THE ECONOMIC EFFECTS OF LAND VALUE TAXATION:

COMMENTS AND SUGGESTIONS

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I. Introduction

The "Land Value Tax (LVT)," which suggests that governments should raise their revenues solely from taxes on land, was first introduced more than a century ago by Henry George, a Philadelphia-born economist and land reformer. Although this theoretically venerable and empirically controversial fiscal policy proposal has not had significant impacts on state and local government finance in this country, a variant of LVT—the differential tax—by taxing land much more heavily than buildings, has recently received a number of commendable, as well as non-negative, appraisals. Interestingly enough, most of them came from within the state of Pennsylvania.[1]

The advocates of the LVT argue that taxing only the value of the land would stimulate urban development and renewal, eliminate absenteeism or landlords for speculative purposes, and ensure an efficient utilization of such scarce urban resources as land. On the other hand, the opponents assert that the effects of LVT are financially insignificant and neutral at the very best, and distorted or biased most likely. With theoretical arguments both for and against the LVT and its variant, the effects of the differential tax on urban development, be they stimulative, neutral, or adverse, boil down to an empirical question.

In view of that, Professors Mathis and Zech have recently published in this journal a paper entitled "The Economic Effects of Land Value Taxation: An Empirical Test." In the paper, they concluded that:

> Testing the differential tax for 27 Pennsylvania cities using multiple regression analysis, the authors found no evidence that the differential tax stimulates urban development. It is, therefore, recommended that

those third-class cities in Pennsylvania that are eligible to implement the differential tax do not do so."[2]

The primary objective of this paper is to review and comment on the empirical test that Mathis and Zech conducted and consequently the conclusion and recommendation they deduced. Since the authors (Mathis and Zech) claimed that other authors arrived at their conclusions without the benefit of sound empirical testing, our comments will be centered first on the empirical test, including the appropriateness of model specification and model structure, input data deficiencies, and then on results produced in their econometric analysis for policy decisions and recommendations.

II. The Model: Structure, Specification, and Estimation Problems

The multiple regression analysis used by Mathis and Zech is a static, single equation model with the dependent variable (Q_i) denoting either the mean or the median per capital value of construction in the period 1976-78 for the ith observation (city, town, or borough, in Pennsylvania). There are four common regressors in the model, and jointly they were supposed to represent the supply, demand, and institutional factors affecting the interregional variation in the per capita value of construction: INC_i is the median level of income in "i" in 1970; VAC_i is the vacancy rate for rental units in "i" in 1970; WAG_i is the average wage of construction workers in "i" in 1977; and ASS_i is the ratio of government assessed to market value of real estate in "i" in 1977. The strategic variable employed to test the effects of the differential tax was either the ratio of the city tax rate on land to that on buildings or the combined ratio of the city and county tax rates on land to those on buildings, 1977 (TRC_i and CTR_i), respectively.

According to Mathis and Zech, TRC_i and CTR_i were the surrogates for LVT, and per capita construction value (Q_i) was that for urban development or investment. The hypothetical relationship of this simple regression model indicates that total variation in (Q_i) may be partially explained by the variations in (TRC_i) or (CTR_i), ceteris paribus. The direction and magnitude of the causal-effect relationship was explicitly assumed to be revealed by the sign and value of the coefficient estimated for this independent variable being investigated. The coefficients estimated for the independent variables are generally treated as the elasticities if a double-log model is employed and estimated. Mathis and Zech presented in this paper only the results estimated from two of a host of models tested with different structural formulation and specification (see footnote 12 on page 5).

The model would have been better received if it were formulated as a simultaneous-equations system, consisting of one equation each for the demand, supply, and institutional factors which would in turn affect the new and renovative construction investment activities independently. The per capita construction value variable (Q) would then be treated as an ex-post event set whose individual outcome value is jointly determined by the forces representing the supply, demand, and institutional factors; and the effects of LVT on Q would finally be estimated through a reduced form approach. Furthermore, the effects on the new construction should also be analyzed separately from those on the renovative activities. The two- or three-stage least squares technique should have been used in order to produce better and consistent estimates for the coefficients. The coefficients estimated by Mathis and Zech in their single equation model with the ordinary least-squares (OLS) technique cannot and should not be used outrightly to reflect the effect of TRC_i (or CTR_i) on Q_i, let alone the effect of LVT on urban development.

In addition to the problem of model specification and the OLS technique employed, Mathis and Zech's empirical test is highly questionable in that two of the control variables used, namely (VAC_i) and (INC_i), were lagged by seven years. The authors gave no explanation for using these lagged variables in their static, cross-city study. Even if they proved there had been a seven-year business cycle for the construction sector in Pennsylvania, which might put them on safer ground by assuming these two variables as exogenous, the model would still be questioned with other econometric problems such as the multicollinearity among the regressors and the heteroskedasticity inherited in the error term. The existence of these problems would violate the assumptions critical to the formulation and utilization of any single multivariate regression model, and the OLS technique could not generate the best linear unbiased estimates (BLUE).[3]

The wrong signs and statistically insignificant coefficients estimated for TRC_i and CTR_i in the Mathis and Zech model are likely attributable to such econometric problems as misspecification, multicollinearity, and heteroskedasticity, etc.

III. Data Deficiencies and Hypothesis Testing Problems

The overall model development and methodological limitations of Mathis and Zech's paper have been discussed in the preceding section. This section will examine the data deficiencies and comment on the pitfalls of the estimated effects of the strategic variables, i.e., TRC_i and CTR_i, respectively.

Mathis and Zech used 1970 data on income and housing vacancies, but 1977 or 1976-1978 data on other variables in their study. Although they admitted that "the large difference in data years is an obvious problem," they

defended their results by asserting that "these were the best available data" (footnote 15, page 5). In the paper, there was no evidence to substantiate this assertion or to demonstrate their scientific research efforts in data collection and data reliability assessment.

Mathis and Zech used data for a single year from 27 cities in Pennsylvania and made statistical inferences and drew conclusions from this cross-city empirical study. However, the most appropriate data set for testing the hypothesis should be those developed on a time-series basis for many past years and corrected for the serial correlation problem retained in the data set. In order to have enough sample observations, the authors could have chosen a pooled approach with both time-series and cross-city data sets included in the model, if they must conduct such an empirical test at all!

The logical time-series data set should consist of information ranging from several years before to several years after the tax reform policy was in effect. Construction activities in any city tend to vary from time to time, and the effect of the differential tax policy on urban development may be theoretically hypothesized and statistically tested with a dummy variable that can clearly divide the time-series data set into two segments, before and after policy implementation. Thus, before one can speculate about the relative trends between one city and another, a great deal of information about each city and about each city's data series must be gathered. Without those data and information essential to policy effect estimation, any regression study, including this one being discussed, would not be considered scientifically sound or practically acceptable by the users.

Among the 27 observations (cities) employed in Mathis and Zech's study, only three had actually introduced differential taxation: Pittsburgh, Scranton, and Harrisburg. Since Harrisburg's tax reform policy went into

effect only one year before the study period, Martin and Zech's data set actually consists of two cities with the tax reform and 24 cities without. The corresponding values for the two strategic variables being tested, (TRC_i) and (CTR_i), are hence set to equal "unity" for all 24 cities and a ratio greater than "one" for Pittsburgh and Scranton (page 3).

How could any researcher use and interpret the results estimated for these two ratio variables in such a cross-section study? There were virtually little or no variations in either of these two variables. They would indeed be represented by a vector of "unity" if the data for Pittsburgh and Scranton were excluded from the set. In addition, Pittsburgh and Scranton are two very different second-class cities, and each differs from the other 24 third-class cities in very significant ways, including variations in spatial and demographic characteristics and in urban and industrial structures. Therefore, the comparison made by Mathis and Zech, even if it were a legitimate one, would then be a tale between 2 cities of one class against 24 of another. As a result, the causal-effect relationship between TRC (or CTR) and Q was neither scientifically hypothesized nor statistically tested because of input data deficiency and the measurement errors underlying the ratio variables of TRC, CTR, and others.

IV. Concluding Remarks and Suggestions

It is quite clear that the empirical results produced by Mathis and Zech are neither relevant nor useful and appropriate as far as assessing the potential impacts of differential taxation on urban development in Pennsylvania is concerned. The authors' conclusion that they "found no evidence that the differential tax stimulates urban development" (page 4) can be rejected, individually or collectively, on the grounds of model misspecifica-

tion, data deficiency, and the inefficient estimation techniques used. The policy recommendation made by Mathis and Zech, i.e., "those third-class cities in Pennsylvania that are eligible to implement the differential tax do not do so," (page 5) was neither substantiated nor warranted, statistically or empirically.

Due to the paucity of data and insufficient sample observations, any empirical test on the empirical issue being studied should be executed with care and subsequently with skepticism regarding the statistical inferences drawn. To better test the direction and magnitude of the economic impacts of differential taxation, it is better to utilize a well constructed econometric model with sufficient time series data inputs and appropriate estimation techniques.

For the empirical question at hand (and if there must be such a test at all), we would suggest that a set of historical data pertaining to the dependent and independent variables under consideration be collected and tested for Pittsburgh and Scranton individually. The intertemporal effect of the differential taxation variable will be evaluated through a dummy variable accounting for the before- and after-reform period. For a cross-city test, the second-class cities in Pennsylvania with socioeconomic characteristics similar to those in Pittsburgh and Scranton should be selected for a paired comparison between the ones with and the others without the tax reform.[4] Tests for the third-class cities should be postponed until there is enough information to warrant such an empirical task.

While the philosophical controversy of Henry George's land value taxation has never seemed to end, the principle he espoused is just being implemented and tested. Although the Mathis and Zech test is not at all a scientifically good one, it is good for concerned students to start testing the principle empirically.

FOOTNOTES

1. For the positive effects of the differential tax, see Gurney Breckenfeld, "Pennsylvanians Experiment with 'Incentive Taxation'," in _Fortune_ (August 8, 1983) and for others, see R. V. Anderson (ed.) _Critics of Henry George: A Centenary Appraisal of their Strictures on 'Progress and Poverty'_," (Teaneck, N.J.: Fairleigh Dickinson Univ. Press, 1979); Bruce Yandle, "Henry George, His Advocates and Adversaries," _The American Journal of Economics and Sociology_, Vol. 43, No. 1 (January 1984), pp. 125-127; and F.C. Genovese, "Why Everyone should Read George's 'Progress and Poverty'," _The American Journal of Economics and Sociology_, op. cit., pp. 115-121.

2. Edward J. Mathis and Charles E. Zech, "The Economic Effects of Land Value Taxation: An Empirical Test," _Growth and Change_ (October 1982), pp. 2-5.

3. For econometric problems and techniques discussed in this and other sections, see Arthur Goldberger, _Econometric Theory_ (N.Y.: John Wiley & Sons, 1963) and Jan Kmenta, _Elements of Econometrics_ (N.Y.: MacMillan Publishing Co., 1971).

4. For a similar empirical test of this nature, see Ben-chieh Liu, "Evaluating a Hospital Cost-Containment Program in a Paired Experiment," _Journal of the American Statistical Association_, Vol. 78, No. 382 (June 1983), pp. 249-256; and for an alternative approach, see Milton Chen, "Developing Policy Impact Models," _Management Science_, Vol. 30, No. 1 (January 1984), pp. 25-36.