Cletus C. Coughlin

Cletus C. Coughlin is a senior economist at the Federal Reserve Bank of St. Louis. Thomas A. Pollmann provided research assistance.

The Competitive Nature of State Spending on the Promotion of Manufacturing Exports

THE expansion of jobs and incomes is a leading priority of state governments. An increasingly popular view is that economic growth can be stimulated by increasing the amount of manufactured goods that are sold by firms in a state to consumers and producers in foreign countries. To accomplish this, many states have devoted more resources to the promotion of manufactured exports abroad. Very little, however, is known about the effects of this economic development effort.

Research by Coughlin and Cartwright (1987) found a positive relationship between a state's exports and its promotional expenditures. A related issue, the focus of this study, is whether a state's exports are affected by the promotional expenditures of other states.[1] Are the effects of a state's promotional efforts being counteracted by the expenditures of other states? On the other hand, are the promotional expenditures of other states increasing export demand overall, thereby increasing a state's exports?

This paper begins with an overview of state export promotion expenditures and programs. The subsequent analysis consists of developing and estimating a model of state-manufactured exports for 1980 that includes standard international trade variables as well as export promotion expenditures.[2] A summary of the primary results completes the study.

STATE GOVERNMENT EXPORT PROMOTION

Manufactured exports are an important source of jobs for many state economies. In 1984, the most recent year of estimates in the *Annual Survey of Manufactures*, more than 500,000 jobs in Califor-

[1]A similar issue arises as states compete for foreign direct investment. This issue is illustrated in an anecdote from Prestowitz (1988). The author, then a Department of Commerce specialist on U.S.-Japanese trade, was asked to brief a group of Kentucky congressmen on Japan. The briefing occurred shortly after Toyota had announced its plans to build an assembly plant in Kentucky, and the congressmen were hoping to attract Japanese parts suppliers with various incentives. Prestowitz asked whether they realized that for every Japanese plant that opened in Kentucky, an American one in Michigan was likely to close. "We're not the congressmen from Michigan," was their reply. While one might question Prestowitz's assertion about the effects on Michigan of attracting a parts supplier to Kentucky, the motivation of the Kentucky congressmen is clear. Their goal is to stimulate economic activity in Kentucky with, at most, minimal regard for its consequences elsewhere.

[2]While some of the data in this study are available for more recent years than 1980, the more recent data are not as complete. For example, more states supplied figures for export promotion in 1980 than in recent years. A second reason for using 1980 is a desire to compare the current results using the export equation with previous research.

nia, 5.5 percent of private-sector employment, were due to manufactured exports. Though California led the nation in the number of jobs involved, numerous states were relatively more dependent on manufactured exports for jobs. The percentage of private-sector employment due to manufactured exports exceeded 7 percent for Connecticut and 6 percent for Indiana, Massachusetts, Michigan, Ohio and Washington.[3]

Not surprisingly, states have tried to increase their manufactured exports.[4] State governments provide resources for trade missions and catalog shows. Many maintain overseas offices to provide basic information to potential foreign customers about goods and services available from state firms. The information available through some state governments (for example, New York) has been expanded by the development of computerized information systems concerning trade opportunities. Some state governments (for example, Illinois and Arkansas) are also becoming increasingly involved in providing financial assistance to exporters. Finally, a number of states are either developing their own export trading companies (for example, New York/ New Jersey and Virginia) or assisting private firms using export trading companies. Due to the alleged cost disadvantages faced by small firms, these state services tend to be geared to small rather than large businesses.

Before 1980, evidence on state export promotional expenditures is scarce. Albaum (1968) reported sketchy budget information on 36 states (16 of which had no specific budget) for 1967. The most complete budgetary data for all states was compiled by Berry and Mussen (1980), who reported state export promotion expenditures of approximately $18.9 million during 1980. These expenditures reflected an average state expenditure of $377,111.

Due to the complexity of allocating state budget expenditures to export promotion, these figures are likely to represent a lower bound. For example, although the figures include the salaries of personnel explicitly tied to export promotion, the salaries of state government officials such as governors who spend much time and effort promoting exports are not included in these figures. One might also include the salaries of personnel at state universities involved in export promotion as well as the costs associated with providing financial assistance to exporters. Given the small size of the reported state expenditures, these omissions could be relatively important.

Table 1 presents the state export promotion data used in this analysis. Export promotion, which is a very small share of a state's total expenditures, ranged from zero for Utah to more than $1.8 million for Ohio. Illinois, Virginia and Maryland joined Ohio in spending more than $1 million to promote exports.

To take into account the differences among states in terms of their populations, the export promotion figures in table 1 are also presented on a per capita basis. The median expenditure is slightly in excess of 5 cents. On a per capita basis, Alaska is far and away the leading state. Alaska's expenditure of 93 cents per resident is more than 2 1/2 times the per capita expenditure of Montana, the second-leading state. Although neither Alaska (13) nor Montana (18) were among the leading states on a total expenditures basis, those that were, were also among the leading states on a per capita basis. Ohio, Illinois, Virginia and Maryland were ranked 6, 12, 4 and 3, respectively, on a per capita basis.

The limited evidence, which mixes expenditures to attract foreign direct investment with export promotion, suggests that export promotion expenditures are increasing rapidly. Berry and Mussen (1980) reported that average state expenditures for the promotion of international business increased by a factor of four between 1976 and 1980 for a sample of 25 states that supplied adequate data. Figures from the National Association of State Development Agencies (1986) indicate that such expenditures increased by two-thirds between 1984 and 1986.

A MODEL OF STATE EXPORTS

In this section, a model of state exports is presented and estimated. The model incorporates the standard variables used in international trade studies along with export promotion variables. The empirical results shed some light on the effect of a state's promotional expenditures on its ex-

[3]Between 1980 and 1984, the relative importance of manufactured exports for jobs declined; however, recent increases in U.S. exports suggest that this decline has been reversed.

[4]Barovick (1984) and Ouida (1984) can be consulted for details about the proliferation of export activities.

Table 1

1980 State Export Promotion Expenditures

State	Total Export Promotion	Total Rank	Per Capita Export Promotion	Per Capita Rank
Alabama	$ 273,750	19	$.0709	22
Alaska	372,500	13	.9306	1
Arizona	107,200	32	.0395	34
Arkansas	175,000	27	.0767	20
California	234,224	23	.0100	45
Colorado	120,120	30	.0417	33
Connecticut	75,000	37	.0242	38
Delaware	30,000	43	.0504	27
Florida	458,280	12	.0478	29
Georgia	310,050	17	.0575	24
Hawaii	107,250	31	.1112	14
Idaho	47,500	40	.0048	49
Illinois	1,527,060	2	.1349	12
Indiana	752,042	7	.1379	11
Iowa	240,273	22	.0826	16
Kansas	70,000	38/39	.0297	37
Kentucky	576,810	10	.1584	7
Louisiana	25,000	44	.0060	48
Maine	90,740	35	.0807	19
Maryland	1,287,319	4	.3070	3
Massachusetts	45,000	41	.0079	46
Michigan	682,000	9	.0738	21
Minnesota	188,000	26	.0462	30
Mississippi	150,000	28	.0599	23
Missouri	729,000	8	.1487	9
Montana	277,632	18	.3542	2
Nebraska	195,711	24	.1251	13
Nevada	5,000	49	.0063	47
New Hampshire	20,000	45	.0218	40
New Jersey	315,000	16	.0429	31
New Mexico	70,000	38/39	.0542	25
New York	845,000	5	.0484	28
North Carolina	503,500	11	.0861	15
North Dakota	99,960	34	.1533	8
Ohio	1,832,800	1	.1704	6
Oklahoma	247,604	21	.0826	17
Oregon	361,767	14	.1382	10
Pennsylvania	263,285	20	.0223	39
Rhode Island	11,250	47	.0120	44
South Carolina	100,000	33	.0326	35
South Dakota	139,200	29	.2024	5
Tennessee	193,644	25	.0427	32
Texas	739,794	6	.0523	26
Utah	0	50	.0000	50
Vermont	6,825	48	.0133	43
Virginia	1,487,187	3	.2795	4
Washington	333,000	15	.0810	18
West Virginia	35,773	42	.0186	41
Wisconsin	82,500	36	.0176	42
Wyoming	15,000	46	.0320	36

SOURCE: Berry and Mussen (1980) in *Export Development and Foreign Investment: The Role of the States and Its Linkage to Federal Action.*

ports as well as the effect of export promotion by other states on a selected state.

The Heckscher-Ohlin approach to international trade, developed by two Swedish economists, Eli Heckscher and Bertil Ohlin, highlights the importance of a country's productive resources in determining its pattern of international trade.[5] Goods are traded internationally because of differences in production costs. These differences depend on the proportions in which factors of production exist in different countries (that is, the relative factor endowments) and how the factors are used in producing different goods (that is, the relative factor intensities).

An example can be used to illustrate the Heckscher-Ohlin theory. Assume two countries, the United States and Mexico, two factors of production, capital and labor, and two goods, airplanes and cloth. In a two-factor world, a country is capital-abundant (labor-abundant) if it is endowed with a higher (lower) ratio of capital to labor than the other country. Assume the United States is capital-abundant and Mexico is labor-abundant. In a two-good world, a product is capital-intensive if its production requires a relatively higher ratio of capital to labor than the other good. Assume airplanes are capital-intensive and cloth is labor-intensive. The Heckscher-Ohlin theory predicts that a country will export the good that uses its abundant factor intensively and import the other good. The reason for this trade pattern hinges on the relative production costs. A country should be able to produce the good that uses relatively larger amounts of its abundant resource at a lower cost. Thus, the United States should export airplanes to Mexico and import cloth from Mexico.

The Heckscher-Ohlin approach allows for predictions about trade patterns based on knowledge of countries' factor supplies. Since the services of factors of production are embodied in exports and imports, international trade may be viewed as the exchange of the services of the country's abundant factor for the services of the country's scarce factor. In the example, the United States exports the services of its abundant factor, capital, and imports the services of its scarce factor, labor. A common summary statement is that capital is a source of comparative advantage for the United States, while labor is a source of comparative disadvantage.

The preceding idea can be applied to regions within a country. In Coughlin and Fabel (forthcoming), a Heckscher-Ohlin approach was developed to examine the export performance of individual states. The international exports of a state (EX) are defined as the value of manufactured direct exports for 1980.[6] A state's endowment of manufacturing resources determines its international competitiveness. Relying upon a standard Heckscher-Ohlin framework, a three-factor model with physical capital (K), human capital (H) and labor (L) is used. Thus, a state's exports are related to its relative endowment of these manufacturing resources. A state with larger amounts that are sources of U.S. comparative advantage (disadvantage) will have more (less) exports.

Whether physical capital is a source of U.S. comparative advantage has been a controversial topic since Leontief's (1954) surprising finding that the U.S. exported labor-intensive rather than capital-intensive goods. This continuing controversy is irrelevant for the current research.[7] To reflect the controversy, the expected impact of physical capital, measured by the gross book value of a state's depreciable manufacturing assets, is uncertain.[8]

Stern and Maskus (1981), as well as many others, have concluded that human capital is a source of U.S. comparative advantage. Thus, increases in a state's endowment of human capital, *ceteris paribus*, are expected to be related positively to state export performance. The calculation of a state's endowment of human capital, following Hufbauer (1970), attributes the difference between a state's

[5]Additional details on the Heckscher-Ohlin theory can be found in Krugman and Obstfeld (1988) or any other introductory international trade text.

[6]Unless noted otherwise, the data were taken from various issues of the *Annual Survey of Manufactures*.

[7]The bulk of cross-industry studies have found physical capital to be a scarce factor (Baldwin, 1971; Branson and Junz, 1971; Sailors, Thomas and Luciani, 1977; Stern and Maskus, 1981); however, the deficiencies of these studies have been highlighted by Leamer and Bowen's (1981) demonstration that inferences about factor abundance were not strictly justified and by Aw's (1983) identification of the highly restrictive conditions that are necessary to justify the inferences. Research by Bowen (1983) and by Coughlin and Fabel (forthcoming), which were designed to avoid the criticisms of cross-industry studies, suggests that physical capital is a source of U.S. comparative advantage.

[8]The use of the gross book value of depreciable assets as a measure of physical capital is not ideal. As Browne et al. (1980) have indicated, this measure is derived from accounting practices rather than economics. Consequently, it might not be a good measure of productive capacity. This problem is partially mitigated by the cross-section nature of the current analysis because relative productive capacity rather than absolute capacity is of primary importance.

average annual pay in manufacturing and the median pay of persons with zero to eight years of education as a return to human capital.[9] This return is multiplied by the number of manufacturing employees to generate a measure of total returns to human capital in manufacturing. A state's endowment of human capital is the capitalized (at 10 percent) value of these total returns.

A standard research finding reconfirmed recently by Stern and Maskus (1981) is that labor, measured as the number of manufacturing employees in a state, is a relatively scarce factor in the United States. If this factor is a source of U.S. comparative disadvantage, then increases in a state's endowment of labor, holding physical and human capital constant, should be related negatively to the state's exports.

In addition to a state's endowment of physical capital, human capital and labor, export promotion expenditures are expected to affect manufacturing exports from a state positively. The export promotion figures cited in table 1 encompass expenditures for the promotion of manufactured and agricultural goods. Since this study focuses on manufactured exports, the use of total export promotion expenditures might introduce some error into the estimations. Unfortunately, the magnitude of agricultural export promotion at the state level is unknown.

Berry and Mussen (1980) reported that the Department of Agriculture in 26 states received funds for export promotion. Since agricultural exports could be promoted by other administrative units, agricultural export promotion is not necessarily restricted to these states. To approximate total expenditures for manufacturing export promotion, total export promotion expenditures were multiplied by the ratio of manufacturing employees to the sum of manufacturing and full-time agricultural employees. This new measure is designated as PROM.[10]

Estimation Results

Assuming a linear function, the preceding model can be represented as

$$(1)\quad EX = d_0 + d_1K + d_2H + d_3L + d_4PROM + e,$$

where the d's are the parameters to be estimated and e is the disturbance term. The model was estimated using generalized least squares because the residuals using ordinary least squares indicated heteroscedasticity.[11] The results, which were also reported in Coughlin and Cartwright (1987), are listed under variant #1 in table 2.[12] The results indicate that both physical and human capital are positive, statistically significant determinants of state manufacturing exports. The remaining endowment variable, labor, is not statistically significant.

For present purposes, the positive impact of export promotion expenditures is the key result; however, the statistical significance of this variable hinges on whether a 5 percent or 10 percent significance level is chosen.[13] The point estimate indicates that manufacturing exports, on average will increase by .432 for a one-unit increase in manufacturing export promotion expenditures. Since export promotion expenditures are measured in thousands of dollars and exports are measured in millions of dollars, an increase in export promotion expenditures of $1000 is estimated to increase exports by $432,000.

This estimate seems much too large and, in fact, there are reasons to think the estimate is biased

[9]This calculation of human capital has been used frequently in international trade studies. It should be noted that the difference between average annual pay in manufacturing and the pay of persons with zero to eight years of education might not be entirely a return to human capital. For example, the market power of unions might increase wages in manufacturing; however, the inclusion of a state unionization variable did not affect the impact of human capital and was not statistically significant.

[10]Two other adjustments to total export promotion expenditures were examined; these adjustments did not alter the empirical results. Total export promotion expenditures were multiplied by: (1) the percentage of a state's population that did not live on farms; and (2) the ratio of manufacturing employees to the sum of manufacturing and total agricultural employees. Total export promotion expenditures were found in Berry and Mussen (1980). The adjustment factors to develop estimates of manufacturing export promotion expenditures were taken from the *Statistical Abstract of the United States* (farm population figures) *and the Census of Agriculture* (agricultural employment figures).

[11]Following Glejser (1969), the weights for the observations are determined by a two-step procedure. First, the residuals from an ordinary least squares regression of equation 1 are generated. Second, the inverses of the weights are generated by a linear function using total state employment as the determinant of the absolute value of the residuals from the first step. See Fomby et al. (1984), pp. 180–82, for details.

[12]Since Washington was uncharacteristic in the sense that the actual value of exports was exceptionally large relative to its predicted value, it was dropped from the estimation.

[13]It should be noted that export promotion expenditures likely have important investment aspects. The results of current export promotion expenditures will not necessarily occur immediately. Consequently, export promotion expenditures in 1980 will affect exports in future periods as well as the current period, and exports in 1980 were likely affected by previous export promotion expenditures. Because of absence of sufficient time-series data on export promotion, this lag structure could not be estimated.

Table 2

Export Promotion Variants of 1980 State Export Functions

Dependent Variable: EX′

Independent Variables	GLS Parameter Estimates (t-ratios)				
	Variant #1	Variant #2	Variant #3	Variant #4	Variant #5
Intercept	−8.503	−4.281	23.343	−54.725	−56.837
	(−0.15)	(−0.07)	(0.32)	(−0.98)	(−1.04)
K′	9.259*	12.677*	11.994*	9.330*	9.476*
	(3.81)	(3.88)	(3.78)	(3.99)	(4.12)
H′	39.173[a]	42.654[a]	52.735[a]	37.632[a]	37.054[a]
	(2.19)	(2.39)	(2.13)	(2.18)	(2.18)
L′	7.730	5.922	3.895	12.633	13.408
	(0.60)	(0.41)	(0.02)	(0.89)	(0.96)
PROM′	0.432	0.354	0.436*	−0.001	−0.119
	(1.65)	(1.36)	(1.72)	(−0.00)	(−0.36)
RP-Census′				14.388*	
				(2.36)	
RP-Cluster′					24.651*
					(2.66)
TP-Census′		−0.646			
		(−0.69)			
TP-Cluster′			−1.297		
			(−0.83)		

* statistically significant at the .05 level (two-sided)

a statistically significant at the .05 level (one-sided)

′ The variables are defined in the text and are measured as follows: EX = millions of dollars; K and H = hundred millions of dollars; L = ten thousands of employees; PROM = thousands of dollars; TP-Census and TP-Cluster = numerator is in millions of dollars and denominator is the number of states; and RP-Census and RP-Cluster = numerator and denominator are in cents per capita.

upward. First, as mentioned previously, the reported state budget expenditures on export promotion are likely a lower bound. To the extent these figures are understated, the coefficient estimate will be overstated. For example, if the export promotion expenditures are understated by 50 percent, the coefficient estimate should be halved. Second, the model does not control for either private or other governmental export promotion expenditures. To the extent that these other export promotion expenditures are correlated with state expenditures, the coefficient estimate is biased upward. Finally, due to the lack of data, there is no lag structure in the model. Consequently, while export promotion expenditures and exports are positively related, the point estimate is likely unreliable.

Cross-State Effects

Attention can now be focused upon whether there are externalities associated with export promotion. If these externalities exist, they could be positive or negative. Export promotion expenditures by other states might increase export demand generally and produce additional exports from the state in question. On the other hand, perhaps a substitution effect exists; increases in export promotion expenditures by one state will reduce the exports of other states.[14] In this case, a state may be forced into promotional efforts as an act of self-defense.

Ascertaining the existence of externalities is neither easy nor straightforward. The preceding

[14]Even though a state's exports may be affected adversely by the export promotion expenditures of competitive states, the state may not necessarily incur short-run employment losses because the export demand reduction could be offset by increased domestic demand.

paragraph focuses on the notion of competitive export goods; however, the dependent variable is total state exports. Given this aggregation, the idea of competitive exports must be transformed into competitive states. For example, it is difficult to envision how export promotion by South Carolina would affect Alaska; it is not difficult, however, to envision how export promotion by South Carolina would affect North Carolina. The notion of competitive states was developed in two ways. First, states were viewed as competitive if they belong to the same census region.[15] Since geography is a key feature of this categorization, an attempt to classify states on the basis of certain economic characteristics was made. The results reported in variant #1 in table 2 reflect the fact that states have different sources of comparative advantage. Competitive states should be those states whose sources of comparative advantage (that is, resource endowments) are similar. A cluster analysis was performed that grouped states into seven clusters based on their ratios of physical capital to labor and human capital to labor.[16]

After the states were grouped, the next step was to construct reasonable variables to test for externalities. There are numerous reasonable candidates. The difficulty arises because of the necessity of scaling the promotional expenditures of competitive states. For example, assume two groups of states, one containing five states and the other three states. The goal of the regression analysis is to indicate the impact upon a member of a group when promotional expenditures by another member (or members) increase. It seems reasonable that the larger the group the smaller the impact on any individual member of increased expenditures by another member. The effect is lessened because it is spread over more states. A straightforward approach is to divide the total promotional expenditures of competitors by the number of competitors. These variables are designated as TP-Census and TP-Cluster. The existence of a positive impact of a region's export promotional expenditures will be revealed by a positive sign for the TP variables, while a negative impact will be revealed by a negative sign.

Another approach to test for externalities is to use a state's spending on export promotion relative to the spending of its competitors. Scaling the promotional expenditures of a state relative to its competitors is accomplished by dividing both expenditures by their respective populations.[17] These variables are designated as RP-Census and RP-Cluster. If a region's per capita export promotion expenditures increase, *ceteris paribus*, then the ratio of state to region per capita export promotion expenditures will decline. Consequently, the existence of a positive impact of a regions's export promotion expenditures will be revealed by a negative sign for the RP variables, while a negative impact will be revealed by a positive sign.

Variants #2 and #3 in table 2 highlight the effect of adding TP-Census and TP-Cluster to the basic model, while variants #4 and #5 highlight the effect of adding RP-Census and RP-Cluster. The

[15]The nine census regions are as follows: New England — Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont; Middle Atlantic — New Jersey, New York and Pennsylvania; East North Central — Illinois, Indiana, Michigan, Ohio and Wisconsin; West North Central — Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota and South Dakota; South Atlantic — Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia and West Virginia; East South Central — Alabama, Kentucky Mississippi and Tennessee; West South Central — Arkansas, Louisiana, Oklahoma and Texas; Mountain — Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming; and Pacific — Alaska, California, Hawaii, Oregon and Washington.

[16]The clusters were generated using the CLUSTER procedure in SAS. The purpose of cluster analysis is to group objects such that those in a given cluster tend to be similar to each other in some sense while those in different clusters tend to be dissimilar. In the present case, states with similar ratios of physical capital to labor and human capital to labor were grouped together. The procedure, described on pages 423 and 424 in the *SAS User's Guide: Statistics* (1982), begins with each observation (i.e., state) as a cluster by itself. Next, the two closest clusters are combined to form a new cluster. This merging continues until only one cluster remains. There are different clustering algorithms with the distinguishing feature being how the difference between two clusters is measured. In Ward's method, which was the specific algorithm used, the distance between two clusters is the sum of squares between the two clusters over all clusters. At each step, the within-cluster sum of squares is minimized over all the possibilities obtainable by merging two clusters from the previous step. This method was used to reduce the original 49 clusters until there were the following seven groups: (1) California, New York, Connecticut and New Jersey; (2) Arizona, Missouri, Oklahoma, Utah, Wisconsin, Massachusetts, Minnesota, Colorado, Oregon, Pennsylvania, Maryland and Nevada; (3) Indiana, Delaware, Ohio, Illinois, Washington and Michigan; (4) Alabama, Idaho, North Dakota, Hawaii, Kentucky, Iowa and New Mexico; (5) Florida, Tennessee, Georgia, Kansas, Virginia, New Hampshire and Rhode Island; (6) Arkansas, Maine, South Carolina, Mississippi, Nebraska, North Carolina, Vermont and South Dakota; and (7) Texas, West Virginia, Wyoming, Alaska, Louisiana and Montana.

[17]The ratio of state to region per capita export promotion expenditures was selected rather than the ratio of region to state because of Utah's zero value for export promotion. This complicates the interpretation of the variable, but was unavoidable.

only unqualified conclusion is that there is no substantial impact on the statistical results for the factor endowment variables. The remaining conclusions must be qualified.

The results, while similar for both groupings of competitive states, are sensitive to which method is used to control for externalities. The results for each variant indicate that increases in promotional expenditures by competitors, *ceteris paribus*, are associated with a reduction in a state's exports; however, the results are not strong. Total promotional expenditures divided by the number of competitors in variants #2 and #3 is not a statistically significant determinant of state exports, while state per capita promotional expenditures divided by competitors' per capita promotional expenditures in variants #4 and #5 is a statistically significant determinant. In addition, the impact of adding the variable to control for externalities has different effects on the export promotion variable (PROM). The t-ratios are roughly similar in variants #2 and #3 compared to variant #1. In fact, in variant #3 PROM is statistically significant. On the other hand, in variants #4 and #5 the t-ratio for PROM is virtually zero.

SUMMARY

The results, which should be viewed as tentative because of the acknowledged data limitation, highlight the effects of export promotion expenditures. Using two groupings of competitive states, statistical evidence was found that exports from a state are affected adversely by the promotional expenditures of other states; however, another reasonable variable designed to capture this effect was statistically insignificant. Thus, definitive conclusions about the effects of export promotion expenditures are not possible. Nonetheless, one suggestion does emerge. In light of the large increases in expenditures and the increasing use of financial incentives to promote state exports, the competitive and efficiency aspects of export promotion expenditures and programs deserve additional scrutiny.[18] At this point, the lack of time-series data is the major obstacle.

REFERENCES

Albaum, Gerald. *State Government Promotion of International Business* (University of Arizona, Division of Economic and Business Research, 1968).

Aw, Bee-Yan. "The Interpretation of Cross-Section Regression Tests of the Heckscher-Ohlin Theorem With Many Goods and Factors," *Journal of International Economics* (February 1983), pp. 163-67.

Baldwin, Robert E. "Determinants of the Commodity Structure of U.S. Trade," *American Economic Review* (March 1971), pp. 126–46.

Barovick, Richard. "State Governments Broaden Range of Export Expansion Activities," *Business America* (October 1, 1984), pp. 16–18.

Berry, Willard M., and William A. Mussen. "Part I — A Report," in *Export Development and Foreign Investment: The Role of the States and Its Linkage to Federal Action* (Committee on International Trade and Foreign Relations, National Governors' Association, 1980).

Bowen, Harry P. "Changes in the International Distribution of Resources and Their Impact on U.S. Comparative Advantage," *Review of Economics and Statistics* (August 1983), pp. 402–14.

Boyd, John H. "Eximbank Lending: A Federal Program That Costs Too Much," Federal Reserve Bank of Minneapolis *Quarterly Review* (Winter 1982), pp. 1–17.

Branson, William H., and Helen B. Junz. "Trends in U.S. Trade and Comparative Advantage," *Brookings Papers on Economic Activity* (1971:2), pp. 285–345.

Browne, Lynn E., P. Mieszkowski, and R.F. Syron. "Regional Investment Patterns," *New England Economic Review* (July/August 1980), pp. 5–23.

Coughlin, Cletus C., and Phillip A. Cartwright. "An Examination of State Foreign Export Promotion and Manufacturing Exports," *Journal of Regional Science* (August 1987), pp. 439–49.

Coughlin, Cletus C., and Oliver Fabel. "State Factor Endowments and Exports: An Alternative to Cross-Industry Studies," *Review of Economics and Statistics*, forthcoming.

Fomby, Thomas B., R. Carter Hill, and Stanley R. Johnson. *Advanced Econometric Methods* (Springer-Verlag, 1984).

Glejser, H. "A New Test for Heteroscedasticity," *Journal of the American Statistical Association* (1969), pp. 316–23.

Hufbauer, Gary C. "The Impact of National Characteristics and Technology on the Commodity Composition of Trade in Manufactured Goods," in Raymond Vernon, ed., *The Technology Factor in International Trade* (National Bureau of Economic Research, 1970), pp. 145–231.

Krugman, Paul R., and Maurice Obstfeld. *International Economics: Theory and Policy* (Scott, Foresman and Company, 1988).

Leamer, Edward E., and Harry P. Bowen. "Cross-Section Tests of the Heckscher-Ohlin Theorem: Comment," *American Economic Review* (December 1981), pp. 1040–43.

Leontief, Wassily W. "Domestic Production and Foreign Trade; the American Capital Position Re-examined," *Economia Internazionale* (February 1954), pp. 3–32.

National Association of State Development Agencies. *State Export Program Database* (NASDA, 1986).

Ouida, Herbert. "XPORT: Port Authority ETC Simplifies and Expands Export Operations," *Business America* (March 19, 1984), pp. 8–12.

[18]In a recent cost-benefit analysis of the Export-Import Bank of the United States, Boyd (1982) concluded that for 1976–80 the annual costs exceeded the benefits by an average of $200 million.

Prestowitz, Clyde V., Jr. *Trading Places: How We Allowed Japan to Take the Lead* (Basic Books, Inc., 1988).

Sailors, J.W., R.W. Thomas, and S. Luciani. "Sources of Comparative Advantage of the United States," *Economia Internazionale* (May–August 1977), pp. 282–94.

SAS User's Guide: Statistics, 1982 Edition (SAS Institute, 1982).

Stern, Robert M., and Keith E. Maskus. "Determinants of the Structure of U.S. Foreign Trade, 1958-76," *Journal of International Economics* (May 1981), pp. 207–24.

U.S. Department of Agriculture. *1982 Census of Agriculture — Geographic Area Series — Volume 1, Part 51* (GPO, 1984).

U.S. Department of Commerce, Bureau of the Census. *Annual Survey of Manufactures* (GPO, various years).

_____. *1980 Census of Population — Volume 1, Characteristics of the Population — Part 1, United States Summary* (GPO, December 1983).

_____. *Statistical Abstract of the United States* (GPO, various years).