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Fiscal Planning and State Business Taxation: An Application of input-Output Analysis

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FISCAL PLANNING AND STATE BUSINESS TAXATION: AN APPLICATION OF INPUT-OUTPUT ANALYSIS *

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The question of the "proper" method of taxing industry is one of the thorniest confronting state government fiscal decision makers. On the one hand, the potentially large revenue yield of the direct business tax is welcomed by the fiscally pressured state government; but on the other, there are the ever-present fears that high taxes will drive industry from the state, or at least cause it to stop expanding. As a consequence of the former, proposed state tax reform more often than not centers around some adjustment to the state business tax structure. As a consequence of the latter, the success of such proposed reform, in the state legislature, often turns on the potential or believed effects on the state's industry. This continues to be true, even in the face of a great volume of research which indicates with more than a little consistency that taxes play only a minor role in the location decisions of industry.[1]

This belief in the importance of tax effects on the business sector is strongly evident in the all-important state tax study, which inevitably includes extensive consideration of inter-industrial tax liability differentials. Comparative analysis of industry tax burden may be made a number of ways, but their computation and interpretation are prob-

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[1] The pre-1960 literature on this subject is ably summarized in John F. Due, "Studies of State and Local Tax Influences on Location of Industry", *National Tax Journal,* XIV, No. 2 (1961), 163-173.

ably best described as "Differential Impact Analysis" in a 1965 *National Tax Journal* article by John Legler and James Papke.[2] Their differential impact analysis — the measurement of changes in the distributional pattern of tax payments, by industry, associated with the substitution of equal-yield but different-base taxes — is applicable in evaluating alternative business taxes and in selecting and rationalizing an optimal program. Specifically, Legler and Papke focus on the question of what tax base or combination of bases secures a distributional pattern consistent with policy objectives. In their paper, the alternative bases of gross receipts, net value added and net income are considered. Acceptance of this general approach is well evidenced in recent State Tax Studies. Most thoughtful examinations of the state business tax structure now include a similar differential direct-tax liability analysis in the hope of detecting any departure from desired equity or desired public policy. This is pretty much the state of the art insofar as the linkages between state tax studies, business taxation, and state fiscal planning go.

Objectives of This Paper

Our objective is to pick up where Legler-Papke have left off, and consider a sometime neglected aspect of state business taxation and fiscal planning — that of the indirect business tax. For example, an evaluation of a proposed higher state tax rate on the power industry might traditionally include a statement of the ratio of taxes to net income by industry class. But to the extent the output of the power industry is an input of other industries, which supply still other industries, the impulses of the initial tax on electric power are felt throughout the state's economy. The task of this paper is to describe, in non-technical terms, and to give some empirical content to, a method useful in integrating this kind of information into the state government fiscal planning process. The method used is based on input-output analysis, the now familiar techniques of which were introduced by Professor Wassily Leontief in 1936.[3]

The specific objectives in the following sections of this abbreviated version are (a) to describe, in simple terms, the conceptual relationship between the inter-industry interdependencies and direct-indirect business taxation, (b) to estimate the magnitude of distributional (cross-industry) "inequalities" which can arise in the presence of certain kinds of state business taxes (a gross sales tax in our example),

[2] John B. Legler and James A. Papke, "Optimizing State Business Taxation: An Application of Differential Impact Analysis", *National Tax Journal,* XVIII (September 1965), 240-247.

[3] Wassily Leontief, "Quantitative Input-Output Relations in the Economic System of the United States", *The Review of Economics and Statistics,* XVIII (August 1936), 105-125, and *The Structure of the American Economy, 1919-1939,* (Oxford Press, 1951).

(c) to discuss the implications of these inequities for the attraction of industry to a state, and (d) to conclude with an assessment of using this kind of information as a tool in forecasting the revenue effects of certain structural changes in the state's economy, i.e., in anticipating those sectors in which rate or base adjustments will be needed. Then the subject matter of the following sections would seem to fall under the broad heading of fiscal planning, with each consideration seemingly necessary to plot an optimal economic development strategy for the state.

This approach has not been an integral part of state tax studies primarily because of a lack of data on interindustry-interdependencies — more specifically, the lack of an input-output table. For at least that reason, we will try to give empirical content to our analysis, by focusing on the state of West Virginia where an input-output analysis is in the final stages of completion.[4] An additional benefit to be gained from examining the West Virginia case is its gross receipts tax which presently constitutes the state's largest single source of revenue. Of the major forms of business taxation, the gross sales tax has the greatest potential for pyramiding, i.e., it may show the greatest difference between direct and indirect taxes per dollar of output.[5]

Interindustry Interdependencies and State Business Taxes: The Conceptual Relationship

Table 1 is a hypothetical example of production requirements of seven industries, representing transactions which would necessarily precede the sale of one automobile to a final consumer.[6] The table shows the following: Transaction (1): the final consumer purchased the auto from the auto retailer for $2,000. Transaction (2): the auto retailer purchased the auto from an auto assembly plant for $1,600. Transaction (3): in order to produce the auto, the assembly plant purchased $300 of parts from fabricated steel manufacturers, and a $100 engine from an auto engine manufacturer. Transaction (4): in order to produce $300 of parts, the fabricated steel manufacturer had to purchase from steel mills $100 of raw steel forms. Transaction (5): in order to produce $100 of raw steel forms, the

[4] See John H. Chapman and Kenneth Shellhammer, *The Structure of the West Virginia Economy, 1965: A Preliminary Report,* Regional Research Institute (Morgantown: West Virginia University, 1967).

[5] Specifically, our definition of a direct state business tax is one paid directly to the state government by the firm. An indirect business tax is meant here to include the higher input costs resulting from a forward shifting of the tax by intermediate suppliers.

[6] For a thorough but non-technical discussion of the input-output method and results, see William H. Miernyk, *The Elements of Input-Output Analysis,* (New York: Random House, 1965), especially chapters 1-4.

steel mills had to purchase $20 of coal from coal mines and $20 of iron ore from iron ore mines.

Other transactions which would take place are: (1) payments to labor of $400-$300 by the auto assembly plant, $60 by the fabricated steel manufacturer, $10 by coal mines, $10 by iron ore mines, and $20 by the auto retailer (row 8), (2) payments to state governments of $111 [7]; $8 by labor (income tax), $60 by final consumers (consumer sales tax), $16 by the auto assembly plant (gross receipts tax), $3 by the fabricated steel manufacturer (gross receipts tax), $1 each by the auto engine manufacturer, the steel plant, coal mines, and iron ore mines, and $20 by the auto retailer (gross receipts tax).

All other inputs to these industries are purchased out-of-state and their values aggregated with profits and depreciation as shown in row 10. Labor's after-tax earnings and state government revenue are shown in the same row; savings, and the system is stopped at this point.[8]

The application of the I-O technique to tax structure analysis requires the derivation of a "tax" matrix. The coefficients of the tax matrix, shown in Table 4 for our hypothetical auto retail sector, will show the amount of *direct and indirect* taxes embodied in the delivery of $1 of output to final demand. This is accomplished in the following steps:

1. Find the direct taxes per dollar of delivery to final demand, paid by the auto retail sector. This is equal to the actual gross sales tax rate (.01) times output per dollar of delivery to final demand (1.0 in this case). The product of .0100 is the direct state payment for every dollar of delivery to final demand.
2. The second step is to find the indirect tax — the amount of tax embodied in the inputs needed by the auto retail sector to produce $1 for final demand. So (from Table 4) if the auto retail sector in producing $1 for delivery to final demand requires $0.80 of inputs from the auto assembly plants, (and if the auto assembly plant shifts all of its taxes forward) it receives as indirect taxes the .008 in state taxes paid by the auto assembly plant. Likewise, embodied in every dollar of delivery to final demand by the auto retail sector are indirect

[7] In our hypothetical example, only three taxes are levied; (a) a personal income tax on labor's earnings, (b) a consumer sales tax on purchases by final consumers, (c) a gross receipts, or turnover tax on *all* sales of firms.

[8] Though it is possible to show with I-C analysis the complete continuum of transactions which could be attributed to final consumers' purchases of, for example, one auto (if the analyst could predict how labor would spend net earnings of $392, and how the state would dispose of its revenues of $111), for the purposes of this paper, the state revenue which can be logically and predictably attributed to the sale of one auto to a final consumer is assumed to be $111.

TABLE 1. — Hypothetical Transactions in a State Attributable to The Delivery of One Automobile to a Final Consumer

Seller \ Purchaser	1. Auto Assembly Plant	2. Fabricated Steel Mfg.	3. Auto Engine Mfg.	4. Raw Steel Forms	5. Coal	6. Iron Ore	7. Auto Retailers	8. Labor	9. State Government	10. Final Consumer	11. Total Output	#
1. Auto Assembly Plant	0	0	0	0	0	0	1,600 (1)	0	0	0	1,600	1
2. Fabricated Steel Mfg.	300 (3)	0	0	0	0	0	0	0	0	0	300	2
3. Auto Engine Mfg.	100 (3)	0	0	0	0	0	0	0	0	0	100	3
4. Raw Steel Forms	0	100 (4)	0	0	0	0	0	0	0	0	100	4
5. Coal	0	0	0	20 (5)	0	0	0	0	0	0	20	5
6. Iron Ore	0	0	0	20 (5)	0	0	0	0	0	0	20	6
7. Auto Retailer	0	0	0	0	0	0	0	0	0	2,000 (1)	2,000	7
8. Labor	300	60	0	0	10	10	20	0	0	0	400	8
9. State Government	16	3	1	1	1	1	20	8	0	60	111	9
10. Imports, Profit Savings	884	137	99	59	9	9	360	392	111	0	2,060	10
11. Total Outlay	1,600	300	100	100	20	20	2,000	400	111	2,060	6,711	11

taxes of .0015 from the fabricated steel manufacturer, raw steel forms, coal and iron ore sectors.

Then from the sum in Table 4, row 8, it may be seen that embodied in every dollar of delivery to final demand by the auto retail sector is

TABLE 2. — Direct and Indirect Requirements Per $1 Delivery to Final Demand by the Auto Retail Sector

Industry Producing			
1. Auto Assembly Plant	$\frac{\$1,600}{\$2,000}$	=	$.80
2. Fabricated Steel Mfg.	$\frac{300}{2,000}$	=	.15
3. Auto Engine Mfg.	$\frac{100}{2,000}$	=	.05
4. Raw Steel Forms	$\frac{100}{2,000}$	=	.05
5. Coal	$\frac{20}{2,000}$	=	.01
6. Iron Ore	$\frac{20}{2,000}$	=	.01
7. Auto Retail	$\frac{2,000}{2,000}$	=	1.0
Total	$\frac{4,140}{2,000}$	=	2.07

TABLE 3. — Tax Payments Per $1 of Output: (The Gross Receipts Tax Rates)

Tax Paying Industry			
1. Auto Assembly Plant	$\frac{\$\ 16}{1,600}$	=	$.01
2. Fabricated Steel Mfg.	$\frac{3}{300}$	=	.01
3. Auto Engine Mfg.	$\frac{1}{100}$	=	.01
4. Raw Steel Forms	$\frac{1}{100}$	=	.01
5. Coal	$\frac{1}{20}$	=	.05
6. Iron Ore	$\frac{1}{20}$	=	.05
7. Auto Retail	$\frac{20}{2,000}$	=	.01

$0.0215 in tax, of which $0.0100 is directly paid by the sector and $0.0115 is contained in the price of inputs purchased by the sector.[9]

TABLE 4. — Direct and Indirect Taxes Attributable to $1 Delivery To Final Demand by the Auto Retail Sector

Tax Paying Industry				
1. Auto Assembly Plant	$.01 times	$ .80	=	$.0080
2. Fabricated Steel Mfg.	.01 times	.15	=	.0015
3. Auto Engine Mfg.	.01 times	.05	=	.0005
4. Raw Steel Forms	.01 times	.05	=	.0005
5. Coal	.05 times	.01	=	.0005
6. Iron Ore	.05 times	.01	=	.0005
7. Auto Retail	.01 times	1.0	=	.0100
Total		$2.07		$.0215

What does all of this mean? If the real world situation is similar to our hypothetical auto retail sector — i.e., having indirect effects greater than direct effects — the implications of state tax structures for industry location may be more relevant than is usually thought. Accordingly, the following section is given over to estimates of such direct and indirect taxes per dollar of delivery to final demand for one state.

CROSS-INDUSTRY VARIATIONS IN DIRECT-INDIRECT TAXES: EMPIRICAL ESTIMATES FOR WEST VIRGINIA

In Table 5 are shown estimates of direct and indirect effects for each of 48 industry sectors in West Virginia in 1965. The figure in column (1) is direct taxes paid per dollar of delivery to final demand, by the industry at the left, and column (2) is the sum of direct and indirect taxes. For example, the chemical industry (row 17) paid $0.004060 of direct state taxes and a sum of $0.009866 direct and indirect taxes for every dollar of output. The multiplier, M_i, shown in column (3) gives an estimate of the total dollar tax burden (direct + indirect) per dollar of direct tax levy, and $(1 - M_i)$ shows the ratio of indirect to direct taxes. Then for each industry having a multiplier greater than 2.0, the indirect taxes in the form of higher input costs are greater in dollar terms than are the direct taxes paid to the state government.

As may be seen from the multipliers in column (3), there is considerable variation across industries in the indirect tax burden, with these differentials being determined by a combination of the tax rates

[9] Note that when the coefficients in Table 4 are multiplied by $2,000, the resulting values are the same as in Table 1, i.e., sector 1 pays $16 in taxes, sector 2 pays $3, etc., and total tax payments by all of the seven industries of $0.0215 × $2,000 = $43.

TABLE 5. — Direct and Indirect Taxes Per Dollar of Final Demand: For 48 West Virginia Industry Sectors

Sector	Direct 1965
1. Agriculture	0.002130
2. Coal Mining (Underground)	0.013630
3. Coal Mining (Strip and Auger)	0.017200
4. Petroleum and Natural Gas	0.047390
5. All Other Mining	0.016970
6. General Contractors (Building)	0.015770
7. General Contractors (Non-building)	0.021930
8. Special Trades Contractors	0.029440
9. Food and Kindred Products (Meats and N.E.C.)	0.005650
10. Food and Kindred Products (Dairies)	0.006370
11. Food and Kindred Products (Bakeries)	0.005650
12. Food and Kindred Products (Beverages)	0.154190
13. Apparel and Accessories	0.005220
14. Logging and Sawmills	0.009230
15. Furniture and other Wood Fabrication	0.007250
16. Printing and Publishing	0.004490
17. Chemicals	0.004060
18. Petroleum	0.005850
19. Glass	0.007700
20. Stone and Clay Products	0.006460
21. Primary Metal Products	0.004680
22. Fabricated Metal Products	0.005050
23. Machinery (except electrical)	0.004340
24. Electrical Machinery and Apparatus	0.005240
25. Transportation Equipment	0.006550
26. Instruments and Related Products	0.008710
27. All Other Manufacturing	0.005130
28. Eating and Drinking Establishments	0.036750
29. Wholesale trade	0.117680
30. Retail Food Stores	0.032000
31. Retail Gasoline Service Stations	0.117810
32. All Other Retail	0.018410
33. Banking	0.007470
34. Other Finance	0.016540
35. Insurance Agents and Brokers	0.027930
36. Real Estate	0.025300
37. All Other Finance, Insurance and Real Estate	0.011980
38. Hotels and Other Lodging Places	0.009240
39. Medical and Legal Services	0.005950
40. Educational Services	0.000270
41. All Other Services	0.028810
42. Railroads	0.030250
43. Trucking and Warehousing	0.017380
44. All Other Transportation	0.015550
45. Communications	0.029390
46. Electric Companies and Systems	0.040420
47. Gas Companies and Systems	0.012490
48. Water and Sanitary Services	0.024100

TABLE 5 (Continued)

Sector	Direct + Indirect 1965	Multiplier 1965	Direct 1975	Direct + Indirect 1975	Multiplier 1975
1.	0.012335	5.790854	0.002140	0.012479	5.831159
2.	0.017878	1.311673	0.013210	0.018036	1.365354
3.	0.032024	1.861847	0.017920	0.035921	2.004521
4.	0.055772	1.176870	0.044250	0.058252	1.316431
5.	0.022648	1.334610	0.017360	0.024463	1.409177
6.	0.034561	2.191552	0.016190	0.034399	2.124717
7.	0.033558	1.530214	0.016810	0.029256	1.740396
8.	0.037062	1.258897	0.026380	0.033670	1.276347
9.	0.015346	2.716170	0.006440	0.016890	2.622661
10.	0.012448	1.954086	0.005650	0.013049	2.309520
11.	0.013691	2.423194	0.005370	0.015907	2.962127
12.	0.160080	1.038201	0.140720	0.147800	1.050313
13.	0.007511	1.438807	0.008520	0.012228	1.435173
14.	0.018194	1.971157	0.007980	0.016829	2.108885
15.	0.013021	1.795996	0.008000	0.012737	1.592164
16.	0.009571	2.131633	0.005490	0.012269	2.234812
17.	0.009866	2.430097	0.004340	0.010826	2.494544
18.	0.015712	2.685851	0.006170	0.016596	2.689718
19.	0.012435	1.614916	0.009310	0.016803	1.804828
20.	0.012981	2.009500	0.006230	0.016361	2.626210
21.	0.007527	1.608326	0.004700	0.007696	1.637425
22.	0.008758	1.734332	0.005530	0.009414	1.702360
23.	0.008095	1.865106	0.004870	0.008447	1.734575
24.	0.010742	2.050058	0.005410	0.011845	2.189504
25.	0.009222	1.407880	0.006490	0.009299	1.432759
26.	0.010871	1.248151	0.009500	0.012214	1.285708
27.	0.008180	1.594520	0.006790	0.009925	1.461666
28.	0.047709	1.298198	0.036740	0.050667	1.379072
29.	0.124075	1.054341	0.110420	0.117710	1.066017
30.	0.038682	1.208808	0.030760	0.038490	1.251286
31.	0.125934	1.068954	0.121380	0.129716	1.068678
32.	0.023985	1.302802	0.017350	0.024832	1.431243
33.	0.010195	1.364788	0.007540	0.010960	1.453580
34.	0.018950	1.145717	0.016550	0.019237	1.162381
35.	0.030126	1.078627	0.028100	0.029947	1.065735
36.	0.034439	1.361237	0.026480	0.036196	1.366915
37.	0.018169	1.516621	0.009020	0.015573	1.726516
38.	0.023204	2.511282	0.009330	0.026356	2.824890
39.	0.010814	1.817547	0.005480	0.011227	2.048780
40.	0.008523	31.565314	0.000200	0.009508	47.541164
41.	0.033946	1.178259	0.031680	0.039447	1.245169
42.	0.034347	1.135436	0.028860	0.032763	1.135254
43.	0.026139	1.503994	0.019140	0.030306	1.583396
44.	0.020525	1.319920	0.015700	0.022498	1.433013
45.	0.032065	1.091024	0.030360	0.033480	1.102762
46.	0.050310	1.244685	0.049850	0.058224	1.167993
47.	0.019797	1.588012	0.014630	0.022757	1.555516
48.	0.034579	1.434817	0.022960	0.033425	1.455811

Source: See Table 6

levied on direct and indirect suppliers, and the proportion of inputs purchased from out-of-state.

Implications for Industry Location

In addition to the comparative tax burden technique, two general approaches to identifying the relationship between state business taxation and the level and rate of state economic growth have been taken. Neither considers the indirect tax question. First, on a macro level, Campbell and Sacks have attempted to show the cross-state relationship between business taxation and the level and rate of growth of per capita income.[10] As other indicators of economic growth they used rates of growth of total employment, non-agricultural employment, and population; and the state manufacturing employment location quotient. Their findings do not lend support to the thesis that either higher per capita business taxes or a higher business tax component in the state tax structure dampens state economic development. Similarly, the work of Thompson and Mattila indicates no statistically significant correlation between the level of per employee business taxes and the rate of employment growth.[11]

The micro-approach usually involves a questionnaire survey of plants which have recently relocated. The conclusions are similar here — business taxes are not a major determinant of plant location.[12]

But factor costs are almost always thought to be an important determinant of industry location, and perhaps expansion, and if the state tax structure exerts a measurable (indirect) effect on these costs, it may well play a significant role in the industry location decision. To reach for a hypothetical example, an argument which might be made by utilities is that higher business taxes (on them) hurt their chances to attract new industry into the state by negotiating favorable utility rates.

The typical location study is concerned only with *direct* taxes, but in Table 5, it may be seen that for many West Virginia industries, the indirect effects of state taxes may be greater than the direct. In the case of this particular state — where a gross sales tax is the major business tax — distortions in relative prices may be expected, as well as absolute price level rises considerably in excess of the nominal rate

[10] Alan K. Campbell, "State and Local Taxes, Expenditures, and Economic Development," pp. 195-208, and Seymour Sacks, "State and Local Finances and Economic Development," pp. 209-224; both in *State and Local Taxes on Business,* Tax Institute of America, Princeton, N.J., 1963.

[11] Wilbur Thompson and John Mattila, *An Econometric Model of Postwar State Industrial Development* (Detroit: Wayne State University Press, 1959).

[12] For example, see Alan K. Campbell, "Taxes and Industrial Location in the New York Metropolitan Area," *National Tax Journal* (September 1958); and *Industrial Mobility in Michigan* (Ann Arbor: University of Michigan Press, 1950).

TABLE 6. — Estimates of Total Direct and Indirect State Business Taxes: By Industry, for 1965 and 1975

Sector [1]	Actual Direct Taxes Paid 1965 [2]	Estimated Direct Taxes 1975	Estimated Direct + Indirect Taxes 1965 [2]	Estimated Direct + Indirect Taxes 1975
1.	271	311	1039	1073
2.	9609	13492	11311	16052
3.	934	1581	773	1282
4.	2994	5003	47	550
5.	1208	1596	590	792
6.	2725	4217	5041	7180
7.	3835	4109	5032	5868
8.	4189	5587	2198	2424
9.	296	439	551	739
10.	498	560	899	1139
11.	270	333	600	871
12.	4650	5529	4561	5185
13.	123	318	169	402
14.	577	812	737	972
15.	187	299	257	322
16.	276	800	167	321
17.	5266	8409	10689	17571
18.	406	708	447	739
19.	2069	3625	3195	6142
20.	855	1350	1223	2493
21.	4536	6431	6797	9674
22.	609	1069	747	1196
23.	490	848	857	1353
24.	624	947	1234	1944
25.	1163	1514	1621	2145
26.	76	124	53	97
27.	649	1310	699	1180
28.	4253	5817	5333	7561
29.	36437	48411	26513	35069
30.	3818	4780	4579	5931
31.	4577	7089	3760	5041
32.	7254	9465	8778	12207
33.	746	1149	749	1137
34.	926	1311	963	1316
35.	7664	11066	6254	8433
36.	1537	2340	1083	1624
37.	580	630	304	380
38.	351	524	781	1221
39.	1052	1448	1476	2147
40.	59	87	1838	4102
41.	12838	19297	11355	16937
42.	6447	8516	5510	7842
43.	3246	5618	3283	5479
44.	628	998	301	437
45.	3500	5729	2406	3515
46.	6378	27508	3519	20716
47.	4737	9297	6331	11970
48.	730	1031	494	664
Total	157,143	243,432	156,841	243,435

[1] See Sector Descriptions in Table 5

[2] Estimates of direct taxes paid are the product of a vector of direct coefficients similar to that shown in column (1) of Table 5 and estimates of the 1965 final demand. Estimates of direct plus indirect taxes are the product of the vector of direct-indirect coefficients similar to that shown in column (2) of Table 5 and projected industry final demand in 1975.

Source (for Tables 5 and 6): William H. Miernyk and Kenneth L. Shellhammer, *Simulating Regional Economic Development With An Input-Output Model,* (Regional Research Institute, West Virginia University, Morgantown, West Virginia: 1968).

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of the tax.[13] And if earlier stage producers make purchases from later stage producers, e.g., if manufacturers make purchases from retailers, the distortions are accentuated cumulatively.

But high indirect tax burdens alone do not necessarily mean an impediment to industrial development in the state. Two additional considerations would seem necessary. First, does the existing rate or base structure adversely affect the industry, *or certain firms,* in the product market and, second, what effect does the existing rate or base structure have on the factors of production in the industry's input market.

Let us consider a number of different possible effects on the product and factor markets, assuming that we can estimate the amount of tax (direct + indirect) embodied in each dollar of final demand (as in Table 5, column 2). If all firms in the industry are selling in a local market, all firms pay the tax; hence it is likely to be shifted forward to state consumers entirely.[14] In this situation the tax is not likely to discourage either the attraction of new firms or the expansion of old. In terms of intra-industry effects, if there exists one vertically integrated firm in the industry, it avoids the (direct and indirect) tax at n-1 stages of the production process and, *cet. par.,* may produce at a lower cost than non-vertically integrated firms. To compensate, the latter may soon cut the price, shifting the tax on n-1 production processes backward to the factor inputs; initially to the least mobile of inputs — land and labor.

On the other hand if all firms in a particular industry are selling in a national market, the question of business taxes on that industry in other states becomes a relevant consideration. For example, if West

[13] For some recently published views on the subject of pyramiding, see Ann F. Friedlaender, "Indirect Taxes and Relative Prices," *The Quarterly Journal of Economics,* LXXXI (February 1967), 125-139; John F. Due, "Indirect Taxes and Relative Prices: Comment," *Quarterly Journal of Economics,* LXXXII (May 1968), 340-342; and Paul Taubman, "The Effects of Ad Valorem and Specific Taxes on Prices," *Quarterly Journal of Economics,* LXXIX (November 1965), 649-656.

[14] Note that our use of the "pyramiding" and "indirect" terms relates only to the taxes embodied in the cost of productive factors. We have not considered the possibiliy that via a markup process, short-time excess profits would occur because of the pyramiding.

Virginia firms in the i^{th} industry pay higher taxes (direct + indirect) than firms in that industry located in other states, the expected amount of the tax shifted forward is less than if the reverse is true. To the extent it is shifted backwards to capital it may be a negative consideration for firms considering a West Virginia location. If it is shifted backwards to labor it may induce both a short and long-run dampening effect on the rate of economic growth. In the short run, wages and salaries are lower than would have been the case in the absence of the unfavorable tax, thereby resulting in lower income and consumption levels. In the long run, the geographic mobility of factors could have a similar effect.

Then, in general, the business tax would appear to be the least important locational consideration for new firms anticipating a largely local market, and the most important for firms selling in a national market. Accordingly, to the extent taxes are a relevant locational consideration, the kind of analysis sketched out above may be particularly important for a state such as West Virginia. McLure's estimates, for example, place West Virginia third from the bottom in the percent of state value-added in manufacturing for local markets.[15]

It is important to note here that a differential impact analysis does not give the information necessary to evaluate the relative advantages or disadvantages provided by interstate variances in rate or base structure, i.e., interstate comparisons, by industry, of

$$\frac{\text{State Tax Payments}}{\text{Net Income}} \quad \text{or} \quad \frac{\text{State Tax Payments}}{\text{Gross Product Originating}}$$

do not reflect the amount of tax embodied in the inputs to any given industry. The difference is analogous to comparing, for our simple example in Tables 1 through 4, \$0.0080, which is the amount of direct state taxes paid by auto assembly plants per \$1 of output, with \$0.0215, which is the *total* amount of tax embodied in \$1 of final demand in the auto retailing sector. Clearly the latter is more relevant for the location decision of the firm.

Input-Output and Revenue Planning

There is scarcely time in a short paper to examine all of the implications of the input-output technique for fiscal planning.[16] Above, we have dwelt almost exclusively on the question of how the indirect effects of state business taxes might play a more important role than

[15] He estimates West Virginia (and New Hampshire) at 9.1 per cent with only Rhode Island and South Carolina lower. Charles E. McLure, Jr., "The Interstate Exporting of State and Local Taxes: Estimate for 1962," *National Tax Journal,* (March 1967), 57-59, especially Table III.

[16] Though we have dealt with other of the issues in an unpublished paper, "Evaluating the State Business Tax Structure: Another View."

direct levies in the industrial development of the state. We may now turn our attention to the potential of this technique for anticipating future problem areas in the state tax structure, and hence for detecting needed rate or base adjustments.

The most obvious application is the forecast of the revenue effects of an increase or decrease in the activity of a particular sector of the state's economy. For example, from column (2) of Table 5, we know that for every $1 of final demand in the chemical industry sector, $0.009866 in state tax revenues are generated. Then, given a 1965 estimate for Final Demand of $1,083,430, the chemical industry generated $10,689 of state business taxes, or approximately 6.8 per cent of the state total. A greater fraction was generated [see column (3) of Table 6] by industry classes [a] #2, underground coal mining (7.2%), [b] #29, wholesale trade (16.9%), and [c] #41, other services (7.2%). Under the assumption that neither tax rates, nor input-output relationships change, similar estimates may be obtained for West Virginia for 1975. Under one set of assumptions about final demand in 1975, the chemical industry will generate an increased fraction (7.0%) of total tax payments while the proportions attributable to underground coal mining, wholesaling and other retailing will all fall. Conversely, in 1975, the Gas and Electric Power industries will each be contributing substantially more to the level of total business tax revenues than in 1965. Of the projected 54 per cent increment in state business taxes between 1965 and 1975, approximately one-fourth may be attributed directly and indirectly to the Electric Power industry, and 7.9 per cent to the Chemical Industry. Some notion of imbalance is evidenced in the finding that some two-thirds of the increment is accounted for by nine of the 48 industrial sectors considered. The great increments projected for the Electric Power sector are occasioned by an estimated $750 million investment in mine mouth generating stations — an investment which would quadruple the 1965 output of the West Virginia Electric Power sector. The analysis here is based on the assumption that this output will be taxable by the state government of West Virginia.

In columns (1) and (2) of Table 6 are shown industry estimates of direct taxes, and while these data will give the same estimate of the total business tax increment, they do not enable an analysis of the reasons for changes in revenues. For example, assume that a certain export industry will decline because of some national market consideration. The decline in this industry will be transmitted throughout the state's economy as its suppliers also suffer declining output. And if the tax base of the community is gross sales, as in this case, the potential for revenue decline is real. The direct-indirect analysis enables the researcher to estimate the revenue effects of these secondary impulses. Column (5) of Table 5 shows estimates *for 1975*

of taxes generated per $1 of delivery to final demand, and a comparison with column (2) [the corresponding data for 1965] shows the impact of technological changes on state business tax revenues. For example, these data show that while in 1965, each $1 of final demand in the non-building contracting sector generated $0.033558 in business tax revenues, in 1975 the projected figure is lower at $0.029256. Conversely, projections of the Electric Power industry are for an increase from $0.050310 to $0.058224 per dollar of final demand. For West Virginia's all-important chemical industry (row 17), it may be seen that the tax-generating coefficient increased.

MEETING THE REVENUE NEEDS OF LOCAL GOVERNMENTS

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I was asked to speak to the question of "Alternatives for Meeting the Revenue Needs of State and Local Governments." I have chosen, however, to confine my paper to the question of meeting the revenue needs of local governments only. I adopted this constraint because merging the revenue problem of local and state governments seems to me a misleading procedure. The expenditures responsibilities of state and local governments are not the same. Nor do state and local governments share the same revenue streams. Thus it is possible that state and local governments together would be able on their own to meet their combined future responsibilities but at the same time that local governments will be increasingly hard pressed to meet their separate expenditures responsibilities without federal funding. For state governments have not been noted for their generosity to cities and other local governments in the past.

To pursue this tangent briefly, it has become fashionable in recent years to assert that state and local governments (together) are not now in financial straits and for the near-term future, to 1976, face no revenue crisis. Usually this proposition is deduced from projections of past state and local government expenditures and revenues supplemented by some assumption about national economic growth.[1]. It is a lovely dream. However, we must be chary of getting caught-up in such projections. To begin with actual past expenditures and revenues may be an inadequate guide to future expenditures responsibilities,

[1] Examples of recent studies in this tradition are Selma J. Mushkin and Gabrielle C. Lupo "Project '70: Projecting the State-Local Sector," *Review of Economics and Statistics,* May, 1967, and *Fiscal Outlook for State and Local Government to 1975,* Tax Foundation Inc., 1966.