smaller regional companies in 11 different states with an average consolidated asset size of $3.8 billion.[4]

I. Involvement in Nonbanking Activities

We can determine the general types of nonbanking activities that bank holding companies engage in by examining their annual reports or other published materials. These sources show that the sample companies most frequently were involved in consumer and commercial finance (including industrial banks), mortgage banking, leasing, and insurance sales related to extensions of credit.[5] Fewer, generally larger holding companies own factoring operations, small business investment companies, or discount brokers; operate futures subsidiaries or troubled S&Ls; or engage in other authorized nonbanking activities.

However, it is much more difficult to obtain precise quantitative estimates of holding company involvement (and the returns earned) in each type of nonbanking activity. Holding companies can engage in most nonbank activities, either through a subsidiary of the parent company or through a subsidiary of a bank affiliate, or both.[6] Banks that own nonbanking subsidiaries are not required to provide balance-sheet and income-statement data for each subsidiary individually. Banks may even engage in certain nonbanking activities directly (for example, operate a leasing division). Thus, their nonbanking operations become an unidentifiable part of their own consolidated reports of income and condition. Further, a nonbanking subsidiary of the parent may engage in a variety of nonbanking activities and is not required to report disaggregated performance data. The best available quantitative information on the nonbanking operations of bank holding companies is aggregated data for all the nonbanking subsidiaries of the parent holding company contained in Y-9 reports filed with the Federal Reserve. (Y-9 reports contain consolidated and parent company balance sheets and income statements.) This is the source of the data presented in the tables in this article. Accordingly, the extent of bank holding company involvement in nonbanking activities is understated to some unknown extent.

The data in table 1 indicate that bank holding companies generally are not heavily involved in nonbanking activities. The large companies are more actively engaged in these activities than the regionals, but considerable variation exists even within each group. Equity investments in nonbanking subsidiaries averaged only 4.9 percent of parent company total assets at the 25 largest companies at year-end 1982; this figure was just 2.2 percent for the small companies. Because of the wide variation in this ratio within each group, even the relatively low mean ratios exaggerate the typical level of holding company involvement in nonbanking activities somewhat. The substantial within-group variation is indicated by the relatively large size of the standard deviation of the ratio of nonbank equity/parent company total assets relative to the mean and the wide range in this ratio for each group: 14.7 percentage points for the large companies and 19.1 percentage points for the regionals.

Under such circumstances the median value of this ratio is a superior indicator of the typical extent of holding company involvement in nonbanking activities. It is just 3.8 percent for large companies and 1.3 percent for regionals.

An additional 19.7 percent of the assets of large parent companies, on average, consisted of advances to (that is, debt of) nonbanking subsidiaries. At smaller companies the mean

4. In the text, the 25 largest companies are referred to as large, *and the 60 other companies as* small *or* regionals. *The states are Alabama, Florida, Massachusetts, Michigan, Missouri, New Jersey, Ohio, Tennessee, Texas, Virginia, and Wisconsin.*

5. Under section 4(c)8 of the Bank Holding Company Act, the Federal Reserve Board specifies the types of nonbanking activities in which bank holding companies may become involved. (The Comptroller of the Currency has similar authority for national banks.) In general, the Federal Reserve permits bank holding companies to engage in activities "closely related to banking" that are expected to result in net benefits for the public. The approved activities constitute the so-called laundry list; *see Whitehead (1983), pp. 10-11.*

6. The reasons that holding companies choose to structure their nonbank subsidiaries as parent vs. bank subsidiaries are not clear, nor is a clear pattern of organization or trend in organization evident.

ratio was just 4.2 percent. Once again, measures of dispersion indicate that this ratio differs considerably across companies, both between and within groups. The ratio is generally higher and less variable for the large companies, suggesting that they typically assist their nonbank affiliates in raising funds. Fifteen of the regionals made no advances at all to their nonbank subsidiaries.[7]

Alternatively, equity in nonbank subsidiaries constituted 9.8 percent of large company equity investments in all subsidiaries, on average, in 1982. Total parent company investment in nonbank subsidiaries (equity plus advances) averaged 29.7 percent of total large parent company investment in all subsidiaries in the same year. Comparable figures for the regional companies are 2.8 percent and 7.2 percent, respectively. Again because of the skewed nature of the data, the median values of these ratios are slightly below the respective mean for both large and small companies.

Interestingly, comparison of the 1982 ratio of equity investment in nonbanking activities to equity investment in all subsidiaries with its level in 1978 indicates that many regional companies are less involved in nonbank activities now than they were in the past. This ratio actually declined at 27 of these companies over the period. The mean change in the 1982 ratio minus the 1978 ratio was 5.0 percentage points for the large companies and a negative 0.4 percentage point for the smaller ones.

II. Performance of Nonbanking Subsidiaries

The impact of nonbank subsidiaries on the holding company and related banks depends not only on the scale of nonbank operations but also on the performance of these subsidiaries over time. One indicator of nonbank performance is net income earned by these subsidiaries relative to the equity investment

7. For perspective, the mean ratio of equity investment in bank subsidiaries to parent company total assets was 49.6 percent and 77.2 percent at larger and small companies, respectively. The mean ratios of advances to bank subsidiaries relative to parent company total assets were 4.1 percent and 2.7 percent, respectively.

Table 1 Measures of Holding Company Involvement in Nonbanking Activities
Figures in percentage points; 1982 year-end data

	Large holding companies				Regional holding companies			
Ratio	Mean	Median	Standard deviation	Range	Mean	Median	Standard deviation	Range
Equity investment in nonbank subsidiaries/ parent company total assets	4.90	3.75	4.02	14.67	2.20	1.30	3.13	19.10
Advances to nonbank subsidiaries/ parent company total assets	19.74	15.48	18.18	58.22	4.22	0.85	7.87	40.39
Equity investment in nonbank subsidiaries/ equity investment in all subsidiaries	9.77	8.60	8.22	31.57	2.81	1.53	3.70	21.52
Parent company investment in nonbank subsidiaries/ parent company investment in all subsidiaries	29.68	25.45	21.06	65.70	7.24	3.46	9.50	44.77

of the parent company in nonbank activities.[8] Various summary statistics for this performance measure defined over various time intervals appear in table 2. Again, it should be noted that performance of nonbank subsidiaries of holding company banks is not reflected in the Y-9 data used to construct these measures.

Examination of the mean and median values of this ratio reveals that the nonbanking subsidiaries of larger companies generally have been more profitable than those of smaller companies. The exception is 1982, when the median return on nonbank equity of regionals was slightly above that of large companies. However, we cannot reject the hypothesis that the mean returns of the two groups of companies are equal for any time period examined using formal statistical tests.

None of the largest companies realized losses on their nonbanking operations in 1982, down from four in the previous year. The figures for the regional companies are 10 and 17, respectively. The 1978–82 mean nonbank returns of two large and thirteen smaller companies were negative.

The rate-of-return data indicate that 1981 was a particularly difficult year for the nonbank subsidiaries of virtually all holding companies. Market interest rates attained

8. Calculation of nonbank net income presumes that nonbank subsidiaries are 100 percent owned by their parent holding companies.

Table 2 Measures of Nonbank Performance
Figures in percentage points

	Large companies				Regional companies			
Ratio	Mean	Median	Standard deviation	Range	Mean	Median	Standard deviation	Range
1. Nonbank subsidiary net income/equity investment in nonbank subsidiaries								
Time period								
1982	15.26	12.23	13.56	4.51– 64.02	11.34	12.97	24.92	-66.4 – 66.3
1981	10.26	12.76	11.82	-17.14– 29.30	8.93	9.49	64.10	-239.3 -364.1
Average 1981–82	12.81	13.98	7.83	-1.24– 34.10	10.14	13.52	38.83	-152.52-184.72
Average 1978–82	14.85	11.20	23.51	-9.82-119.81	11.63	10.42	87.81	-238.14-532.6
2. Nonbank subsidiary net income/equity investment in nonbank subsidiaries minus bank subsidiary net income/equity investment in bank subsidiaries								
Time period								
1982	3.10	-0.60	12.03	-8.38– 45.14	-1.59	0.66	24.90	-80.71– 52.23
1981	-2.82	1.45	12.92	-38.14– 15.23	-4.30	-2.72	64.90	-252.92-360.41
Average 1981–82	0.14	2.27	7.20	-13.97– 16.14	-2.95	-0.59	39.13	-166.20-176.32
Average 1978–82	1.76	-0.86	23.76	-21.38-108.42	-1.73	-2.49	88.13	-248.68-524.25
3. Equity investment in nonbank subsidiaries/equity investment in all subsidiaries times ratio 2 above								
Time period								
1982	-0.04	-0.03	0.74	-2.42– 1.45	-0.02	0.01	0.75	-2.69– 2.73
1981	-0.30	0.04	0.98	-2.97– 0.92	-0.09	-0.01	1.12	-2.22– 7.07
Average 1981–82	-0.15	-0.05	0.80	-2.51– 1.13	-0.09	-0.001	0.70	-2.22– 2.97
Average 1978–82	-0.25	-0.03	0.57	-2.08– 0.34	-0.21	-0.01	0.62	-2.58– 1.34
4. Revenues paid by nonbank subsidiaries to parent/parent total operating income								
Average 1981–82	26.23	21.32	22.89	0– 76.95	8.20	3.47	10.71	0– 41.17
5. Dividends paid by nonbank subsidiaries to parent/parent total operating income								
Average 1981–82	1.63	0.62	2.64	0– 11.15	1.36	0.30	3.30	0– 23.84
6. Dividends paid by nonbank subsidiaries to parent/parent equity investment in nonbank subsidiaries								
Average 1981–82	3.78	1.35	5.74	0– 22.53	6.60	0.95	11.40	0– 52.26

unprecedented cyclical peaks in this year. The lackluster performance of nonbank subsidiaries may have stemmed from heavy reliance on short-term funds or the existence of usury ceilings, or both.

The analysis also reveals that holding companies' returns on their equity investment in nonbank activities have varied considerably across companies and over time. The variation is particularly notable at the regional companies. The 1982 coefficient of variation of nonbank return on equity was 88.9 percent at large companies and 219.8 percent at the regional companies. The ranges are 59.5 and 132.7 percentage points, respectively. The mean coefficient of variation of return on nonbank equity for large companies defined over the 1978–82 interval was 105.7 percent; for the smaller companies, it was 249.0 percent.[9]

Nonbank returns are considerably more variable than returns earned by holding companies on their equity investment in bank subsidiaries. The coefficient of variation of return on bank equity was approximately the same for large and small companies—roughly 20 percent in 1982 and 30 percent over the 1978–82 interval.

Insight into the relative profitability of nonbank activities can be obtained by comparing holding company rates of return on nonbank equity to a similar measure defined for bank subsidiaries. Summary statistics of such a measure defined over several time periods also appear in table 2. Given the variability of nonbank returns, it may be more informative to focus on the 2-year and 5-year average differences in returns reported in the table. The mean and median figures suggest that larger companies generally have earned somewhat higher, but not markedly higher, returns on their nonbank activities than they have in banking. The opposite is generally true for smaller companies. However, none of the means is significantly different from zero for either group.

Because of the year-to-year variability in nonbank returns, these summary measures obscure some interesting patterns in the disaggregated data for large and small companies. The rate of return on nonbank equity exceeded that earned on bank equity at 10 of the large companies and 20 of the regional companies in three of the five years over the 1978–82 interval. However, the nonbank operations of just two large companies were more profitable than their banking operations in four of these years, and not one large company managed to earn a higher return on its nonbank equity than it did on its equity investment in banking in every year during this period. Fifteen regionals managed to accomplish this feat in four years, and nine of these achieved it in all five years.

Differences in nonbank subsidiary performance across companies could result from any number of factors. It may be explained by differences in the degree of involvement of individual companies in particular types of permissible nonbank activities. For example, some companies may have elected to become involved in activities with high expected returns and risks. Alternatively, companies may simply differ in the organization of their nonbank activities. For example, certain nonbank activities might be grouped into a nonbank subsidiary of the lead bank by some companies but not by others. The length of time companies have engaged in particular types of activities also might influence reported performance. Presumably, experience is an advantage. Nonbank performance might depend on whether the subsidiaries acquired their nonbank subsidiaries or started them *de novo* (that is, from scratch). Generally, *de novo* operations are unprofitable for some period after start-up. Differences in the size and timing of nonbank acquisitions and/or the method of acquisition accounting employed might also influence reported nonbank performance.

Differences in nonbank performance might be explained by the absolute level or rate of growth of their nonbank operations, or the size of their nonbank operations relative

9. These last two figures are the mean of the following ratio for the companies in each group: standard deviation of rate of return on nonbank equity over 1978–82, divided by the mean rate of return on nonbank equity over 1978–82.

to their banking activities. It might be difficult to manage large and/or rapidly growing nonbank operations; or, rapid growth might reflect a preference for volume at the expense of profits. Nonbank performance might also depend on how highly the holding company leverages its nonbank operations.[10] Or, performance might be influenced by the size of the parent company. A large company may be able to realize and share various economies with its nonbank subsidiaries or possess superior management. Nonbank subsidiary performance could even be related to the performance of a company's banking subsidiaries. Companies with highly profitable banking subsidiaries could afford to sacrifice nonbank profits for growth.

It should be noted that, in most of these cases, arguments could be made to support the opposite type of expected impact. For example, the profitability of bank and nonbank subsidiaries might be positively correlated because of common superior parent company management, for example, or shared organizational economies. Thus, the expected relationship between nonbank profitability and each of these factors is generally ambiguous.

Unfortunately, available data allowed only a few of these possibilities to be investigated. Specifically, measures of nonbank subsidiary profitability were correlated with the following: total parent company equity investment in nonbank activities; nonbank equity investment relative to equity investment in all subsidiaries; parent company advances to nonbank subsidiaries as a percentage of equity invested in such subsidiaries; parent company total assets; rate of return on bank equity; and various other measures of nonbank and parent company growth over the 1978–82 interval.

Very few significant correlations were detected for either large or small companies.[11] A significant negative relationship (correlation coefficient = –0.374) was found between the rate of return on nonbank equity and the proportion of total subsidiary equity investment accounted for by such subsidiaries for the large holding companies only. A significant positive relationship (correlation coefficient = 0.625) was detected between the measure of nonbank leverage (advances to nonbank subsidiaries divided by equity investment in such subsidiaries) and nonbank profitability for large companies. Exactly the opposite result was found for the regional companies (correlation coefficient = –0.474). The rates of return on bank and nonbank equity were found to be significantly positively related (correlation coefficient = 0.416) but only for the large companies.

These admittedly limited findings simply do not allow any definitive statements to be made about the causes of the observed variation in nonbank performance. Further empirical research on this issue is necessary to answer this question and is beyond the scope of this study.

The net impact of nonbank operations on the level of holding company returns depends on the interaction of two factors:

1. the proportion of equity investment in all subsidiaries accounted for by nonbank operations;
2. the difference in the rate of return earned on equity investment in nonbank and bank operations.

Summary statistics for products of these two factors, again for several different time periods, appear in table 2. The mean and median net impacts are negative but slight for both large and regional companies in all time periods examined. However, the sample data do allow formal rejection of the hypothesis that the 5-year average mean nonbank net impact is zero for both large and small companies (5 percent level, 2-tail test).

A look at the disaggregated data revealed that the average marginal net profitability impact of nonbank operations was positive at 15 of the 25 large companies and 28 of the 60 regionals over the 1981–82 interval. For the 5-year period, the figures drop to 8 and 25, respectively.

10. Leverage is a measure of the extent to which a firm uses debt rather than equity to finance its assets. Rate of return on equity, the performance measure used here, is the product of rate of return on nonbank assets and nonbank leverage (nonbank assets divided by nonbank equity).

11. Specifically, these were relationships where the correlation coefficient was significant at the 10 percent level.

The impact of the variability of nonbank returns on the variability of consolidated holding company returns depends crucially on the correlation between the rate of return earned on bank and nonbank activities.[12] If bank and nonbank returns are negatively correlated, involvement in nonbank activities could moderate the variability of holding company returns. This is the basis of the alleged advantage of diversifying into nonbank fields. Correlation of bank and nonbank return data over the 1978–82 interval revealed that negative correlations existed for 14 of the large companies and 32 of the smaller companies.[13] These findings suggest that slightly more than half of the sample companies derived some measure of diversification benefits from involvement in nonbank activities. Given these findings, it is not surprising that little correlation was discovered between various measures of the extent of holding company involvement in nonbank activities and the variance of consolidated holding company returns on equity calculated over the 1978–82 interval.

Nonbank rate of return figures paint a somewhat incomplete picture of the contribution of nonbank subsidiaries to the holding company organizaton. For example, some net earnings are generally retained by nonbank subsidiaries and thus are not available for parent company use. Revenues actually upstreamed (that is, transferred) by nonbanking subsidiaries to the parent company averaged 26.2 percent of parent company gross income over the 1981–82 interval vs. just 8.2 percent at the regionals (see table 2). Bank subsidiaries provided the lion's share of parent company operating income at both large and small companies—59.0 percent at the former, 85.3 percent at the latter. However, the relatively large standard deviations and maximum values of the nonbank ratios indicate that nonbank operations contribute materially to the income of a number organizations.

However, part of the revenue paid by nonbank subsidiaries to the parent is compensation for services rendered or funds advanced. A critical measure of the contribution made by nonbank subsidiaries to the holding company organization is dividends paid to the parent. At larger companies, dividends paid by nonbank subsidiaries averaged 3.8 percent of equity investment in such activities and 1.6 percent of parent company gross income over the 1981–82 interval; at the regional companies, these ratios were 6.6 percent and 1.4 percent, respectively. The mean ratios obscure the fact that no dividends were paid in 1982 by the nonbank subsidiaries of 11 of the large companies and 33 of the regionals. The nonbank subsidiaries of 7 large and 31 regionals paid no dividends over the entire 1981–82 interval. Such performance is reflected in the considerably lower median values of these ratios. Bank dividends, on the other hand, averaged 35.4 percent of parent company operating income and 5.3 percent of the equity investment in banking operations at large companies over the 1981–82 interval. Comparable figures for the regionals were 59.5 percent and 7.0 percent, respectively. The importance of bank dividends to the consolidated organization is also reflected in the fact that bank dividends averaged 119.2 percent of parent company dividends at large companies and 158.2 percent at regional companies over the 1981–82 interval.

The figures suggest the possibility that holding companies extensively involved in nonbanking activities may attempt to draw more heavily on the resources of their subsidiary banks to support their nonbanking operations. Specifically, higher dividends and/or management fees may be imposed on their bank affiliates.[14] It is also possible that heavy involvement in nonbank activities may result in the parent company being operated in a more risky manner.

To obtain insight on these issues, various ratios were constructed to reflect bank fee and dividend burdens and were correlated with the measures of parent company involvement in nonbanking activities identical or similar to those defined in table 1. All ratios were 1981–82 averages. The ratios and a summary of the correlation results appear in

12. The variability of holding company returns depends on the variability of bank and nonbank returns, and the proportion of holding company investment in each, as well as on the correlation of returns.

13. Seven of the correlation coefficients for large banks and seven for small banks were significant (10 percent level, 1-tail test).

14. Bank subsidiaries may also make a limited number of loans to nonbank co-affiliates under section 23A of the Bank Holding Company Act. The amount of such loans is not reported on Y-9 forms.

table 3. No association was detected between nonbank involvement and bank fees and dividends for large holding companies. At regional companies, a positive significant correlation was evident between fees paid by subsidiary banks to the parent and one measure of the scale of its nonbank operations.

Additional correlation results suggest

Table 3 Correlations: Nonbank Involvement, Bank Burdens, and Parent Risk

	Measures of involvement in nonbank activities							
	Equity investment in nonbank subsidiaries		Investment in nonbanking subsidiaries		Equity in nonbanks		Investment in nonbanks	
	Parent total assets		Parent total assets		Equity in all subsidiaries		Investment in all subsidiaries	
Bank dividend and fee burden ratios	Large	Regional	Large	Regional	Large	Regional	Large	Regional
1. Subsidiary bank fees/ subsidiary bank net income	0	0	0	+	0	0	0	0
2. Bank fees/equity investment in bank subsidiaries	0	0	0	+	0	0	0	0
3. Bank fees/bank income paid to parent	0	0	0	+	0	0	0	0
4. Bank dividends/ bank net income	0	0	0	0	0	0	0	0
5. Bank dividends/equity investment in bank subsidiaries	0	0	0	0	0	0	0	0
6. Ratio 1 plus ratio 4	0	0	0	0	0	0	0	0
7. Ratio 2 plus ratio 5	0	0	0	+	0	0	0	0
Parent risk ratios								
1. Parent short-term debt/ parent equity	+	0	+	+	+	+	+	0
2. Parent total debt/ parent equity	+	0	+	+	+	+	+	0
3. Parent double leverage ratio (equity investment in subsidiaries/parent equity)	+	0	0	0	+	0	0	0
4. Parent total interest expense/gross income	+	0	+	+	+	0	+	0
5. Consolidated net income/parent total interest expense	–	0	–	–	–	0	–	0
6. Amount of double leverage/consolidated net income	+	0	0	0	+	0	0	0

KEY: + = positive significant correlation (10 percent level, 2-tail test).
– = negative significant correlation (10 percent level, 2-tail test).
0 = insignificant correlation.

that, in general, a direct relationship exists between measures of parent company risk and the degree of involvement in nonbank activities at both large and small companies. The greater a parent company's involvement in nonbanking operations, the higher is the company's reliance on debt and interest expenses and the lower is its debt coverage.

III. Conclusion

The data deficiencies noted in this article suggest that the results reported should be viewed with caution. With this in mind, the results generally suggest that commercial banking remains the core business of the typical holding company. Involvement in nonbank activities appears to be relatively limited, particularly at regional companies. Nonbank profitability varies widely across companies for reasons that are largely unclear. Large size, however, does not appear to guarantee superior nonbank subsidiary performance. Nonbank profitability also appears to vary considerably over time.

The net impact of these activities on the level and variability of holding company returns generally seems to be negligible. These findings result from the fact that nonbank involvement is typically small and that nonbank and bank profitability are not markedly different and are negatively correlated at roughly half of the companies. The latter finding does indicate that some companies have obtained some measure of diversification benefits from engaging in nonbank operations. Involvement in nonbank operations does not generally appear to be strongly related to bank subsidiary fees and dividend burdens but does appear to be positively correlated with parent company leverage.

Perhaps the most noteworthy findings of this study are the evident wide variations in the extent of holding company involvement in these activities and the contribution of nonbank operations to the holding company organization. Disaggregated data indicate that a considerable number of, but not all, holding companies have derived benefits from involvement in nonbank activities. Since holding companies generally are engaged in the same types of activities, the variation in nonbank impacts across companies suggests that management quality is a critical determinant of nonbank subsidiary performance. This, in turn, suggests that a "typical" impact of a particular type of nonbank activity on any holding company (or holding companies) in general is difficult to predict. The implication is that regulatory alterations in the number and/or authorized scale of permissible nonbanking activities of holding companies should be gradual rather than abrupt in either direction (that is, whether liberalizing or restricting holding company nonbanking activities). In particular, entry into more nontraditional fields should be carefully considered.

References

Cates, David. "Analyzing the Parent of a Bank Holding Company," *Magazine of Bank Administration*, November 1976.

Curry, Timothy J. "The Performance of Bank Holding Companies," in *The Bank Holding Company Movement to 1978: A Compendium*, Board of Governors of the Federal Reserve System, 1978.

Drum, Dale. "The Nonbanking Activities of Bank Holding Companies," *Business Conditions*, Federal Reserve Bank of Chicago, March–April 1977.

Karna, Adi. "Bank Holding Company Profitability: Nonbanking Subsidiaries and Financial Leverage," *Journal of Bank Research*, Spring 1979.

Wall, Larry D., and Robert A. Eisenbeis. "Risk Considerations in Deregulating Bank Activities," *Economic Review*, Federal Reserve Bank of Atlanta, May 1984.

Whitehead, David D. "Interstate Banking: Taking Inventory," *Economic Review*, Federal Reserve Bank of Atlanta, May 1983.

The Federal Reserve Bank of Cleveland publishes an informative research periodical called Economic Commentary. *Following are the titles published since January 1984. If you are interested in receiving this publication, either future or back issues, please contact our Public Information Center, Federal Reserve Bank of Cleveland, P.O. Box 6387, Cleveland, OH 44101, (216) 579-2048.*

Economic Commentary

The International Debt Situation
Owen F. Humpage
1/3/84

Commercial Bank Holdings of Treasury Debt
Gary Whalen
1/16/84

Closely Watched Banks
Paul R. Watro
1/30/84

Collective Bargaining and Disinflation
Mark S. Sniderman
and Daniel A. Littman
2/13/84

Monetary Policy in the 1980s
Karen N. Horn
2/27/84

Banking without Interstate Barriers
Thomas M. Buynak, Gerald H. Anderson,
and James J. Balazsy, Jr.
3/12/84

The Monetary Targets in 1984
William T. Gavin
3/26/84

Reorganizing the U.S. Banking Regulatory Structure
Sandra Pianalto
4/9/84

Deregulation and Deposit Pricing
Paul R. Watro
4/23/84

The Economy in 1984: Industry Perspectives
Robert H. Schnorbus
5/7/84

Nominal Income Targeting
John B. Carlson
5/21/84

Seeking a Stable Economic Environment
Karen N. Horn
6/4/84

Regional Interstate Banking
Gerald H. Anderson, Thomas M. Buynak,
and James J. Balazsy, Jr.
6/18/84

The Japanese Cost Advantage in Automobile Production
Susan A. Loos
7/2/84

Rate Deregulation and Deposit Shifting
Paul R. Watro
7/16/84

The Costs of a Protectionist Cure
Michael F. Bryan and
Owen F. Humpage
7/30/84

Small-Issue IDBs—Tax Policy in Search of a Focus
Paul Gary Wyckoff
8/13/84

Federal Reserve Bank of Cleveland
Research Department
P.O. Box 6387
Cleveland, Ohio 44101