

**INLAND WATERWAY FINANCING AND
THE POTENTIAL EFFECTS OF USER CHARGES**

Staff Working Paper

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Congressional Budget Office**

PREFACE

This short study was undertaken at the request of Chairman Stafford of the Senate Committee on Environment and Public Works to provide information on issues relating to inland waterway development. Peyton L. Wynns of CBO's Natural Resources and Commerce Division prepared the analysis under the general supervision of David L. Bodde and Everett M. Ehrlich.

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INTRODUCTION AND SUMMARY

The Congressional Budget Office has prepared this study to assist the Congress in considering adjustments to federal policy with respect to inland waterway development. The paper consists of three parts. The first briefly summarizes some of the major issues facing the Congress in the development of inland waterway policy. The discussion focuses on financing the costs of the inland water system. Four questions in particular are considered: Who should bear the costs of the system? How should a proper level of cost recovery be determined? What alternative types of charges are available? And how should capital costs be treated.

The second part reviews a major study of inland waterway user charges undertaken by the Administration to assess the economic impacts of user charges.^{1/} The study, which seems sound in its analytic method, arrives at several conclusions: That user charges designed to recover the system's full costs would be substantially above the levels of current fees;

1. See U.S. Department of Transportation and U.S. Department of Commerce, Inland Waterway User Taxes and Charges (February 1982).

that barge operators and grain shippers are the two groups that stand to be adversely affected to any measurable extent by the institution of user fees set to recover the system's full costs; and that the consequences of uniform user fees levied systemwide would differ from those of fees set at different rates for different segments.

The third part of the paper deals directly with the impact on grain shippers of waterway user charges higher than the current level of less than 1 cent per bushel. (Levied as a tax on gasoline, the current user charge is in fact divided among shippers, consumers, and carriers.) It concludes that user charges designed to recover waterway operating and maintenance costs would result in charges of about 4 cents per bushel of grain delivered. Full recovery not only of operating and maintenance costs but also of all capital investments in the year expenditures were made would raise total charges to approximately 10 cents per bushel. Proposals that would limit capital recovery to new projects and spread recovery over a project's life would result in user charges averaging 6 cents per bushel. The level of user charges faced by individual shippers would vary markedly, depending on such factors as the type of user charge, the availability of other modes of transport, and the responses of competing carriers (primarily rail). Finally, to the extent that foreign grain-importing nations continued to use variable import levies in the attempt to isolate their domestic markets from international price fluctuations, a significant portion of any U.S. user charge would likely be passed on to foreign governments.

PART I. MAJOR POLICY ISSUES

The issues the Congress faces in the development of a comprehensive inland waterway policy fall into two basic categories:

- o Which projects should the federal government undertake? and
- o How should those projects be paid for?

These questions are not new. In 1976, for example, the Congress requested from the U.S. Army Corps of Engineers a study to assist in considering questions dealing with the federal investment required and the projects needed. ^{1/} That study identified potential investment needs arising from technological obsolescence and congestion. It concluded that \$2.9 billion in 1982 dollars would be needed to complete navigation projects already under construction, and another \$8.9 billion would be needed to rehabilitate and improve the inland waterway system over the coming 20 years. Another study, by the Departments of Transportation and Commerce, took up the questions of how such projects should be financed and paid for, and what likely impact should be anticipated from waterway user charges. Mandated

1. See U.S. Army Corps of Engineers, National Waterways Study--A Framework for Decision Making--A Summary, Institute for Water Resources (January, 1983).

by the Inland Waterway Revenue Act of 1978 (P.L. 95-502), the study is most commonly referred to as the "Section 205 Study" and is examined in Part II.

The link between the means of financing projects and the number and types of projects that should be undertaken warrants emphasis. The level of investment "needs" depends in part on how projects are paid for. Assessments of transportation needs reflect a desired quality and quantity of services to be provided at some understood level of prices. When the prices charged for use of a service or facility change, the level of "needs"--that is, demand for that service--may change dramatically as a result. One of the effects of not charging or undercharging users for services provided is that doing so usually leads to exaggerated assessments of demand. In other words, users request a far higher level of investment than they would if they themselves were faced with paying for the investment.

The second set of issues, then, is: Who should pay for the projects the federal government undertakes, and how should those projects be financed. These questions are considered from two perspectives--the general choice between user charges and funding from general revenues, and more specific issues related to user charges.

User Charges Versus Funding from General Revenues

From 1824, when the Army Corps of Engineers first began work on the nation's inland waterway system, most costs were paid from general revenues.^{2/} Early federal involvement in the development and operation of the inland waterways was undertaken to link the newly developing Midwest with the more developed eastern part of the country. Many later projects were also undertaken to promote regional economic growth. The direction of federal policy shifted in 1978, however, with the imposition of an excise tax on fuel under the Inland Waterway Revenue Act. The initial tax rate was set at 4 cents per gallon and is scheduled to increase in stages to a final level of 10 cents per gallon in 1985. Thus, today, commercial users of the inland waterway system are required to share directly in the costs of supporting the system.

When a federal subsidy is intended to promote regional development, few alternatives to funding such projects from general revenues are available. Attempts to finance projects by charging beneficiaries would largely negate the intent of a subsidy designed for that purpose. To the extent that the economy has now matured, however, and federal support of the inland waterway system has come to be viewed as support of one of a

2. In fact, user charges were levied on a few waterway segments until 1871.

choice of freight modes, the Congress may wish to see that users bear an increasing share of the costs of the system. 3/

User charges have at least three major justifications. First, they promote an efficient use of resources. Transportation facilities provided without cost recovery make a mode that is subsidized cheaper to use than it otherwise would be. This can lead to a diversion of traffic from an economically more efficient mode to the subsidized mode. Second, simple fairness suggests that commercial enterprises, not the general taxpayer, shoulder the costs of the government services they use. And third, user charges can help determine the quality and quantity of services to be supplied by the government. Consensus is currently growing that federal subsidies give rise to demand for services that exceeds the level that would be requested if users had to pay for those services, and that many projects previously authorized would not have been undertaken if users had had to pay for them. Appropriate--that is, higher--user charges would tend to diminish the demand for projects that are not economically justified. If users are to pay a share of the costs of the inland waterway system, several subsidiary issues must be resolved.

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3. For an overview of the nation's public works infrastructure and an extensive analysis of user charges, see Congressional Budget Office, Public Works Infrastructure: Policy Considerations for the 1980s (April 1983). See also Congressional Budget Office, Reducing the Deficit: Spending and Revenue Options (February 1983), Chapter IX on "User Fees and Other Government Changes."

Levels of Cost Recovery

User fees now in effect recover approximately 10 percent of the Corps of Engineers' costs of operating and maintaining the inland waterway system. Taxes at their present levels do not recover investment costs. Since other, competing modes of transport receive far less subsidy, ^{4/} a move toward full cost recovery appears to offer potential for improving the efficiency of the nation's transportation system. Such a move would mean substantially higher fees on users, with hardship on some. Thus, the Congress might wish to phase in any changes in user charges or to seek less than full cost recovery. This latter approach would resemble that taken in 1978 under the Inland Waterway Revenue Act, which phases in the current set of fuel taxes at levels that recover less than full costs.

Systemwide Versus Segment-Specific Charges

User fees for services provided to commercial navigation can be uniform for all users throughout the inland waterway system. For example,

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4. The Congressional Budget Office has estimated that, in 1980, federal subsidies covered more than one-fourth of all inland waterway shipping costs. In contrast, trucks and railroads received far less (1 percent and 6 percent, respectively) and pipelines received no subsidies. Since 1980, the level of federal support for the rail freight industry has fallen as Conrail's financial performance has improved. See statement of Alice M. Rivlin, Director, Congressional Budget Office, before the Senate Committee on Environment and Public Works, Subcommittee on Water Resources, February 10, 1982.

the current fuel tax and the Administration's recent proposal (S. 1554) that all carriers pay a tax of 1.1 mill per ton-mile represent fees of this type. Alternatively, different fees can be charged to different users, depending on the costs of the services provided to them. Under such a plan, users of high-cost waterway segments would pay fees reflecting the relative costs of those segments--for example, lockage charges or ton-mile fees, which differ by river segment.

Uniform systemwide charges tend to be easier and therefore less costly to administer. Since all users pay the same charge regardless of the costs of services provided to them, however, systemwide fees do not necessarily promote the selection of the most cost-effective projects. Segment-specific fees, on the other hand, tend to be administratively more complex, but they may lead to greater gains in efficiency; users more directly responsible for the costs must pay more of the costs incurred in their behalf. Some combination of systemwide and project-specific charges is also possible--for example, a systemwide fee to recover basic operating and maintenance costs, combined with a segment-specific fee for any water route on which heavy use requires exceptionally large investment costs. ^{5/}

5. This approach, a combination of systemwide and segment-specific fees, is reflected in S. 1554, which was introduced on June 28, 1983 and referred to the Senate Committee on Environment and Public Works.

Treatment of Capital Costs

Because waterway projects are relatively few and of large scale involving sizable capital investment, the Congress may wish to consider initial federal financing of the projects, with subsequent cost recovery. Federal highway and airport programs are financed on a "pay-as-you-go" basis, with concurrent federal financing and cost recovery. That is, user fees are set at a level high enough so that user charge revenues offset current capital outlays. Such an approach is feasible with highways and airports, in which there are large numbers of capital projects and the administrative costs of treating each individually would be high.

With waterway projects, a somewhat modified approach might be effective. If major up-front costs were federally financed, they might subsequently be recovered over a projects' economic life with user charges tailored to specific projects. Doing so would strengthen the tie between investment costs and payments by users--thereby increasing economic efficiency.

PART II. THE SECTION 205 STUDY

In their "Section 205 Study," the Departments of Transportation and Commerce undertook to forecast the level of inland waterway traffic, first assuming no user charges. ^{1/} Cost information provided by the Corps of Engineers was then used to estimate an initial level of user charges that, if levied on this traffic, would recover all inland waterway costs. Since user charges would increase the costs of barge transportation, some traffic would be diverted to other freight modes. The reduction in the expected level of traffic, in turn, would mean that the initial level of user charges would not result in full cost recovery. Hence, the simulation model was run through several iterations, each time with assumptions of lower traffic and higher user charges than in the previous round until the level of traffic appeared to stabilize.

Two key aspects of the Section 205 Study are particularly worth noting. First, the waterway use levels forecast prior to any diversion

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1. See U.S. Department of Transportation and U.S. Department of Commerce, Inland Waterway User Taxes and Charges (February 1982). Since only a small fraction of the \$8 million authorized for the study was actually appropriated, the final report was not so comprehensive as the act describes. Reference to supporting analysis is provided in the Appendix.

of traffic that might result from user charges reflected a continuation of the substantial growth experienced during the 1970s (averaging a little over 3 percent a year). In light of the slower growth experienced since 1979, continuation of such high growth rates is not now a clear prospect. Second, the study contemplated recovering only a relatively small amount of capital expenditures. It did not include any capital recovery of projects previously completed and concluded that traffic growth would not necessitate completion of any major new projects until the year 2000. Thus, the only capital expenditures to be recovered were projects still under construction. ^{2/} In 1985, the costs to be recovered would include about \$25 million in capital recovery, and by 1995, annual capital recovery would rise to about \$150 million. (Converted into 1982 dollars, capital recovery would be about \$31 million for 1985 and \$190 million for 1995.) These amounts are relatively small compared with current Corps of Engineers construction levels, which have been running at about \$400 million a year, and they are also small next to the Corps' estimates of approximately \$12 billion worth of construction required over the next 20 years (or about \$600 million a year in 1982 dollars). ^{3/}

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2. Those costs would be amortized over a 50-year period at a 3 percent rate of interest. Since all costs were expressed in 1979 dollars, the 3 percent represents a real rather than nominal interest rate.
 3. See U.S. Army Corps of Engineers, National Waterways Study.

The combination of traffic levels that may be high and cost figures that are probably low means that any estimates of the tax levels needed to achieve full cost recovery are on the low side. Thus, the Section 205 Study's conclusion that a fuel tax of 34 cents a gallon (in 1979 dollars) would be required in 1985 to recover costs fully appears low. ^{4/}

Taxes under present law will reach a maximum of 10 cents a gallon in 1985. This level is clearly far below the rate required for full cost recovery. The ultimate level of taxes that would be needed for full cost recovery would depend on a large number of uncertainties including future traffic growth, elasticity of demand for waterway transport, responses of competing freight modes to waterway charge increases, and the strength of foreign markets. Thus, the exact per-gallon level of fuel taxes that would fully recover waterway expenditures is uncertain. But calculation of an exact figure is unnecessary unless the Congress should desire to raise the tax level in one large increase. Much more important is the fact that the tax level for full cost recovery would be far above current levels.

The 205 Study is useful in pointing out differences between segment-specific versus systemwide user charges. When facilities are financed by charges that clearly reflect the costs of the services provided,

4. Converting the 34 cents to 1982 dollars would yield an estimate of 43 cents per gallon.

users usually tailor their demand to their needs more carefully than they do when services are paid for either by a systemwide excise tax or out of general federal tax revenues. This observation holds as well for services provided by the private sector. For example, when electric power is metered and users are charged according to use, less power is consumed and conservation is encouraged. ^{5/}

The 205 Study notes several high cost/low volume waterway segments that would carry no traffic at all if charges we set to cover the full costs of providing services. Some such segments have already cost the federal government substantial sums of money, and the projection of increased waterway traffic in general suggests that these segments may have adequate prospects for future use to warrant their continuation. In such instances, the structure and timing of user charges might be adapted to particular circumstances. Levies could be limited to less than full cost recovery, leaving responsibility for remaining costs still with the federal government--that is, still subsidized. Should traffic growth continue, this would retain the opportunity for the federal government to recover a greater proportion of costs in the future. To prevent such situations from recurring, however, the Congress might choose to impose segment-specific user charges designed to recover full costs on new projects not yet begun.

5. For other instances of this effect in the private sector, see Congressional Budget Office, Public Works Infrastructure.

Several other conclusions of the 205 Study are also notable. One is that, with or without user charges, traffic growth on the inland waterway system is projected to continue. It also concludes that user charges would have minor or negligible impacts on regional economies, on energy consumption, and on the international balance of payments. On the other hand, two groups would sustain negative impacts, namely barge operators and grain interests. Though these effects are not analyzed in great detail, the diversion of some traffic to other freight modes (mainly rail) would cause the barge industry to experience slowed growth in traffic, revenues, and employment. Given the forecast of continued overall traffic growth, however, industry revenues and employment are nonetheless expected to rise over time, though less than might be achieved without increased user charges.

Thus, in light of all the other changes occurring in a dynamic economy, the study concludes that user charges would probably not be a major influence on the well-being of the groups affected. It does, however, analyze in detail the impact of waterway user charges on grain shippers, discussed in the next section.

**PART III. IMPACT OF USER CHARGES ON AGRICULTURAL
SHIPPING**

Various factors would determine the effects of waterway user charges on farmers. These include the level and type of charges and conditions in domestic and foreign markets. The effects would not be uniform among all farmers; not surprisingly, those closest to waterways and making the most extensive use of them would feel the most impact. In other words, farmers--or indeed, any other users of public works--who benefit most directly from a subsidy stand to be the most directly affected by the withdrawal of that subsidy. And conversely, if the imposition of higher user charges should result in a higher delivered or market price for grain, farmers far from water transportation who make relatively little use of such services might actually benefit.

COST EFFECTS FOR GRAIN SHIPPING--TWO ANALYTIC APPROACHES

Recognizing the importance of grain transportation, the Section 205 Study presents the results of two different analytic methods to simulate effects of user charges. First, grain transportation was studied in the same manner as all other commodities by Data Resources, Inc. (DRI). Future

traffic volumes without user charges were generated in DRI's macro-economic model. "Trigger points," or potential price increases at which shippers would begin to alter their shipping patterns, were then estimated. Then, DRI sought to estimate amounts of traffic diverted. Assuming that all costs were borne by farmers, the results suggested that the cost per bushel of moving grain by barge would increase by about 2 cents to 4 cents by 1990, and that a fuel tax of about 38 cents per gallon would be required to recover costs fully in that year. ^{1/}

The results differed according to whether the means of cost recovery assumed was a systemwide fuel tax or a segment-specific mechanism. With the segment-specific user charge, barge transportation on several river systems emerged as no longer viable, because the waterway charges would result in costs higher than shippers would have to pay to use other transport modes. In such cases, only a systemwide charge would support these segments' costs. Shippers on high volume segments, in contrast, would bear lower shipping costs under a segment tax than under a systemwide tax.

The second approach, taken in a study by researchers at Iowa State University, uses production estimates from the U.S. Department of Agriculture for the years 1985 and 1990. The Iowa study identified the origin points for the grain shipments and the final destination points on the

1. All estimates are expressed in constant 1979 dollars.

basis of consumption and export patterns. It then used a mathematical model to derive a least-cost distribution system. This provided a base case--an estimate of traffic flows in the absence of raised user charges. Transport costs were then increased to reflect user charges, and the program was rerun with a different set of commodity flows resulting.

The basic result of the Iowa analysis is that grain transport costs per bushel would be increased an average of between 2 cents and 3 cents, assuming a systemwide fuel tax of 32 cents a gallon in 1985. Because the Iowa study's method used more geographically specific input information, the results yielded more specific geographic information. The results were not uniform for all farmers. Typically, the price increases appeared lower on the Columbia/Snake River system (Washington/Oregon), ranging from less than 1 cent per bushel up to 2.5 cents per bushel, and higher on the Missouri River system, ranging from 4 cents per bushel to 7 cents per bushel.

CBO ESTIMATES

The CBO estimates that the level of user charges that would have been required to recover all 1982 operation and maintenance costs would, on average, have been about 4 cents per bushel. These charges are shown in Table 1, along with the user charges that might result from the Administra-

TABLE 1. LEVEL OF WATERWAY USER CHARGES REQUIRED TO RECOVER OPERATION AND MAINTENANCE COSTS IN 1982

River	City Where Shipment Originates	Miles to Port <u>a/</u>	In cents per bushel	
			Charges to Recover Full Costs <u>b/</u>	Charges to Recover 70 Percent of Costs <u>c/</u>
Mississippi	Minneapolis, Minn.	1,811	7.8	5.8
	Clinton, Ia.	1,471	6.4	4.7
	St. Louis, Mo.	1,128	4.9	3.6
	Cairo, Ill.	954	4.1	3.0
	Helena, Ark.	661	2.9	2.1
Illinois	Seneca, Ill.	1,424	6.2	4.5
	Peoria, Ill.	1,330	5.8	4.2
Ohio	Cincinnati, Ohio	1,456	6.3	4.6
	Louisville, Ky.	1,332	5.8	4.2
Missouri	Sioux City, Ia.	1,880	8.2	6.0
	Omaha, Neb.	1,773	7.7	5.7
	Kansas City, Mo.	1,517	6.6	4.8
Arkansas	Catoosa, Okla.	1,040	4.5	3.3
Columbia-Snake	Lewiston, Wash.	475	2.1	1.5
	Central Ferry, Wash.	405	1.8	1.3
	Windust, Wash.	350	1.5	1.1
	Biggs, Ore.	209	0.9	0.7

NOTE: In all cases, estimates assume systemwide user charges.

- a. From C. Phillip Baumel, Robert J. Hauser, and Jeffrey Beaulieu, Impact of Inland Waterway User Charges on Corn, Wheat and Soybean Flows, Iowa State University (March 1982), p. 44.
- b. CBO estimate.
- c. Administration proposal. CBO estimate based on a user charge of 1.1 mills per ton mile, as specified in S. 1554.

tion's proposal to recover 70 percent of operation and maintenance costs. These estimates assume that user charges are related to ton miles carried. User charges would be substantially lower if calculated on the basis of tons shipped, because agricultural shipments tend to have trip lengths much longer than the average for the full spectrum of waterway users.

LONG-TERM EFFECTS

Depending on market conditions, increased user fees might be borne in the short run by U.S. producers, by consumers, or by intermediaries. In the longer term, the burden would likely be divided somehow between producers and consumers only.

During the past year or so, increasing attention has been devoted to import levies and other attempts by foreign nations to insulate their domestic markets from international commodity price fluctuations.^{2/} In

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2. See, for example, Maury Bredahl, William Meyers, and Keith Collins. "The Elasticity of Foreign Demand for U.S. Agricultural Exports" in American Journal of Agricultural Economics (February 1979), and Gary P. Sampson and Richard H. Snape. "Effects of the EEC's Variable Import Levies" in Journal of Political Economy (1980). See also Congressional Budget Office, "Agricultural Export Markets and the Potential Effects of Export Subsidies," Unpublished Staff Working Paper (June 1983).

essence, such policies seek to maintain a fixed domestic price by raising tariffs in response to falling import prices and lowering tariffs in response to rising prices. To the extent that U.S. exports are bound for destinations that adhere to such practices (such as the European Community), and to the extent that user fees resulted in higher delivered prices, the nations importing the grain would absorb the user fees by reducing import levies to maintain constant domestic prices. On the basis of current export patterns, two analysts have estimated that approximately two-thirds of any U.S. user fees would ultimately be absorbed by foreign governments. ^{3/}

In any event, the magnitude of the impact of user fees on farmers would be swamped by normal price fluctuations and other economic variables. For example, CBO estimated last year that a one-percentage-point increase in the interest rate would cost about \$5,700 each year for a typical farm harvesting 400 acres of corn and soybeans. ^{4/} By contrast, user fees resulting in a price change of 3 cents a bushel would result in a loss of gross

3. See James K. Binkley and Jerry A. Sharples, "The Incidence of Inland Navigation User Charges on U.S. Grain Producers and Consumers Abroad: A Discussion and Some Preliminary Results" in Waterway User Charges Conference Proceedings, University of Illinois at Urbana-Champaign (June 23-24), 1982.

4. See statement of Alice M. Rivlin, Director, Congressional Budget Office, before the Senate Committee on the Budget, March 10, 1982 and responses to subsequent questions.

annual farm income of about \$900. In comparing any price changes resulting from user charges, one should note that changes in daily grain prices of 5 cents to 10 cents per bushel are not uncommon.

APPENDIX. ANALYSES SUPPORTING THE SECTION 205 STUDY

Detailed reports of the research undertaken for preparation of the Section 205 Study can be found in the following publications of Data Resources, Inc. (DRI) and Iowa State University (Iowa State). See Robert Schuessler and Allan Phillips, The Economic Impact of Inland Waterway User Charges, DRI (March 1982), and Schuessler, Analysis of Issues Relating to the Economic Impact of Inland Waterway User Taxes and Charges, DRI (March 1982). See also C. Phillip Baumel and Curtis D. Huyser, Impact of Inland Waterway User Charges on Fertilizer Flows, Iowa State (March 1982), and Baumel, Robert J. Hauser, and Jeffrey Beaulieu, Impact of Inland Waterway User Charges on Corn, Wheat, and Soybean Flows, Iowa State (March 1982).

