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BURDEN, BURDEN! WHY COMPUTER TAX
SIMULATIONS MISLEAD POLICYMAKERS

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Legislative staff and special interest lobbyists often employ computer simulations of tax systems, to highlight purported shifts in tax burden implied by new tax proposals. These computer programs typically contain both the existing tax laws and the key characteristics of tax filers needed to compute a taxpayer's bill under these laws. The programs are often capable of displaying various distributions of tax bills paid. Frequently computed distributions include the distribution of bills paid across property classes (e.g. residences, farms, commercial properties, etc.), the distribution of bills paid across incomes, and the geographic distribution of tax bills paid.

Insofar as these programs are used solely to display the current distribution of tax bills paid under current law, they will not mislead policymakers. However, these programs are seldom used solely for this purpose. These programs are also used to infer the true burden of current tax law, by implicitly (and incorrectly) assuming that the distribution of tax burdens is the same as the distribution of tax bills. And these programs are also used to simulate the changes in tax bills which would result from changes in existing tax laws, implicitly making additional incorrect assumptions in doing so.

This paper investigates both of these misleading uses in the context of a simple, hypothetical "burden table" derived by the usual techniques. We show that, in this case, the usual incorrect assumptions all work to overstate the increased burden on residents resulting from the Citizen's League's proposed reforms of Minnesota's property tax and intergovernmental aid

laws. When viewed in the light of reality, the proposed reforms will not significantly increase the burden on homeowners, and needn't increase the burden on any homeowners other than the extremely wealthy.

The table on the next page purports to show changes in the distribution of tax burden across three major property classes, which would follow from the adoption of the comprehensive reforms.

TABLE 1: A Typical Burden Table

<u>Proposed Reform</u>	<u>State Budget</u>	<u>Property Taxpayers</u>			
		<u>All Other</u>	<u>Res. & Apts</u>	<u>Farm</u>	<u>Exempt</u>
Uniform Assessment		-\$290	+\$207	+\$83	
No Credits	-\$727	+\$5	+\$601	+\$121	
No Circuit Breaker	-\$162		+\$162		
No Local Gov. Aid	-\$319	+\$81	+\$222	+\$16	
Equalized Income Maint. Levy	+\$50	-\$15	-\$27	-\$8	
New Aid for Cities	+\$160	-\$42	-\$118		
Adding Exempts Prop.	0	-\$20	-\$54	-\$16	+\$90
Farmland Relief	+\$149			+\$149	
SALT	+\$849		+\$849		
Net Difference	\$0	-\$281	+\$144	+\$47	+\$90
% of current tax bills		-27%	+13%	+19%	
Resulting average tax rate (% of market value)		2.3%	1.8%	0.9%	

Note that table 1 purports to show an apparent shift of \$191 million dollars in tax burden to residents (i.e. homeowners and apartment dwellers) and farm owners, from owners of all other taxable property, primarily businesses. This alleged shift is only about eight percent of total property tax bills paid in Minnesota. Even if correct, it still leaves business owners paying far higher average tax rates than do residents and farm owners. Still, policymakers might worry about the implications of this alleged shift of burden. But before they do worry, they should bear in mind that five incorrect assumptions were made in computing the size of the alleged shift. All five of them make

the shift appear to be worse than it would be in reality. They are:

INCORRECT ASSUMPTIONS OFTEN MADE IN COMPUTER BURDEN ESTIMATES

1. Except for residential landlords, tax burdens aren't shifted to others, i.e. the burden is borne by the person paying the tax bill.
2. Total government spending, and hence, total property taxes raised, are not changed by the enacted reforms.
3. Tax burdens aren't significantly changed by their deductibility from Federal and State taxable income.
4. It is reasonable to analyze tax burdens by classifying taxpayers into homogeneous classes for which data are readily available, e.g. all homeowners, all farm owners, all homeowners living in some county, etc.
5. Capitalization of property tax changes into market values of property does not occur.

We analyze the effects of each of these mistakes in turn.

First, tax burdens are often shifted away from the owners of taxed property. Indeed, the central tenet of modern tax analysis is that the burden is often shifted by economic adjustments people make in response to changes in tax bills (see any recent text on public finance, e.g. Atkinson and Stiglitz [1980]). This fundamental fact is not ignored in many simulations of Federal tax policy changes (see Scarf and Shoven [1984]), but is usually ignored in simulations constructed by state lobbyists and legislative staffs, at least in Minnesota. For example,

competitive local service businesses that don't operate with lots of "personal property" (e.g. retailers and restaurants) pay relatively high property tax bills in Minnesota. Their customers do not have easy access to similar firms paying lower taxes in other states. Because of this, it is probable that part of the burden of these relatively higher taxes has been shifted to consumers of these local services--a de facto excise tax. Because excise taxation is generally regressive, what was intended to be a progressive measure, i.e. the taxation of business owners' property, becomes partly a regressive measure. While the business owners pay the bill, the burden falls partly on their customers as well. Such excise tax burdens on customers are likely wherever business property tax rates are relatively high, and where customers cannot easily avoid doing so by obtaining similar goods from lesser taxed businesses (see Mieszkowski [1972]).

Because a share of the business property tax bill reductions listed in table 1 would go to the local service sector, which is one of the faster growing sectors in the Minnesota economy, the regressive excise burden on their resident/customers would also fall. Thus, the burden on residents will be partly lessened by the business property tax reduction. This would lessen the actual size of the alleged shift indicated in table 1.

Also listed as part of incorrect assumption number one is the commonly made guess that taxes on rental apartment property are wholly borne by apartment tenants. On the contrary, some believe that some of the burden, if not all of it, is borne by landlords and other owners of taxed capital (see Aaron [1979]).

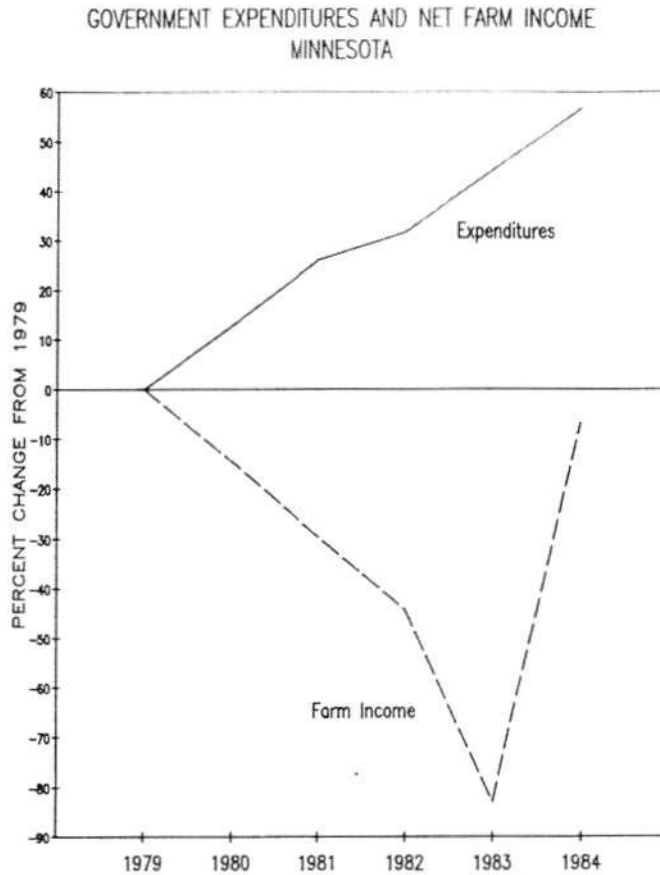
This may be especially true in periods of relatively high vacancy rates and/or high tenant mobility into home ownership. To the extent that landlords, rather than tenants, bear the burden of the property tax, the first assumption is in error. The burden on apartment tenants would be accordingly lower than indicated.

Second, it is extremely unlikely that the reform package will leave total state and local spending unchanged. The reason for this is the incentives for lower local spending growth inherent in the proposed State Aid to Local Taxpayers (SALT) program. A massive amount of scientific literature has indicated that payments from higher level governments (like states) to lower level governments (like cities) results in higher combined spending than if payments were paid directly to resident/taxpayers of those lower level governments. This finding has been dubbed the "flypaper effect", because aid from higher level governments sticks where it hits. The flypaper effect has been documented in numerous contexts (see, e.g. review articles by Gramlich [1977], Oates [1979], and the appendix to this paper). The flypaper effect has also been dramatically established by Bell and Bowman [1986] using recent Minnesota data, in work accepted by the blue-ribbon Latimer Commission.

It is important to note that this scientific research is conducted using well established, multivariate statistical methods which are the hallmark of serious research in the physical and social sciences. It is essential that multivariate methods be used, for they are the only way to control for other factors which may have affected the relationship between higher level government

payments and lower level government spending. Failure to do so invites fallacious conclusions.

For an example of such a fallacious conclusion, consider the following chart, contrasting rapidly growing state and local spending with rapidly falling net farm income in Minnesota.



No one would seriously suggest that rising state and local spending caused the farm problem. Clearly, there were other factors at work, including the strong value of the dollar, increasing food production abroad, and foreign tariffs against U.S. farm exports. Correlation of the two series, in this case negative (-.42), does not imply causation. Only multivariate statistical studies can separate the wheat from the chaff, so to speak, to discern how important each of these factors are in causing the decline of net farm income. A competently done study of this type would undoubtedly rule out Minnesota spending as a major factor in the decline of agriculture.

We have just seen how dangerous it is to infer causation from a simple correlation of two data series. An equally serious mistake is to do the converse, i.e. to infer a lack of causation from a lack of simple correlation. Yet there are those who would replace the net farm income series with a series of Minnesota state aid values, which have not always moved in lockstep with state and local spending, and infer that there was no relationship between them. This simpleminded analysis ignores the fact that myriad factors influence state and local spending in any given year, e.g. personal income growth, number of students enrolled in public schools, highway maintenance needs, etc. What is relevant is whether or not state and local spending is higher than it would have been in the absence of state aid, which can only be determined after a multivariate accounting for the effects of these other factors.

Bell and Bowman [1986] carried out precisely such an analysis for Minnesota, and concluded that" ... the size of the local public sector is larger with these property tax relief programs than without them.... But the stimulus is decidedly stronger for property tax credits than for local government aid" (Bell and Bowman, op. cit, p. 358). As listed in the appendix, these findings corroborate a large number of earlier statistical studies conducted for different areas and time periods. Aid sticks where it hits, and that is that. Because of that, effective property tax relief must be sent directly to the property tax payers, rather than to their local government officials.

In summary, both property tax credits and local government aid stimulate higher combined state and local spending. The reform proposal entirely replaces the most stimulative payments (the over \$700 million in credits) and part of the other stimulative payments (local government aid) with SALT payments to taxpayers. Due to the flypaper effect, the rate of local spending growth would fall, lowering the property tax burden of all taxpayers, including residents and farm owners. Again, this would lessen the allegedly higher burden on residents and farm owners incorrectly implied by table 1. Because of the size of the proposed SALT program, the reduction of burden could be quite substantial.

Third, Stinson and Vanderwall [1986] have called attention to the fact that deductability of property tax payments from State and Federal taxable income significantly changes estimates of the burden of the Minnesota property tax. The reduction in tax

bills of business property owners indicated in table one would raise the owners' income tax payments. Owners living in Minnesota will thus bear a higher burden of Minnesota taxes than is indicated by table one, which ignores the burden of the state income tax. Some residents (those that itemize deductions) and farm owners, of course, will bear a smaller burden than indicated by table one, for their state income tax liabilities will fall as a result of larger property tax reductions. Once again, we see that table one overstates the shift in burden resulting from the proposed changes.

Fourth, it is misleading to lump taxpayers into homogeneous classes. Within the class of homeowners, there are high income, moderate income, and low income people. The same is true of the class of farm owners, and of the class of business property owners. Unlike the current credits, the proposed SALT aid explicitly depends on both the taxpayer's income as well as her property value. As such, it makes more sense to examine the distribution of tax bills along the income dimension--data lacking in table one. It is doubtful that policymakers would be as concerned about a shift of burden toward residents and farm owners if all the burden fell on the wealthy residents and farm owners. Yet that is the intent of the SALT program. Again, table one misleads.

Fifth and finally, there is evidence that property tax bill changes get capitalized into the market values of the taxed property (see, e.g. Oates [1969] and Hamilton [1976]). If so, business property values should rise as a result of lower tax bills, while wealthier homeowners and farm owners' property values

should fall somewhat. As such, the actual tax bills paid by business property owners will be higher than implied by table one, while bills paid by wealthy residents and farm owners will be lower than implied by table one. But the latter is small consolation for residents and farm owners, whose actual burden then includes the fall in their property values. Thus, while capitalization lessens the differences in tax bills paid due to the reforms, it doesn't really change the burden.

Conclusion

Tables of tax burden shifts caused by changes in current state and local tax policies are often based on five erroneous assumptions. A typical burden table for the Citizen's League's proposed reforms of Minnesota's property tax and intergovernmental aid policies was constructed. Four of its five erroneous assumptions led it to overstate a shift of tax burdens away from business property owners and towards the vast majority of residents and farm owners. The fifth incorrect assumption led it to overstate the shift of tax bills paid, but not necessarily the burdens borne. Because of the documented strength of these five effects, table one and other tables which ignore these effects will vastly overstate the size of any burden shift away from business property owners. Because table one only showed a moderately sized burden shift of this type, it is likely that only a relatively small shift of burden away from business property owners will be caused by the reform package. Policymakers should be wary of computer simulated "burden tables," which often measure the wrong quantities (tax bills) with high accuracy, instead of the right quantities (actual burden shifts) with less accuracy.

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Appendix

Intergovernmental Revenue:
Its Effects on Recipient Government Spending

There have been many econometric analyses of the recipient spending response to intergovernmental aid. These studies can be grouped into two categories: ad-hoc regressions and theory-based models. Results of these studies pertaining to two issues are summarized and critiqued. The first issue is whether aid stimulates (i.e., increases) or substitutes for (i.e., decreases) recipient government taxes, i.e., whether or not aid provides even partial local tax relief. The other issue is whether the recipient government response to intergovernmental aid differs from its response to an equal amount of taxpayer income growth. The observation that the spending response to aid exceeds that to an equal amount of taxpayer income growth is termed the "flypaper"¹ or "grant illusion" effect.

Ad-Hoc Regressions

A general form for an ad-hoc regression is:

$$(1) \quad G_j \text{ or } T_j = A_{1j}X_{1j} + \dots + A_{mj}X_{mj} + B_{1j}R_{1j} + \dots + B_{nj}R_{nj} \\ + D_jM_j + E_j$$

¹The term "flypaper effect" was coined by Arthur Okun, and is meant to summarize the notion that "money sticks where it hits."

where X_{1j}, \dots, X_{mj} are m independent factors for recipient j other than intergovernmental aid, which are thought to influence recipient j 's government spending G , or alternatively, its own source tax level, T_j . These factors include such variables as population density, percentage of population in school, and the percentage of urban population. R_{1j}, \dots, R_{nj} are intergovernmental aid variables, such as total federal grants to education, total federal highway aid, state welfare aid, state revenue sharing, and federal revenue sharing. M_j is the income or per capita income of recipient government j . In their excellent review of the literature, Whitman and Cline⁽¹⁾ cite ten ad-hoc regression studies. All except one of these inferred that stimulation of recipient taxes resulted from federal aid, i.e., not only was there no local tax relief but higher local taxes resulted! Furthermore, most of them provide empirical evidence for the existence of the flypaper effect. Most ad-hoc regressions use cross-section data, i.e., observations across recipients in some year, for estimation of (1). Degrees of freedom are gained by assuming that the coefficients A_{ij} and B_{ij} are the same for all recipients, i.e., that all recipients' behavioral responses are the same.

A typical, recent ad-hoc regression study was conducted by Bell and Bowman [1986] for the Minnesota Tax Study Commission. In their study, the dependent variable T_j was the 1983 net (of state paid credits) property tax levy of Minnesota city j containing over 500 residents. They reported $m = 7$ independent variables for 1983:

X_{1j} = city j 's per capita property tax revenue from one equalized mill.

- X_{2j} = share of city j's property tax base composed of apartments, commercial/industrial and seasonal/recreational properties.
- X_{3j} = per capita state-paid property tax credits to residents of city j.
- X_{4j} = per capita local government aid paid to city j.
- X_{5j} = per capita federal aid paid to city j.
- X_{6j} = percent of city j's population aged 16 or younger.
- X_{7j} = property tax share (including special assessments) of city j's own-source revenue.

With the exception of X_6 , Bell and Bowman found all these variables to be statistically significant, positive determinants of city net property tax levies. Thus, their recent findings for Minnesota are consistent with the bulk of the pre-existing evidence from other aid programs. That is, state aid to cities results in higher local government spending out of their own revenue sources.

Theory-Based Econometric Estimates

More elaborate versions of the partial equilibrium utility maximization model of grants (see, e.g., Wilde⁽³⁾) comprise the theory-based models. Whitman and Cline survey four such studies, done prior to 1974. Since then, a few more have cropped up, illustrated by one formulated and estimated by Slack⁽⁴⁾.

Slack assumes that recipient governments in Ontario, Canada, solve the following problem:

$$(2) \quad \max U_i(C_i, G_i)$$

s.t.

$$C_i = M_i - T_i$$

$$G_i = (1+r)T_i + L_i + O_i$$

where C is private spending within the recipient jurisdiction, r is a matching grant rate, L are unconditional, lump sum grants (in which he classifies revenue sharing), and O are other miscellaneous revenues. Unlike other authors, Slack attempts to incorporate the fact that "unconditional" revenue sharing grants are allocated by formulae, which in Ontario include the previous year's tax effort T^{t-1} as a factor. He represents the allocation as:

$$(3) \quad L_i = a_0 + a_1 \frac{G_i - G_i^{t-1}}{G_i^{t-1}} + a_2 T_i^{t-1} + a_3 \text{Pop}_i$$

where the superscript $t-1$ is the year 1973 and all other variables are for the year 1974, and where Pop_i is recipient jurisdiction i 's population.

After substituting (3) into (2) Slack assumes, as do all other authors, that all recipients have the same utility function $U_i = U$; $i = 1, \dots, N$. He uses 3SLS to estimate simultaneous reduced form linear equations resulting from maximization of a Stone-Geary utility. He repeats the procedure for a translog indirect utility specification. In each case, there are 50 observations, consisting of 1973-74 data from 50 municipal governments in Ontario.

Slack's results showed that "unconditional" lump sum grants were very substitutive, with virtually all of the inter-governmental aid being used for local tax reduction. This stands in sharp contrast to most other studies. Whitman and Cline report that virtually all studies surveyed indicated stimulation. Some of these studies mixed lump sum and matching grants into one

variable, while others separated them. Still others (O'Brien⁽⁵⁾, Pogue and Sgontz⁽⁶⁾) resorted to procedures to remove the simultaneous equations' upward bias resulting from recipient taxes occurring as both dependent and independent variables. The latter occurs when matching grants and/or tax effort revenue sharing are treated as exogenous independent variables. Yet, virtually all of these models find that even truly lump sum grants are stimulative of higher recipient taxes. A notable exception to this outcome, though, occurs in the study of Gramlich and Galper⁽⁷⁾. Like Slack, they treat revenue sharing as an exogenous, lump sum grant in their complex, quadratic utility-based time series model. They report that revenue sharing will result in substantial substitution, with between 56 and 75 cents of every revenue sharing dollar being used for tax reduction.

Slack reports mixed findings about the impact of matching grants, however. The Stone-Geary utility specification resulted in a large stimulative effect, with one dollar of matching aid resulting in an additional 1.28 dollars of recipient taxes. The translog specification, though, indicated a high degree of substitution, with a dollar of matching aid reducing recipient taxes by 57 cents. Again, most other studies indicate that matching grants are stimulative, although Gramlich and Galper are the exception again. They show that matching grants are substitutive, with a dollar of matching aid resulting in a local tax reduction of 20 cents. In addition, they agree with virtually all other researchers that matching grants are more stimulative than lump sum grants.

Finally, most of the theory-based estimates also support the existence of the flypaper effect. Henderson⁽⁸⁾, for example, shows that virtually all of a dollar increase in personal income is privately spent, whereas a dollar increase in intergovernmental revenue actually reduces local private spending, i.e., stimulates recipient taxes. Gramlich and Galper find that a dollar increase in revenue sharing, with they classify as a lump sum grant, is five times more stimulative than a dollar increase in income. Slack, unlike other authors, restricted his model so that income changes always have the same impact as unconditional grants. Ontario's revenue sharing program uses the previous year's recipient taxes as a factor. Slack treats the previous year's tax levy as exogenous in his current year regression, thus "justifying" the restriction. This is theoretically inappropriate, as it is tantamount to assuming that the recipient never perceives any relationship between its tax levy and its grant size. In contrast, Zampelli⁽⁹⁾ concluded that federal revenue sharing and state general revenue support to 18 U.S. cities between 1974 and 1978 did not cause a flypaper effect.

Analysis

A clear majority of empirical studies imply that intergovernmental aid stimulates higher total combined spending than would occur if equal funds were distributed as lump sums to recipient government taxpayers. Studies are virtually unanimous in demonstrating that grants with matching features stimulate higher recipient government spending than do lump sum grants. Because, Minnesota property tax credits have matching features, it is not

surprising that Bell and Bowman [1986] found them to be more stimulative than local government aid. Because even the latter was found to stimulate higher local property taxes on the local tax base, a shift to direct, lump sum payments to local taxpayers should lower combined state and local spending growth.

References for Appendix

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