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Site Value Taxation in Australia:

Where Land Is Taxed More and Improvements Less, Average Housing Values and Stocks Are Higher

By MARY E. EDWARDS*

ABSTRACT. *Site value taxation* is neither a new nor a strictly western concept. Taxing *land* based on *location* was proposed in *India* around 300 B.C. *François Quesnay, David Ricardo* and *John Stuart Mill* were among the economists favoring land taxes but *Henry George* is credited with bringing it about in several areas, notably *Australia.* That subcontinent has experimented with the land tax on the national as well as the state and local levels but it is presently used only on the latter two. Empirical tests of the tax instrument are few. *Pollock and Shoup* (1977) forecast that eliminating the tax on improvements would increase *investment* levels by about 25 per cent in the long run. *Hutchinson* (1963) found great differences in house values and stocks. This study evaluates the effects of site value taxation on the basis of *multivariate regression analysis.* It finds strong evidence that, where improvements are relieved of taxation and more revenues are obtained from land values, the average value of *housing* is significantly higher and the value of the housing stock substantially larger.

I

Introduction

THE PURPOSE of this study is to evaluate the effects of site value taxation on the average value of new houses and on the stock of dwellings in Australia.

* [Mary E. Edwards, M.A., is a graduate student and research assistant, Department of Economics, Texas A. & M. University, College Station, TX 77843.] [Some readers may be interested in how this study came about. The author was a teaching assistant in Econ 51 at the University of Missouri, Columbia, when Professor Walter Johnson, who taught the course, gave his annual Harry Gunnison Brown Memorial Lecture on site value taxation, in recognition of the abiding interest of his predecessor, Professor Brown, in land value tax theory and practice. This aroused the author's interest and in further research she came upon Professor Brown's essay in this *Journal,* "The Challenge of Australian Tax Policy," and upon many volumes of Australian data in the University of Missouri Library. This paper is a revised version of the author's master's thesis. The assistance of Mrs. Elizabeth Reed Brown, Walter L. Johnson, Richard McHugh and Douglas Pearce is gratefully acknowledged. All remaining errors are the author's sole responsibility.]

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Although a vast amount of literature, both theoretical and empirical, deals with property taxation, few empirical studies examine the mass of theory concerning site value taxes. One reason for this is that while many localities use the site value of land as a tax base, few use it as the sole or the predominant tax base.

Site value taxation is neither a new nor a strictly western concept. The theory of taxing land based on its location in proximity to sources of water was proposed by Kautilya, a counsellor and advisor to King Chandragupta of northern India around 300 B.C. (Bandyopadhyaya 1927: 144–150). India has used a tax on land, called "Land Revenue," for over 200 years (Gulati and Kothari 1969: 108).

Ever since François Quesnay published *Tableau Economique* (1758), western economists have debated the suitability of taxing land rent, whether in the form of a single tax, as Quesnay and Henry George envisioned, or as an alternative to the property tax, as most present day supporters of this tax propose.

David Ricardo defined rent as "that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil" (Ricardo 1817: Ch 2). He further stated that a tax on unearned increases in land value will fall solely on the landlord and will not discourage cultivation or production, as might other taxes. John Stuart Mill remarked that this type of tax would "merely be applying an accession of wealth, created by circumstances, to the benefit of society, instead of allowing it to become an unearned appendage to the riches of a particular class" (Mill 1848: 819).

Henry George's campaigns in the United States, England and Ireland for land value taxation won adherents in several other countries, among them Australia.

Australia has experimented with the land tax on three levels of government. The federal rates were applied to the "total value of land held by one individual anywhere in the Commonwealth" (Lent 1967: 92). The aims of this tax were "to dismember the great estates and to encourage widespread ownership of land" (Bird 1960: 386). This tax, criticized by land taxers as not heavy enough, was abolished in 1952 as the revenue yield and the supposed "social benefits" became less important (Bird 1960: 386).

All states except Tasmania now tax property on the basis of unimproved capital value; that is, site value. Until 1975–76, land tax for the state of Tasmania was based on the unimproved land value (*Tasmanian Yearbook* 1982: 79). This changed with the Land and Income Tax Act no. 74 of 1976

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(*The Acts of the Parliament of Tasmania* 1977: 531–33). Tasmania now taxes on the improved capital value of land. Because of the exemptions and low rates, the state land tax is usually considered not fiscally important (Lent 1967: 92; Brown 1949: 377). Nevertheless the local real estate taxes are a genuine attempt to capture economic rents (Groves 1949b: 10).

The local governments in Australia use one or some combination of three different rating (taxing) schemes: assessed annual value, improved capital value and unimproved capital value. Although the legal definitions vary slightly between states (Woodruff and Ecker-Racz 1969: 159–61), in general, the assessed annual value of property is the "rental it might be expected to earn annually if let, after deducting expenses . . ." (*Victorian Yearbook* 1981: 150). Improved capital value is the "total market value of land and buildings and is roughly the basis on which property has been assessed in the United States" (Woodruff and Ecker-Racz 1969: 158). Unimproved capital value, according to the *Queensland Yearbook* (1982) is "the amount that would be paid by a willing but not anxious buyer to a willing but not anxious seller for a piece of land assuming that actual improvements had not been made." Unimproved capital value is in general the same as site value, although some slight differences exist.[1] Since the authors who write about the effects of the land tax usually refer to UCV as a site tax, this paper will do so too.

The next section contains a review of the empirical work done on site value taxation. The following one develops the two models which examine the effects of site value taxation on the average value of new houses and on the stock of dwellings in Australia. A description of the data and the results of this study follow. The last section summarizes the work and suggests policy implications.

II

Review of Literature

IF THE PROPERTY TAX were replaced by a land value tax, theory suggests that among the changes expected are lower housing costs and more efficient use of land. Changing to site value taxation should increase the capital intensity of real estate (Pollock and Shoup 1977: 67) and provide an incentive to develop land to its optimum potential. Empirical studies examining the effects of a land tax do not always support the theory.

One study, by Pollock and Shoup (1977), does tentatively support the theory. In 1963 the state legislature of Hawaii enacted a modified version of a site tax which was based on the Pittsburgh graded tax plan. The "Pittsburgh

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Plan" shifts a portion of the tax burden that normally falls on the buildings onto the land and thereby puts a higher proportion of tax burden on the value of the land than on the value of the buildings. This tax went into effect in January 1965.[2]

Pollock and Shoup looked at tourist hotel investments in Waikiki between 1965 and 1973. Using micro data and a partial equilibrium model they estimated a revenue production function to determine the profitability of capital applied to a given site. This revenue production function, $R = AL^aK^B$ is estimated (t-values in parentheses):

$$\log R = -.91750 + \underset{(2.08)}{0.27303} \log L + \underset{(5.936)}{0.7329} \log K$$

where A = constant term
R = annual net revenue of the hotel (in thousands of dollars)
L = land input (site area in square feet)
K = capital input (construction cost in thousands of dollars)
a = elasticity of net revenue with respect to land input
B = elasticity of net revenue with respect to capital input.

By partially differentiating the revenue production function and substituting the estimated parameters, they estimated the marginal net revenue product of capital to be:

$$ABL^aK^{B-1} = .293L^{.273}K^{-.268}.$$

The formula for the elasticity of capital investment to the property tax is $\frac{-t}{(i + t)(1 - B)}$. Using the effective property tax rate, (t) on hotel buildings in Honolulu in 1973 (1.07 per cent), and an interest rate (i) of 15 per cent, they estimated the "elasticity of investment with respect to the tax rate" to be −.25. This means that the "elimination of the tax rate on improvements would increase the long-run equilibrium investment in improvements by a maximum of 25 per cent" (p. 75).

Although this study refers to only one particular form of improvement in one location, and ignores several general equilibrium effects, the forecast of a 25 per cent increase in improvements compares favorably with the study by Grieson (1974). He used a general equilibrium model and aggregate data and estimated that a total elimination of the property tax on improvements would increase the supply of structures by 23 per cent (Pollock and Shoup 1977: 76).

Several cities in Pennsylvania do tax improvements at a lower rate than

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land. In 1978 the ratio of land to building taxes in Pittsburgh was 49.5/24.75, or 2 to 1. Since then, Pittsburgh has increased this ratio markedly, so that in 1983 the same ratio is now 151/25, or 6.6 to 1 (Neri December 22, 1982 :1). In 1978, Pittsburgh's land tax was watered down by a large increase in the tax on improvements; moreover, Pittsburgh's two rate tax only applies to municipal property taxes, not to the overlapping county and school district taxes (McHugh 1978: 8–9; Rybeck 1983: 3).

Many local governments in Australia have implemented a much less diluted version of the differential land tax than that of Pittsburgh. Empirical studies examining the effectiveness of site taxes in Australia have reached mixed conclusions.

A. R. Hutchinson is the director of research for the Land Values Research Group of Glen Iris, Victoria. In his booklet, *Public Charges Upon Land Values* (1963), he divides the Australian states into two groups. The states in which the local real estate rates are levied mainly on the unimproved capital value (UCV) of the property, New South Wales, Queensland and Western Australia, are in the first group; and the states in which the local rates are levied mainly on the net annual value of land and improvements (NAV), South Australia, Victoria and Tasmania, are in the second. Hutchinson then compares the rate of increase of dwellings per 100 marriages, the value of improvements on land holdings, and the mortgage assets of financial institutions along with 18 other comparisons.

The average increase in dwellings per 100 marriages for the Land-Value rating states, is 65.4 per cent, but for improvement-value rating states (NAV) that increase is only 61 per cent between 1921 and 1958. "The superiority in favor of the states taxing land values is clear-cut both as groups and individually," Hutchinson reports. "The lowest of the land-value rating states (New South Wales, with 64.5 per cent) (is) higher than any state in the group taxing improvements." Of the second group South Australia is the highest with a 62.0 per cent increase in dwellings per 100 marriages (p. 19).

In the year 1939/40, the ratio of the value of the improvements on the land to the value of the land itself was almost two times greater for states using UCV than for those using NAV. The average of the UCV group was 151 per cent, but it was only 79 per cent for the NAV group.

Hutchinson also determined that the mortgage assets of registered building societies increased from 1908 to 1938, by, for the first group, an average of 605 per cent, but only 122 per cent for the second group. This same comparison for postwar years, 1948 to 1957, was 401 per cent for the UCV group to 203 per cent for the NAV group (p. 39).

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Hutchinson makes about 21 such comparisons, all of which suggest that states in which the local governments use UCV as the base fare much better than the other group.

The differences in his comparisons are substantial, but there is no effort to determine what other factors besides the form of local taxation contribute to these dissimilarities.

One most often cited study concerning site value taxation in Australia was done by Woodruff and Ecker-Racz (1969). They published a report which was the result of a "field trip" to Australia and New Zealand that they made in the fall of 1964 (p. 147). They asserted that the "frequently reiterated claim that rating on unimproved capital value [of the site] is responsible for a rapid pace of community development could not be substantiated by direct observation" (p. 171–72).

They questioned valuers general (tax assessors) and others (see Appendix A) as to their opinion "on whether local rating had any significant effect on the pattern of land development in any particular community." The replies were "almost unanimously negative." This "overwhelmingly negative opinion . . . is confirmed by (their) own observations as (they) rode diligently through the suburbs of Melbourne, Auckland, and Adelaide. . . ." One area they found particularly interesting was:

> . . . the so-called Toorak area in Melbourne, which is a prestige residential neighborhood divided between the cities of Prahran and Malvern. Prahran rates on assessed annual value and Malvern on unimproved capital value. The people of Toorak are more impressed with the fact that they live in Toorak than with the fact that part of Toorak is under one system of rating and part under another. We rode back and forth across the boundary line between the two parts of Toorak and were unable to distinguish any difference in appearance between the two (p. 172).

They attribute the lack of visible differences between areas using site tax and areas which tax improvements to a generally low level of tax rates, a mixture of local rates on the land value, and water/sewerage rates not based on UCV where the general rates are based on the site value of the property. Many hardship and agricultural exemptions also help dilute the effect of the local tax rates (p. 175).

Most authors who critique the Australian tax system seem to expect this tax to be ineffective. Bentley, Collins and Drane (1974) estimated the incidence of total Australian taxation in 1966–67. In their view, "households treat local government taxes as a cost to be met out of annual income and thus in effect divorce the tax paid from any income-earning potential of their properties." For this reason the local government taxes are not shifted, they believe, but are "borne in full by the households legally obliged to pay the taxes" (p.

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498). This seems to imply the Australians are not economically rational, that they do not respond to any tax incentives embedded within this property tax.

Groenwegen (1971), in a paper advocating tax reform in Australia, points to "the tax on land values in the form of local rates and state land tax" as one type of tax that should disappear, and whose "departure would probably not be mourned" (p. 545). In so far as these taxes are a tax on factor use, "there would also be a beneficial effect on the cost structure of land-using enterprises" if these taxes were eliminated. His proposal is that land values be taxed "under a net worth tax, as part of the value of private wealth holdings" (p. 545).

Neutze (1969) argues that a tax on site values discourages large scale developments in affected areas. The large scale developments especially of apartments or new towns where a good deal of expected returns take the form of an increase in site value would also increase the effective tax rate of the locations. In order to keep this effective tax rate low, small scale developments should take precedence, he believes, over any large scale development in areas which tax site value (Neutze 1969: 127).

In summary, Pollock and Shoup's forecast (1977) is essentially the same as Grieson's (1974), that elimination of the property tax on improvements should increase investment in improvements over time by about 25 per cent. Hutchinson (1963) demonstrated that Australian communities which base local rates on site value boast a more rapid pace of community development. In his studies the only difference between the states he accounts for is the local tax base. Woodruff and Ecker-Racz (1969) reported after a field trip to Australia that they didn't observe any difference between communities with different tax bases.

III

The Models

EITHER HUTCHINSON'S or Woodruff and Ecker-Racz's study might be more convincing if the only factor in building or investment were the tax structure. Hutchinson does qualify his results by suggesting that the "limits imposed by nature and the changing conditions of usage mean wide gulfs between the development in one district as compared with another in the same state." He suggests the land policy will not change the "basic potentialities" of the district, but a land tax will "conduce to their full development" (Hutchinson 1963: 45).

In order to estimate changes in variables in relation to land development

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one should use multivariate regression analysis. No studies using this technique have yet been done to determine whether changes in taxation schemes are associated with changes in housing construction in Australia.

The first model of this paper relates changes in site value taxation to the average value of new houses in Australia. Because of data limitations, the study is confined to years 1951/52 through 1964/65 for all states but New South Wales and Queensland. New South Wales does not report expenditure figures for the year 1963/64, and Queensland does not report them for the years 1954/55 or 1955/56.

The model for average house values may be expressed as follows:

$$Qi = f(\ln Y, TSR, \ln HCPI, LTAX, PCE) \quad [1]$$

where:

Qi = the value of total houses completed/total new houses completed
ln Y = log (average weekly earnings per employed male unit)
TSR = long term interest rates − short term interest rates
ln HCPI = log (Housing Consumer Price Index)
LTAX = the proportion of local governments in each state which use unimproved capital value as the tax base.
PCE = per capita expenditures of local governments

A better variable to indicate the influence of site tax would be some ratio of tax rates on land to rates on improvements. But those data are not given in the yearbooks. LTAX is effectively the same grouping that Hutchinson (1963) used. In several places in his report he points to the size of variables by states and suggests that, for instance, Tasmania may be at the bottom of the second group of states because no local government in that state uses U.C.V. for the tax base. Since some of the municipalities of South Australia and Victoria do use U.C.V., these states have higher average statistics in one set or another (*e.g.,* Hutchinson 1963: 15, 22, 34). The proportion of municipalities in the states which use site tax would then be a better measure than would a dummy variable. If the method of taxation affects housing values as the theory predicts, then the coefficient for LTAX should be positive.

Other things equal, an increase in weekly earnings should increase the average value of houses constructed. Therefore ln Y should also be positive.

Mortgage rates in each state are not available in the yearbooks, but since Australia does have a "social policy of low interest rates for low cost housing" (Coombs 1971: 69), perhaps the better variable to reflect the cyclical tightness of credit would be the term structure of interest rates such as Evans (1969) used in his model of residential construction costs in the United States.

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According to H. C. Coombs (1971: 69), both the savings banks and the permanent building societies "suffer the profit squeeze in periods of rising interest rates" much like the "United States housing and [building financing] societies in 1967 and 1968." The coefficient for TSR should thus be positive. As the difference between long and short term rates is large, there is more credit available for long term loans. But if the spread between long and short term rates narrows, the savings banks and the permanent building societies will suffer a "profit squeeze" and be less willing to lend long term.

The housing Consumer Price Index (CPI) measures housing rental rates, construction costs, and mortgage rates. The price index of materials used in house building would have been preferred, but this index was first constructed in July, 1966, and it was not extended back before that period. The housing CPI is calculated from 1948/49 to present. The average correlation coefficient between the two indices is .9982, so housing CPI is a good proxy for price index of materials used in house building.

Since this is a reduced form equation, one cannot infer any elasticity of demand or supply from this variable. It has both elements of supply, in the form of building costs, and demand, in the form of rental rates.

Per capita expenditures by local authorities include not only general public services, health, recreational and related cultural services, but also roads, and other "housing and community amenities." This variable also indicates the level of tax receipts of the communities of each state. If people "vote with their feet" and build where there are high levels of government expenditure, perhaps in new housing tracts, this coefficient should be positive. But if people prefer lower taxes rather than new amenities, this will be negative in sign.

The second model of this paper evaluates the effects of site value taxation on the stock of dwellings in Australia. This should give a more accurate description of the intensity of land use than the first model. The model for the stock of housing is as follows:

$$\ln \text{STOCK} = f(\ln \text{PCY}, \text{POP}, \ln \text{HCPI}, \text{PCE}, \text{LTAX}) \qquad [2]$$

where:

ln STOCK = log (estimated value of housing stock in each state)
ln PCY = log (per capita income) (net income/population)
POP = total population in each state
ln HCPI = log (Housing CPI) per state
PCE = per capita expenditures by local governments
LTAX = the proportion of local governments in each state which use unimproved capital values as the tax base.

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As the per capita income increases, the stock of housing should also increase, so the coefficient should have a positive sign.

The number of households would be a better measure of the demand for housing stock than total population, but those data were not available. The coefficient for POP should be positive. This size of the coefficient depends on the nature of the population increase. Increases due to migration should have a positive effect on the variable, but increases due to births may not necessarily result in increased stock of housing.

The signs of ln HCPI and PCE should be the same as for the first model. If the land tax provides an incentive to increase the capital intensity of land use, the LTAX should be positive.

IV

The Data

THE SOURCES of the data are found in the data appendix.[3]

The proportion of local governments in each state which used unimproved capital value as a tax base in 1962 is found in the appendix to Hutchinson's work (1963: 47). The issues of March, May and June 1975 of *Progress,* a publication of the Land Values Research Group, lists 23 local governments in Victoria that switched to unimproved capital value from net annual value between 1954 and 1972. The *Victorian Yearbook* (1981) calculated a total of two more than the issues of *Progress* reported, but since the dates for the transitions are not known, these communities were left out. Any other changes in the tax base for local governments in Western and Southern Australia are not accounted for because exact dates are not known.

In order to estimate the value of housing stock in each state, a current-cost perpetual inventory method of stock estimation similar to that of John C. Musgrave (1974: 32) is used. The number of dwellings per state is given in the Dwelling Census reported in the *Australia Official Yearbooks.* In order to estimate a base stock, the number of dwellings in existence as of June 30, 1954, the first census given within the time limits of the available data, is multiplied by the average value of new houses in 1953/54. This estimate of the value of stock is admittedly greater than the value of the actual stock. The estimates of the benchmark year of values of dwellings are biased upward for all states.

The value of the total houses and flats constructed each year is added to the existing stock, and a depreciation rate of two per cent is subtracted. This depreciation rate is that used by Musgrave (1974: 33) and by Grebler, Blank

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and Winnick in *Capital Formation in Residential Real Estate* (NBER: 1956). The formula used to create the stock variable is:

$$\text{STOCK}_t = \text{TOTAL VALUE}_{\text{new dwellings}} + .98\ \text{STOCK}_{t-1} \qquad [3]$$

V

The Results

THE RESULTS of the equations are listed in Appendix C.

The model for average house values is very highly autocorrelated. This problem may be due to not using some measure of permanent income rather than the income variable now used. The autocorrelation coefficients used were estimated by the maximum likelihood procedure. Both the autocorrelation coefficients and Durbin-Watson statistics are also reported in Appendix C. After the correction, as D.W. statistics suggest, there is no definite autocorrelation. All D.W.'s are in the indeterminant region of the D.W. test.

Equation [1] is the model before adjusting for autocorrelation. Equation [2] includes the adjustment. The only variable affecting housing stock according to Equation [2] is per capita expenditures. This may have validity since the local authorities supply new housing projects with new roads, sewers, water mains, lights and other necessities in development areas. The residuals for several states are off center, when all states are in the equation, which suggests that other things not accounted for in this model are changing the average value of new houses. In each state this variable is different. In order to account for these differences, perhaps in climate or in preferences for types of houses constructed, dummy variables are added to the model.

Thus Equation [3] is more realistic. Ln Y, and TSR are both positive and significant as they should be according to theory. Ln HCPI is also positive. Neither the tax system nor the tax level is significant in Equation [3].

Estimating the same equation without PCE gives rather interesting results. In this trial, Equation [4][4], all but the intercept are significant. TSR is significant and the "wrong sign"; LTAX, which is thought to be either insignificant or positive, turns negative and significant at the .001 level. Dummy variables are needed for this model as they were for the model without PCE. Equation [5] includes four dummy variables which will improve the efficiency of the model. These results suggest that LTAX has a great effect on the value of housing. TSR and ln HCPI are still negative and significant. Some sort of multicollinearity must exist between PCE and LTAX, even though the correlation coefficient is −.21695 between them. According to Maddala (1977: 185), in cases of more than two variables, "the simple correlations could all be low and yet multicollinearity could be very serious."

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The model with housing stock also had very high degrees of autocorrelation. Even after adjusting for first-order autocorrelation (AC(1)), the D.W. statistics for each state were in the indeterminant range. For South Australia, the D.W. was exceptionally low.

The sign on per capita expenditures (PCE) is negative and may suggest that local tax levels show an inverse relationship with growth of housing stock. Site tax in this model is insignificant, but both prices and population are positively related to growth in housing stock.

Before PCE was added to the model, housing CPI was insignificant, but population and per capita income increases were shown to increase the stock of housing.

The D.W. statistics after adjustment of Equation [8] are not encouraging. Not one is in the area greater than the upper bound of the test. The D.W. for the New South Wales data set still suggests that autocorrelation is still causing inefficient estimates. Since second-order autocorrelation may be a problem, a least square second-order autocorrelation procedure is necessary. Estimating the autocorrelation coefficients by maximum likelihood was impossible for some states. With the first observation dropped, a regular Cochrane-Orcutt method of estimating the autocorrelation coefficients (Rho_1 and Rho_2) produced the coefficients.[5]

As one can tell from the Rho's and their respective t-statistics, different patterns of AC emerge for each state. New South Wales and Western Australian data show both AC(1) and AC(2) for each. Only AC(2) is apparent for Tasmania, AC(1) for Victoria and Queensland. South Australia exhibits no discernable AC.

The greatest differentiation is with Equation [10]. New South Wales, Victoria and Queensland seem troubled only with AC(1). South Australia is plagued with just AC(2); Western Australia and Tasmania show signs of both AC(1) and AC(2).

Stationary assumptions include the assumption that Rho_2 lies between plus and minus one. Tasmanian Rho_2 violates this assumption. This is the reason for Equation [11] which is estimated without the data of the island state included. Equation [11] shows ln HCPI to be significant and negative.

Residuals for all states except Victoria and South Australia are well behaved scatterplots. The error terms for these two states exhibit the pattern of a staircase. The first eight or nine observations are all positive, constant or rising slightly; the next six are steadily decreasing but positive and the last of the error terms are negative and continually decreasing. To counteract some of the inefficiency of this pattern, dummy variables were added to the model

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for both of these states. With this addition, ln HCPI, ln PCY and LTAX are now significant and positive.

The addition of PCE to the models in both Equations [3] and [9] results in a positive coefficient for HCPI. This is true even with Equation [3] when PCE is insignificant. The income variables are significant in all forms of the equations. LTAX is positive and significant in all but the misspecified Equation [4]. After adding the four significant dummies, LTAX is not only significant, but it suggests a very great impact on the average value of housing.

The coefficient for population is significant but tiny for all but Equation [12]. The mystery variable is TSR. Either Equation [5] is still misspecified or the mortgage rates in Australia are controlled so tightly that, as the longterm government rates increase, bankers find these more attractive than mortgages for investment. But until one finds out more about the Australian monetary system, this variable remains a mystery.

VI

Conclusions

THIS PAPER ANALYZES—to the extent the data and the limitations of the procedure permit—the effects of site value taxation on the average value of new houses and on the stock of dwellings in Australia. Given both the tax levels of local governments (or expenditure levels) and the site tax variable from Equation [3] it is difficult to conclude if either has an effect due to multicollinearity.

When one omits the local expenditure level, the site tax variable is very great and extremely significant with respect to the average value of new houses (Equation [5]).

After the inefficiencies of autocorrelation are removed in Equation [9], the level of taxation has a decreasing effect on the stock of dwellings but the greater the proportion of communities that tax the unimproved capital value of land in each state, the greater the growth in housing stock.

The results of this paper coincide with the conclusions of A. R. Hutchinson—that not taxing improvements tends to bring about an increase in the average value of housing and the value of total housing stock.

In designing or reforming its tax system, a community must see to it that it avoids the difficulties of an exceptionally watered down system of taxation. That would vitiate the economic benefits of an optimum tax system. It must also avoid the troubles encountered by the Australian national land tax (Bird 1960, Groves 1949a). Among other devices, they took the form of "bogus

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companies owning land while a large landowner held control," and of partners dividing the land among themselves in order to get two exemptions (Bird

The weight of the evidence now at hand strongly indicates that if a new or reformed tax system is administered honestly, efficiently, and equitably, then a site value tax will result in a more rapid pace of development. Further research (and undoubtedly additional data) are needed to determine the effect of a site value tax on land speculation, on the one hand, and land availability to lower income groups, on the other.[6]

Notes

1. The difference according to *Victorian Yearbook* (1976: 150) is that the "site value" is: ". . . the amount a property might be expected to realize if sold in an unimproved state. (This) differs from unimproved capital value in that the valuer is not required to notionally restore the land to its primitive condition. Instead, the improvements which are to be imagined as not existing are those which can be seen, *i.e.* buildings, fences, sown pastures, etc., including works undertaken on the land such as removal of timber or stone, draining or filling of the land, erosion works, etc., which have been made within the 15 years preceding the valuation."

2. According to a mimeographed report from the State of Hawaii Department of Taxation (June 23, 1973): in 1969, legislation was enacted to remove improved residential property, agricultural and conservation properties from the differential tax. Hotels and apartments are still affected by the tax.

3. One possible data problem exists. For all states but Queensland, change in the stock of housing is less than the total number of dwellings built, which is expected. For Queensland, according to the housing census, between 1954 and 1961 a net of 71,401 new dwellings should exist, but only 59,609 were built in that period. The next sequence, from 1961 to 1966 presents similar discrepancies. After the model was adjusted for autocorrelation, dropping the Queensland data set from the observations did not change any of the signs of the coefficients.

4. The models without PCE contain 24 observations, from 1951/52 through 1974/75.

5. The complex roots for the autoregressive process display pseudo periodic behavior with damped sine wave.

6. The report of this research includes, in addition to the foregoing paper, 6 pages of supplementary material: Appendix A, "Summary of Empirical Literature on Site Value Taxation;" Appendix B, "Data Appendix;" and Appendix C, "Dependent Variable: Average Cost of Housing; Housing Stock," plus 17 pages of data for each of the 10 equations. This material is available on microfiche and photocopy under a program of the American Society for Information Science, the National Auxiliary Publications Service (NAPS), inititated with the cooperation of the Library of Congress, in which the *American Journal of Economics and Sociology* participates. For this material, order NAPS Document 04208 from ASIS/NAPS, c/o Microfiche Publications, P.O. Box 3513, Grand Central Station, New York, NY 10163. Remit in advance to "Microfiche Publications" US $4.00 for microfiche or US $7.75 for photocopies; outside the U.S. and Canada add postage of US $1.50 for microfiche or US $4.50 for photocopy.

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