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IDENTIFICATION OF CHARACTERISTICS DENOTING QUALITY

In this chapter the historical record of instrument and borrower characteristics as indicators of state and local debt difficulties is examined. The borrower and instrument characteristics that were indicators of past payment problems are examined in two ways: first, identifying the aggregate characteristics that seem to have led to the heavy incidence of defaults and losses in each of the four major default periods; second, classifying the historically significant characteristics according to the primary groupings of variables for the conceptual model developed in Chater 2. Cross sections of available instrument and borrower characteristics for defaulting and nondefaulting issues are analyzed.

Characteristics Corresponding with Past Payment Difficulties

The first major default and loss period was in 1839-43. Some of the primary characteristics leading to the heavy incidence of defaults and losses are apparent, despite the scarcity of data. Table 6 shows that net state and local debt increased from $13 million in 1825 to $51 million in 1835, $196 million in 1840 and $260 million in 1843. Table 6 also shows that between 85 and 90 per cent of this indebtedness was incurred by states, most of this debt for purposes of indicating questionable financial prudence. Census data reveals that 95 per cent of the state indebtedness outstanding in 1838 was for private or state enterprises such as banking, canals, railroads and turnpikes.[1]

It is doubtful that any measure of wealth or income indicating potential cash inflows increased as rapidly as the state and local debt service charges that resulted from the increased indebtedness. A large proportion of state

[1]The *Tenth Census*, VII, p. 526 showed gross state indebtedness of $54 million for banking, $60 million for canals, $43 million for railroads, $7 million for turnpikes and $8 million for other purposes.

TABLE 6

Estimated Net State and Local Debt Outstanding in Selected Periods, 1825-1902
(in millions of dollars)

	Net State and Local Debt[a]			
Year	Total	Per Capita	Net State Debt	Net Local Debt
1825	13	1	13[b]	n[c]
1835	51	3	46[b]	5[c]
1840	196	12	176[d]	20[e]
1843	260	14	232[f]	28[b]
1850	230	10	190[e]	40[c]
1860	457	15	257[g]	200[e]
1870	869	23	353[g]	516[g]
1880	1,096	22	275[h]	821[h]
1890	1,137	18	211[h]	926[h]
1902	1,869	24	239[h]	1,630[h]

[a]Net state and local debt computed by adding net state debt and net local debt. Per capita debt computed using Bureau of the Census population figures.

[b]R.E. Badger and H.G. Guthmann, *Investment Principles and Practices*, New York, 1951, pp. 555-558.

[c]Estimated from indebtedness of large cities described in Hillhouse, *Municipal Bonds*, pp. 31-34; William L. Raymond, *State and Municipal Bonds*, Boston, 1932, pp. 295-298; and H.C. Adams, *Public Debts*, New York, 1890, pp. 341-344.

[d]Estimated from Census figures of $164 million in 1839 and $190 million in 1841 in U.S. Bureau of the Census, *Tenth Census of the United States: 1880. Valuation, Taxation, and Public Indebtedness*, VII, p. 281.

[e]Paul Strudenski, *Public Borrowing*, National Municipal League, New York, 1930, pp. 5-13.

[f]*U.S. Magazine and Democratic Review*, XII, (February 1843), pp. 211-212. These figures are probably gross debt; however, debt offsets were probably small at that time.

[g]U.S. Bureau of the Census, *Tenth Census*, VII, pp. 281-285.

[h]U.S. Department of Commerce, *Wealth, Debt, and Taxation, 1913*, I, pp. 38, 234-235.

n = negligible or amount probably less than $.5 million.

revenues in the 1830's probably came from debt-financed private or state enterprises. The severe depression following the Panic of 1837 led to a large decline in the wealth and income of most state and local units. Many of the revenue-producing enterprises either failed completely or ran at a loss. Additional debt financing temporarily kept some states from defaulting but also increased the amount of service charges, which had to be paid from declining cash inflows. As the incidence of defaults increased, this temporary source of cash was cut off. States committed nine of the twelve defaults and accounted for the entire amount of permanent losses in this period.[2]

Unwillingness to pay was also an important factor in this default period. Once debt-financed private or state banks, canals, railroads and turnpikes proved unsuccessful, state officials and residents seem to have felt that the bondholders rather than the borrowers should bear the brunt of the loss.

Many of the instrument and borrower characteristics that led to the first major default and loss period recurred as casual factors in the second major default and loss period, 1873-79. After declining from the early 1840's to the early 1850's, state and local debt began to rise rapidly. Table 6 shows that aggregate net state and local debt nearly doubled from 1850 to 1860 and from 1860 to 1870. The indebtedness of units in the South (excluding the debts of Confederate states which were declared invalid at the end of the Civil War) grew more rapidly than total state and local indebtedness. The majority of Southern borrowing was spent on waterworks, railroad facilities, Civil War expenditures and reconstruction.[3]

The rapidly rising cost of servicing the increased indebtedness did not appear to be matched by a commensurate increase in wealth or income measures indicating potential cash inflows. The estimated true value of real and personal property declined approximately 18 per cent in the Southern states from 1860 to 1870.[4] A serious downturn starting in 1873 reduced wealth and income in all sections of the country. As the depression dragged on, a rising number of poorly conceived railroad ventures failed or became financially dependent. The combination of heavy fixed costs, sometimes contracted for questionable purposes, and declining cash inflows proved too great a burden in many cases.

Financial prudence and willingness to pay was questionable in many of the resulting defaults and losses. Public funds were frequently used for private interests financing railroads. The optimistic predictions regarding the earning

[2]More detail and supporting evidence for the defaults in this period appears in Ratchford, *American State Debts*, pp. 1-161.

[3]*Tenth Census*, VII, pp. 283-293.

[4]*Ibid.*, VII, pp. 7-8.

TABLE 7

Recorded Defaults from 1839 Through 1929, by Primary Purpose of Indebtedness

	1839 -44	1845 -54	1855 -59	1860 -64	1865 -69	1870 -74	1875 -79	1880 -84	1885 -89	1890 -94	1895 -99	1900 -04	1905 -09	1910 -14	1915 -19	1920 -24	1925 -29	Totals Totals
By Purpose of Debt:																		
General[a]	1	3			1	9	13	7	3	6	36	23	7	3	1	12	17	142
Education						1	5	4	4	4	11	13	1	3	1	2	18	67
Governmental bldgs.				2		4	2	2	3	4	16	8	1		1		2	45
Water and sewer	1		1					1	2	3	7	10	4	3	3	2	3	40
Other utilities							1				3	2				1	2	9
Roads and bridges					4	1	5			4	14	6	3	2	4	11	11	65
Flood control						2	1	1		2	10	10	3	5	2	7	22	65
Banking and canals	8																	8
Railroads	2	1	13	25	6	41	70	41	17	33	49	28	5	2	1			334
Other pvt. enterprises						3	5	5	1	2	10	3	1					30
Special assessments							1	1				3	1	2	1	1	12	22
Local improvements																4	55	59
Funding and refunding						1	3	4	1	10	34	9	8	2		2	2	76
Total defaults	12	4	14	27	11	62	106	66	31	68	190	115	34	22	14	42	144	962

Note: Excludes bonds of governmental unit before they became part of the United States and repudiations of Civil War debts of Confederate states acquired when they were not part of the United States.

Sources: Default information in *The Daily Bond Buyer, The Commercial and Financial Chronicle,* and *The Investment Banker's Association Bulletin;* Albert M. Hillhouse, *Defaulted Municipal Bonds,* Municipal Financial Officers Association, Chicago, 1935; B.W. Ratchford, *American State Debts,* Durham, N.C., 1941; and William L. Raymond, *State and Municipal Bonds,* Boston, 1932.

[a]Many of these issues were connected with Civil War and post-Civil War expenditures in the 1870's and 1880's. After that time the majority of these issues were used to finance the development of the issuing area.

power of the sponsored projects often failed to materialize, leaving the governmental unit and its taxpayers saddled with a heavy debt. Table 7 shows that approximately two-thirds of the defaults in this period were on debts issued to finance railroad facilities. The largest dollar amount in default and the majority of the permanent losses were by Southern state and local units. After the Civil War, many of the Southern governmental units were overrun by dishonest politicians who engaged in speculative activities and sometimes carried away the proceeds of debts incurred in the name of the governing body. In addition, some short-sighted Southern governmental units took advantage of the politically popular opportunity to repudiate debts which had been used in their interest.[5]

After declining slightly in the late 1870's aggregate state and local debt grew rapidly through the mid-1890's. Table 6 shows that all of this growth was due to increased local indebtedness. The outstanding indebtedness of states declined in this period. By 1890, net state debt was slightly less than 20 per cent of net state and local debt, lower than net state debt had been in the 1840's. Real estate booms in the central and western sectors of the United States were a major cause in the growth of local indebtedness. General improvements, railroads, roads, bridges, water facilities, etc., in these fast growing areas were financed by local issues.[6]

Defaults and losses on state and local debts became a serious economic problem again after the panic and depression of 1893 lowered wealth and income, sources of potential cash inflows. None of the defaults in this period were by state governments. Aggregate state debt service charges had fallen since the mid-1870's.[7] Many of the local defaults were caused by the collapse of speculative real estate booms, which had been aided by local borrowing. When the planned increases in local cash inflows failed to materialize, many units were unable to pay their high debt service costs. Table 4 shows that the number of defaults was highest in the central and western regions of the United States. The primary purposes for which the defaulting local debts had been issued were railroads, general improvements and funding and refunding, as Table 7 shows.

Once again, unwillingness to pay and the lack of financial prudence contributed to local defaults and losses. Private interests, such as real estate speculators and railroads, had encouraged borrowing beyond the unit's existing capacity to pay. Many officials and taxpayers in the local units were willing to borrow to encourage growth, but unwilling to pay the subsequently increased taxes when this growth failed to materialize.

[5]The causes of and amounts involved in many of these Southern default situations are described in Ratchford, *American State Debts*, pp. 162-229 and Hillhouse, *Municipal Bonds*, pp. 39-61.

[6]Hillhouse, *Municipal Bonds*, pp. 39-44.

[7]Ratchford, *American State Debts*, pp. 253-258.

There is more information about the aggregate characteristics leading to the fourth, and most recent, major default and loss period. State and local debt grew rapidly in the early 1900's. State and local debt outstanding grew from $4.4 billion in 1913 to $19 billion in 1931. The growth in this form of debt became particularly rapid after the end of World War I through 1931 when debt limits were hurdled, new overlapping governmental units were created, old state and local services were expanded and many new ones were added. The yearly amount of long-term state and local debt issued had never exceeded $500 million before 1919. In every year from 1921 through 1931 the yearly amount exceeded $1.1 billion and the annual average for that period was nearly $1.4 billion.[8]

State and local cash inflows did not increase nearly as rapidly as did the debt service charges. Wealth and income, grew at a slower pace than state and local debt. From 1919 through 1928 the coverage of net state and local debt by net wealth fell from 71.1 times to 35.0 times and the ratio of net state and local debt to national income increased from .076 to .156.[9]

The depression starting in 1929 severely lowered both wealth and income. In 1932 the coverage of net state and local debt by net wealth had fallen to 19.5 times and the ratio of net state and local debt to national income increased to .388. Figures for the coverage of interest and estimated debt service charges by state and local revenues are available for 1922 and 1932. Interest payments were 8.3 per cent and estimated debt service charges were 12.7 per cent of state and local revenues in 1922. In 1932 interest payments had risen to 10.7 per cent and estimated debt service charges to 19.7 per cent of state and local revenues.[10]

It is possible to investigate other aspects of the cash inflows available to meet the rapidly rising debt service charges during this period. Total state and local revenues remained at approximately the same level from 1927 through 1934, but the sources of these revenues shifted considerably. Cash revenues from property taxes declined approximately $700 million, from 60 per cent to 48 per cent of total revenues during the period, primarily because assessed

[8]See Appendix Tables 1 and 2 for yearly figures.

[9]See Appendix Table 4 for yearly figures.

[10]U. S. Bureau of the Census, *Historical Statistics on State and Local Government Finances, 1902-1953,* Special Studies Number 38, 1955, pp. 17-18. Principal due was estimated by taking the difference between long-term debt issued and net change in long-term debt for the year. This figure is conservative because some debt was issued to replace outstanding debt.

[11]Chart 16 (p. 74) shows that the proportion of property taxes that were uncollected in cities with over 50 thousand residents rose from 4.7 per cent in 1928 to 26.3 per cent in 1933.

property values declined and the proportion of property taxes that were not collected rose.[11] On the other hand, state and local revenues from the federal government increased approximately $900 million, from 1 per cent of the total state and local revenues in 1927 to 12 per cent in 1934. Despite employee cutbacks, payless paydays and large reductions in capital outlays, state and local cash outflows excluding debt service charges proved very difficult to cut. Current operating expenditures were higher in the early 1930's than they were in 1927, and assistance and subsidies increased from $93 million in 1927 to $815 million in 1934.[12]

At first the effects of high debt service costs, unexpanding revenues and rising expenditure requirements were overcome by skipping sinking fund payments, by reducing liquid assets and by additional borrowing. Short-term debt secured by anticipated or uncollected property taxes was a popular source of cash, but added to the burgeoning debt service costs. When the financial pressures persisted[13] and the temporary sources of cash dried up because of bank failures, high interest costs and loss of public confidence in state and local debts, many governmental units were forced to default. The number of defaults in this period would have been much greater if many state and local units had not forced funding and refunding issues on bondholders and had not used the proceeds from federally aided relief debt issues to meet debt service payments.

Financial prudence and willingness to pay would be questioned in some of the default situations in the 1929-37 period. Some state and local units were forced to default because of the lack of financial planning and the generally poor quality of many governmental administrations. Special assessment or local improvement districts were created to permit the improvement of undeveloped and speculative areas. Some debts which were issued depended entirely on the future growth of wealth and income in the area. In some cases, the officers of real estate companies became officials of local units and promoted bond issues to develop their companies' properties. Finally, a few small communities appear to have decided that bondholders should bear part of their costs. Nevertheless, the incidence of excessive financial mismanagement or widespread unwillingness to pay in this default period was relatively less than the incidence in any of the previous major default periods. This contention is supported by the relatively rapid and complete recovery in most of the larger default situations and the small amount of permanent losses

[12]State and local revenues and expenditures for selected years from 1922 through 1968 appear in Tables 10 (p. 56) and 11 (p.63), respectively.

[13]For example, Census data indicates that in 1932 total state and local revenues were $7,887 million, state and local expenditures (excluding all debt service charges) $7,563 million, interest expenses $840 million and estimated long-term principal payments due probably was approximately $1,400 million.

relative to the amount of debt in default.

The analysis of the time distribution of defaults in the preceding chapter indicated that defaults occurred almost continuously. Several instrument and borrower characteristics recurred frequently as indicators of the default situations in times other than the major default and loss periods.[14] First, some defaulting governmental units contracted for debt service charges that were clearly above the minimum cash flows they could reasonably anticipate. Second, some defaulting units suffered severe declines in cash revenues due to natural catastrophes or economic declines in the area or industry on which the unit was dependent. It would have been difficult to have predicted some of these declines; however, many of the units which were forced to default had allowed themselves very little margin for such contingencies. Third, Table 8 (p.44) demonstrates that many of the bonds which defaulted in times other than the major default periods were issued to finance railroad facilities and other private ventures. If these enterprises failed, many state and local units were either unable or unwilling to pay the debt service charges contracted in financing the enterprises. Finally, poor financial planning and dishonest or inept officials led to some default situations.

Aggregate Historical Characteristics Conforming with the Conceptual Model

The instrument and borrower characteristics that were significant in the past seem to conform closely with the conceptual model formulated in Chapter 2. The defaults on state and local debts were caused by the issuing unit having inadequate cash flows available to meet debt service charges or by unwillingness to pay on the part of the issuing unit. In the past, defaults and losses on state and local debt became a serious problem only when economic declines lowered wealth and income to the point that it significantly affected cash inflows. Prior to each of the major default periods, however, certain instrument and borrower characteristics indicated that state and local units were vulnerable to economic declines. Most of these same characteristics were also indicators of defaults in periods other than depressions. The objective of the following paragraphs is to identify the aggregate characteristics that indicated vulnerability in the past.

The debt service charges which must be paid are the first variable in the conceptual model. A rapid increase in the amount of debt outstanding, a surrogate for debt service charges, occurred before each of the four major

[14]The characteristics for individual issues rather than aggregate characteristics had to be considered for the default situations in times other than the major default and loss periods.

default periods and prior to many individual default situations. Debt service charge figures are often available for individual units; however, there are no aggregate debt service charge figures available at the present time. The amount of debt outstanding should be adjusted for changes in interest costs and in the retirement schedule or sinking fund requirements when such figures are available.

The expected over-all cash inflows during the period of the indebtedness are the second variable. Current state and local revenues by themselves are an inadequate measure. Expected over-all cash inflows also depend on wealth and income levels, acceptable rates of taxation or payment for services, and potential short-term sources of cash. Wealth and income measures, which are indicative of potential cash inflows, seem to have risen less rapidly than estimated debt service charges before each of the four major default periods. These measures then declined absolutely in the economic decline immediately preceding the heavy incidence of defaults. The aggregate wealth and income measures observed included population, total net wealth, assessed property value, estimated full property value, national income and disposable personal income.

There is no quantitative information about the amount of taxes or payments for services that people are willing to pay. However, state and local units were generally unable to raise tax rates in periods when income and wealth were declining. Temporary sources of cash inflows appear to have been used to prevent defaults immediately prior to the major default periods. In each major default period, state and local indebtedness increased very rapidly in the two or three years between the start of an economic decline and the period when the incidence of defaults and losses became heavy. State and local units reduced their cash and security holding slightly over 15 per cent from 1929 to 1933. The majority of the remaining assets were state and local securities.[15] Figures for state and local cash and security holdings are not available for the other major default periods.

The relationships between debt service charges and the wealth measures indicating potential cash inflows give only a partial picture of prospective quality. The expected cash expenditures or outflows that have priority over debt service charges, the third variable in the conceptual model, must also be considered. Whether or not a governmental unit is able to meet its debt service charges is determined by the minimum difference between cash inflows and cash outflows that are paid before debt service charges. In the past this minimum difference has always occurred when cash revenues had declined. For this reason, the level of expenditures as cash revenues decline is

[15]Raymond W. Goldsmith, Robert E. Lipsey and Morris Mendelson, *Studies in the National Balance Sheet of the United States,* Vol. II, Princeton for NBER, 1963, Table III-6a, pp. 218-219.

emphasized. In the past, some expenditures requiring cash outlays have risen, some have stayed relatively constant, and some declined when cash inflows have declined.

Aggregate state and local expenditures were classified by character and function for several years prior to and during the 1929 default period. Despite austerity programs by many individual units, state and local units were unable to reduce aggregate current outlays in this period. The expenditures for current outlays were slightly higher in 1932 and 1934 than they had been in 1927. By 1934 state and local capital outlays had declined approximately 40 per cent from their 1927 level. The entire decline was absorbed by the increase in expenditures for assistance and subsidies. Classified according to function, expenditures for education, highways, sanitation and recreation fell significantly from 1927 to 1934. But expenditures for such functions as hospitals, health, police and fire protection and general control remained about the same; and those for public welfare and natural resources increased significantly from 1927 to 1934.[16]

The borrower's financial prudence and willingness to pay is the fourth variable in the conceptual model. The influence is strictly negative, as financial prudence and willingness to pay cannot create additional wealth or income for the borrower. Financial prudence and willingness to pay are often assumed for all state and local governmental units; however, inadequacies in these basic traits have recurred as causal factors in all four of the major default periods. Unwillingness to pay has led to the majority of the permanent losses in these periods. These characteristics also show up as a major cause of defaults in less extreme periods.

Poor financial planning and management, a lack of financial prudence, existed in many state and local units prior to the actual default as well as in many nondefaulting units. However, many of the units which defaulted would not have done so had they adequate financial planning and management. Very few instrument and borrower characteristics are available to measure the financial prudence of the borrower. Two characteristics were particularly good indicators of the lack of financial prudence in the past – the use of state and local debt for essentially private purposes and a continuing deficit in the current account of the governmental unit. Other pertinent characteristics, such as the ability of government officials and the use of budgeting techniques, are very difficult to assess.

Historically, the state and local units which had exercised financial prudence were also usually willing to pay their debt service charges if this was

[16]Information on state and local expenditures were taken from reports by the Governments Division of the Bureau of the Census. Tables 11 and 12 (pp. 63 and 64, respectively) show the proportionate amount of state and local expenditures by character and by purpose in selected years from 1922 through 1968.

possible. Once state and local officials had resorted to poor financial practices, however, the residents and officials of such units often were unwilling to pay their debt service charges. This unwillingness to pay was particularly noticeable in the case of debt-financed projects for essentially private purposes. As long as the bank, canal, railroad, real estate development or other project was successful there was no problem. If the project became unsuccessful, however, the state and local unit was usually either unable or unwilling to pay the debt service charges. Population characteristics, tax collection records, past debt payment performances, maturity schedules and voter approval for debt issues also have been found to indicate the willingness of state and local units to pay their debt service charges.

Analysis of Cross Sections of Available Instrument and Borrower Characteristics

In both major default periods and individual default situations in less extreme periods, debt service charges rose more rapidly than the local levels of income and wealth. The default usually did not occur until after the cash inflows of the unit fell. In individual default situations the local decline in cash inflows may have been caused by the failure of debt-financed private or local enterprises, the collapse of a local real estate boom or the decline of an industry or company on which the community was heavily dependent.

Analysis of cross-sectional data for the 1929 period substantiates the importance of the relationship between debt outstanding, a surrogate for debt service charges, and selected wealth measures indicating potential revenues. Table 8 shows population growth from 1922 to 1932 was more rapid for the eight states where defaulting governmental units numbered 200 or more and the default situation was a serious statewide problem. This growth in population apparently led to even greater demands for debt-financed services. For the eight states with very serious default problems, per capita net debt increased from $89.94 in 1922 to $170.99 in 1932, an increase of 90.1 per cent. For all forty-eight states per capita net debt increased 77.3 per cent, although for the eight states with no default situations in 1935 per capita net debt increased only 51.7 per cent. Net debt per $1,000 of assessed value increased much more rapidly from 1922 to 1932 for the eight states with the most serious debt problems than for the average of all states. By 1932 the net debt per $1,000 of assessed value for the eight states with serious default problems was more than twice the size of this figure for eight states with no defaults in 1935.

The default record of the 190 cities with populations of over 50,000 in 1930 illustrates the effect of the growth in debt relative to population in individual cities. None of the nineteen cities with indebtedness of less than

$50 per capita in 1935 had any serious difficulty in meeting debt requirements. All of the nineteen cities with debts of over $200 per capita in 1935 had financial problems. Eight of these nineteen cities were in default during the depression; five were forced to engage in extensive refinancing operations to avoid default; three others met their maturing obligations partially by the issuance of refunding bonds; and the remaining three cities felt the pinch of

TABLE 8

Changes in Per Capita Net Debt and in Net Debt Per Thousand Dollars of Assessed Valuation, 1922-32

States	Per Capita Net Debt			Net Debt Per $1,000 of Assessed Valuation		
	1932	1922	Per Cent Increase	1932	1922	Per Cent Increase
States with serious default problems						
Arkansas	$137.20	$ 51.03	168.8	$461.18	$157.80	192.2
Florida	357.74	95.96	252.0	985.73	233.17	322.7
Louisana	169.05	69.18	144.4	216.32	81.30	166.1
Michigan	157.66	94.09	67.6	94.68	61.01	55.2
New Jersey	278.61	116.40	139.4	168.81	93.16	81.2
North Carolina	164.84	69.03	138.8	188.21	72.48	159.7
Ohio	129.89	112.25	15.7	64.38	64.33	.1
Texas	125.93	73.71	70.8	176.44	105.36	67.5
Weighted Average	170.99	89.94	90.1	136.09	78.50	73.4
States with no defaults in 1935						
Connecticut	$ 98.59	$ 70.33	40.2	$ 51.00	$ 51.43	d
Delaware	121.20	98.32	23.3	99.56	98.86	.7
Maryland	158.28	81.43	94.4	94.57	71.76	31.8
Massachusetts	101.77	82.30	23.7	58.66	57.59	1.9
New Hampshire	67.81	36.16	87.5	46.70	26.09	79.0
Rhode Island	158.55	79.38	99.7	76.26	47.04	62.1
Vermont	75.50	34.03	121.9	61.64	39.03	57.9
West Virginia	86.33	46.58	85.3	80.72	33.69	139.6
Weighted Average	108.96	71.83	51.7	66.79	53.03	26.0
For all 48 states	141.17	79.90	77.3	107.63	69.71	54.4

Sources: Bureau of the Census, *Financial Statistics of State and Local Governments, 1932* and *Public Debt,* Washington, D.C., 1932 and 1924 respectively.

d = slight percentage decline

deferred commercial bills and payless paydays in order to meet their debt requirements on time.[17]

The ratio of over-all net debt to estimated full taxable property valuation appeared to be a significant indicator of defaults. Forty-nine of the 190 cities with population over 50,000 had a ratio of 9.9 per cent or over in 1935. Only two of these forty-nine cities were free of default, refunding of maturing bonds or funding of deficits during the 1927-37 depression period. Fourteen of these cities defaulted on their general obligation bonds and two had delays classed as technical defaults. Five more defaulted on limited obligation special assessment debt. Seven refunded maturing bonds and issued refunding bonds to take up deficits or finance relief expenditures, seven more refunded maturing bonds (including at least one forced refunding by exchange), and another twelve issued funding bonds for deficit or relief financing or both. Nine of the cities had over-all net debts of 15 per cent or more of full taxable property value. Seven of these nine cities defaulted on their bonds, the eighth refunded maturing bonds and funded deficits and the ninth funded relief expenses. The forty-nine cities with over-all net-debt-to-taxable-property ratio of 9.9 per cent or more accounted for two-thirds of the bond defaults in the 190 city group, and they accounted for all of the situations with protracted difficulties.[18]

The author used three multivariable statistical techniques – factor analysis, multiple discriminate analysis and multiple regression – to analyze the quantitative characteristics associated with the payment or nonpayment of debt service charges by twenty-four Michigan cities in the early 1930's.[19] The quantitative characteristics available for this sample were: dollar amount of notes outstanding, population, total assessed property values, dollar amount of taxes levied, tax levy for $1,000 of assessed value, dollar amount of debt outstanding, per capita debt, debt to assessed property values, per cent of current taxes delinquent, tax levy per capita and assessed property values per capita. The population figures were from 1930 census, the assessed values were for the 1932-33 fiscal year and the remaining measures were as of July 1933.

The factor analysis identified four potential groupings of the eleven quantitative characteristics: (1) size characteristics; (2) debt burden measures, debt

[17]Frederick L. Bird, "Cities and Their Debt Burden," *National Municipal Review*, XXV, No. 1 (January 1936), pp. 12-19.

[18]The figures are based on unpublished information obtained from Dun and Bradstreet.

[19]The author was unable to obtain adequate quantitative information for a larger or broader sample of state and local units in this period. The gathering of the information on the twenty-four Michigan cities and the ensuing statistical analysis were financed by a grant from the Relm Foundation of Ann Arbor, Michigan.

to assessed valuation and debt to population; (3) relative wealth and tax measures, and (4) measures of willingness to pay, such as the tax delinquency rate and the relative tax levy. Because of complications in interpreting the results of factor analysis, these results were primarily used to select the most meaningful combinations of variables for use in further multivariate analysis.

Several different high and low default classes were used with multiple discriminate analysis. The discriminate function between the seven cities with no defaults on their indebtedness in the 1929-37 period and the seventeen cities with one or more issues in default during the same period seemed most meaningful on conceptual grounds and provided the most meaningful results. The most impressive discriminate analysis results occurred when four characteristics – tax rate per $1,000 assessed valuation, tax delinquency rate, assessed property value per capita and either debt to assessed property values or per capita debt – were used. None of the characteristics was almost a linear combination of the other characteristics, three of the four characteristics were significant at the $p > .10$ level (using the t test) and the probability that the discriminate function was due to chance was a relatively low 4 per cent. The confusion matrix (assuming equal a priori probabilities and equal costs) indicated that there were three misclassifications between the defaulting and nondefaulting groups.

The highest proportion of total debt outstanding that was in default in the 1929-37 period was used as the dependent variable in the multiple regression analysis. Using only the variables that were significant at the $p > .075$ level, the linear regression equation explained approximately 64 per cent of the observed differences in the municipalities' default ratios. Using several combinations of only four variables (to restrict multicollinearity), the coefficients of the independent variables were consistent with the conceptual model and the resulting equations explained 40-50 per cent of the observed differences in the default ratios. The characteristics (independent variables) that were used in the preceding regression equations included the five variables which were particularly meaningful in the discriminate analysis and the tax levy per capita.

When multicollinearity is restricted, the variables in both the discriminate analysis and the multiple regression seem consistent with the conceptual model formulated in Chapter 2 of this study. Debt to assessed property values (or per capita debt) would seem to be a meaningful proxy for the relationship between debt service charges and the revenues available to meet these charges. Assessed property values per capita and the property tax levy per $1,000 of assessed property value should indicate the relative wealth of the unit and the extent to which the municipal government is tapping this wealth. These characteristics should improve the quality of the debt to assessed property value

or population ratio. The tax delinquency rate and the tax levy per capita would seem to enter into the conceptual model as tests of the financial prudence and willingness to pay of the municipal government and its constituents.

Summary

Both aggregate time series data and cross-sectional analysis of historical instrument and borrower characteristics support the conceptual model developed in Chapter 2. The amount of debt outstanding, a surrogate for debt service charges increased rapidly before each of the four major default periods and prior to many individual default situations. Wealth and income measures, which are indicative of potential cash inflows, appear to have risen less rapidly than estimated debt service charges prior to default periods and situations. These measures then declined absolutely in the economic decline immediately preceding each of the four major default periods. Cash outlays to be paid prior to debt service charges failed to decline as rapidly as cash inflows. Finally, the use of state and local debt for essentially private purposes and a continuing deficit in the current account preceded both major default periods and many individual default situations.