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4 Property Taxes and Firm Location: Evidence from Proposition 13

Michelle J. White

4.1 Introduction

California's Proposition 13, passed by referendum in 1978, drastically changed the state's system of local property taxation. Until 1978, separate taxes were levied on real property by a variety of overlapping governmental units—counties, local governments, school districts, and other local authorities. Each tax rate reflected local voters' (or perhaps bureaucrats') preferences concerning the desired level of expenditure on local public goods. Assessed values reflected market values and were rising rapidly in the late 1970s as market values rose.

After Proposition 13, California localities essentially lost control of local property taxes. First, assessed values were set at 1975 market value, with all assessments subsequently readjusted upward at a rate of 2% per year. Reassessments now occur only when properties are sold, at which time they are set at market value. Second, a single overall property tax rate, arbitrarily set at 1%, replaced the menu of local property taxes levied by cities and towns, counties, school districts, and other local authorities.[1] This reduced the level of property tax collections in all localities, but by varying amounts. Emergency state aid to local governments offset some of the drop in property tax revenues, but at varying (and exogenously determined) levels.

Post–Proposition 13 California provides an excellent laboratory for studying the effects of taxes on firm location. This is because, first,

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local property taxes changed from being determined by each locality to being uniform all over the state—thus the tax change was imposed from above and was independent of the levels of local public services provided to firms. Second, other attributes of the business climate in various parts of California presumably were unaffected by Proposition 13. Therefore the effect of the tax change on firm location patterns can be examined without having to correct for such factors as differential production or transportation costs in different California localities. These factors are assumed to remain unchanged.

In this paper we use data from pre- and post–Proposition 13 California to test whether the changes in local property taxes have affected firm location patterns. The paper is arranged as follows. Section 4.2 briefly reviews the literature on economic models of firm location. Section 4.3 develops various models of the effect of taxes on firm location. Section 4.4 describes the model to be tested and presents results.

4.2 Economic Models of Firm Location

There is a large literature dealing with models of firm location from many perspectives.

The classic approach is that of regional scientists, who have developed models of firm location that stress cost minimization or profit maximization when sources of inputs and markets for outputs are dispersed over space at exogenously determined locations and transportation costs for inputs or outputs are nonnegligible. Wages and the prices of land, capital, and output are assumed to be fixed. This type of model leads to results such as that production processes that reduce bulk should be located near input sources, while production processes that increase bulk should be located near product markets.[2]

Urban economists have examined firm location patterns within cities. Here the locations of markets and input sources are usually assumed to be fixed, as are output prices, but transportation costs, land prices, and wages are assumed to vary inversely with the firm's distance from the city center. Typical results in this literature suggest that firms' capital/land ratios fall with greater distance from the center and that firms in different industries segregate themselves in rings around the center of the city.[3]

Neither of these approaches considers taxes as a major factor in firm location. This is because the effect of spatial variation in input costs or in transportation costs is implicitly assumed to swamp the effect of tax changes over space. For most firms, total nonfederal taxes are a much smaller proportion of their expenditures than are wages or capital costs and usually are smaller than total profits. However, the absolute size of each cost item is potentially less important than its variability in determining location.

Those studies of firm location that take taxes specifically into account are quite divided on whether taxes are important or not. For example, Epping (1982) surveyed manufacturing firms that either moved to Arkansas or considered but did not move to Arkansas and asked managers of these firms to rank a set of factors in order of importance in the location decision. He found that taxes ranked second in importance in firms' location decisions, just behind labor costs but above all other factors. The tax factor here presumably included all state and local taxes, not just property taxes, but still the ranking seems extraordinarily high. On the other hand, in an earlier and much more detailed survey of manufacturing firms in Cincinnati and New England that expanded, moved, or opened branch plants, Schmenner (1978) found taxes to be an infrequently cited and relatively unimportant factor in the location decision. Schmenner's results suggest that purely technological considerations, such as the need to expand or modernize production facilities, to separate different product lines, or to provide better geographic coverage of the market are most important in determining whether plants move or not. Both taxes and labor cost considerations became important in his study only in the relatively rare situation when a relocation or a branch plant opening involved a move of more than a few miles. For most firms taxes were unimportant for the simple reason that the firm did not move far enough to allow any significant variation.

There have also been several econometric studies of firm location, which have produced equally conflicting results concerning the importance of taxes. Carlton (1979) used Dun and Bradstreet data to explain the pattern of new births of firms across SMSAs in three manufacturing industries that ship their output long distances and therefore are not tied to locations near particular output markets. The explanatory factors used included wage levels, average corporate and personal income tax and property tax levels, utility costs, and measures of agglomeration effects across SMSAs. The results indicated that neither income nor property taxes were a significant determinant of new births. More recently, Bartik (1984) used Dun and Bradstreet data to estimate a model of branch plant location behavior across the fifty states by the Fortune 500 companies. He found that state corporate income tax rates were a significant determinant of plant location behavior, but property taxes were not.

A variety of econometric studies have used data from cross-sectional samples of local jurisdictions, usually within a single metropolitan area, to test whether the existing pattern or changes in the pattern of firm locations are explained by tax differentials across jurisdictions and a variety of other variables. The latter include, in various studies, measures of transportation facilities; distance to the central city; level of spending on local public services; supply of sites; energy costs; wage

costs; and measures of agglomeration economies. For example, Wasylenko (1981a) and Fox (1981) separately estimated a series of models in which they argue that supply conditions, such as whether particular communities zone out industrial uses, should be taken into account in explaining firm location. Fox found that tax variables were significant in explaining the amount of land occupied by firms in a sample of suburban jurisdictions in the Cleveland area when those communities that zone out industry completely were excluded from the sample. Wasylenko found that property taxes were significant in explaining location choice for a sample of manufacturing and wholesale trade firms that moved to suburban jurisdiction around Milwaukee. However, property taxes were not significant in explaining moving behavior in several other industrial categories.[4]

To the extent that these studies are consistent about anything, they suggest that firms are more likely to be tax sensitive in making relatively short-distance moves within a particular metropolitan area. In considering these moves, other factors, such as wages, are likely to be constant at all possible locations. But since most metropolitan areas contain many local jurisdictions, taxes may vary at different sites. On the contrary, when intercity long-distance moves are being considered, wages, transportation costs, and other factors are likely to vary widely, so that variations in tax liability—while present—are less likely to be important in firms' decision making.

A related literature (see Fischel 1975 and Ladd 1975) takes the approach of examining whether the presence of more firms in a community has the effect of lowering its property tax rate, correcting for factors that would otherwise cause residents to have high demand for public services and therefore a higher tax rate. Both authors use data from communities within a single SMSA. The results of both studies suggest that a higher proportion of nonresidential property has a downward effect on communities' tax rates. Ladd also argues that commercial property has a larger negative effect on the property tax rate than industrial property, suggesting that communities have more monopoly power over commercial than industrial firms. This seems reasonable since commercial firms' markets are smaller and more spatially sensitive.

Another study worthy of mention is by Grieson and his associates (1977). It examines the effect of a change in the form of the business tax in New York City from a gross receipts tax to a profits tax on the level of employment in the city. Since New York City taxes different industries at different rates, a cross-sectional study could be done within a single locality. Grieson and his coauthors found that manufacturing employment was significantly negatively related to the level of taxes, while nonmanufacturing employment was not. Thus only manufacturing firms were tax-sensitive in making their location decisions. Further,

they argued that receipts from the business tax could be increased by lowering the rates applicable to manufacturing firms—i.e., New York's tax rates were too high.

Finally, a related literature deserves mention. In most European countries, "regional policies" are used to give firms financial incentives to locate or expand in depressed regions. The incentives may include tax abatements, subsidized provision of sites or buildings built by government authorities, and wage or training subsidies for employees. Sometimes the positive incentives for firms to move to depressed areas are accompanied by penalties or controls on firms moving to nondepressed areas. Moore and Rhodes (1976) is an example of a study of the effects of British regional policy instruments. Not surprisingly, they find that the British combined tax-plus-regulatory regional policy does have significant effects on firm location patterns.

In the United States, regional policies have never been explicitly adopted by the federal government, except for the Appalachia program of the 1960s. There has been active consideration recently of a federal regional policy that would favor depressed central cities. Generous investment tax credits were enacted by Congress in 1981 for renovation of buildings thirty or more years old and of buildings in historic districts. There has also been discussion (but no action) on a program of "urban enterprise zones," which would release firms located in specific depressed areas from federal minimum wage laws, the social security program, occupational safety and health regulation, and various taxes. However, states and localities have rushed in with their own policies to fill the federal void. They offer a wide variety of financial incentives for firms to move in, ranging from floating tax-exempt industrial revenue bonds to using federal community development funds in ways that benefit firms to abating firms' property taxes. What has emerged is in effect an uncoordinated, ad hoc regional policy in which states and cities compete for firms by offering, primarily, subsidies from the federal government attractively packaged by the states and, secondarily, state or local subsidies in the form of direct tax abatements. It would be of interest to compare the results of these state programs with those of the European regional policies, but thus far no one has even studied the various U.S. policies in a consistent way.

Thus the literature on whether taxes affect firm location patterns shows little sign of general agreement on whether taxes are important or not.

4.3 Theories

In this section I explore several theories of the effect of property taxes on location choice by firms.

4.3.1 The Pure Tax Approach

A rather simplistic view of the firm location problem starts with the assumption that property taxes (or any taxes) levied on firms are pure taxes, unrelated to the level of public goods or services provided by the governmental unit that levies the tax. This might be the case, for example, if the public goods provided by local governments benefit only households, but are financed by taxes on both households and firms. Alternatively, local public goods could benefit both firms and households, but the mix of residential versus business property may differ across communities. In either case, the taxes paid by firms would be unrelated to the level of services received by firms.

Assume also that localities do not (or cannot) engage in direct regulation of land use patterns, i.e., there is no zoning. And assume that production costs for firms in any industry are invariant over space. This means, first, that transport costs of inputs and outputs remain the same regardless of the firm's location, perhaps because its output is exported and it always hires local workers whose wages are constant everywhere. Second, it means that direct production costs are constant over space. Thus, for example, the firm cannot reduce its waste disposal costs by locating on a riverbank site, either because no river exists in the region or because there is a system of pollution charges equal to marginal benefit levied on users of the river.

Firms in this model have incentives to move to those communities having the lowest (equalized) property tax rates. The higher the community's tax rate, the greater the incentive firms have to move out.

Now consider the issue of capitalization: i.e., do differences in land prices across communities compensate for differences in the level of taxes paid by firms? In the simple model depicted here, the answer is probably that differences in land prices would compensate for at least part of the variation in tax liability faced by firms in different communities. This means that high taxes in a community should have less of a discouraging effect on firms locating there than would appear if land prices were assumed to be unaffected by fiscal variables. However, even with capitalization, taxes will still have some locational effects. First, if firms value the public services provided by local communities, then they would be attracted to communities having desirable service menus even if taxes were higher there. This would partially offset the capitalization of taxes. Second, capitalization may cause sites in particular communities to become unavailable or unattractive to firms, either because land values fall to zero without fully compensating firms for higher taxes in that community or because high taxes on firms allow residential or other users that are subject to lower taxes to outbid firms for land. Third, firms may adjust their demand for land in response to

changes in land prices, by substituting capital for land if land values rise or by moving out entirely. The more elastic is firms' demand for land for any reason, the less capitalization can be expected to occur.

A final problem with the capitalization story is that firms have a long-time perspective in making location decisions. While capitalization may insulate them from existing tax differentials, it may not insulate them from future changes in taxes. Thus firms may avoid high tax areas if they feel that high taxes now increase the probability of high tax *increases* later. While some firms that are renters may be able to avoid paying future property tax increases, the usual lease arrangement is likely to allow a pass-through of property tax increases, leaving the renter firm paying a tax increase but getting no offsetting rent reduction. Owner firms are negatively affected by both higher tax payments and capital losses if property taxes rise.

Now suppose that a Proposition 13–type change occurs that reduces or eliminates the variance of property taxes across the state. Assume that the change was unanticipated and that the level of benefits provided to firms remains unrelated to taxes paid. With no capitalization, firms' location incentives would change: previously high tax localities would become relatively more attractive, since taxes have fallen, and previously low tax localities would become relatively less attractive, since taxes have fallen by less or have risen. In this model we expect that firms in all industries would react in the same way to tax changes.

Suppose now that transportation and/or production costs do vary over space, but that there is still no capitalization. In this case firms are attracted to low tax jurisdictions, but the attraction is now weighed against other cost factors such as higher-than-average transportation or land costs, if these apply. The effects of a Proposition 13–type change are the same in this context as in the simpler case just discussed, except that they are more discontinuous. For example, a tax decrease due to Proposition 13 that is not great enough to offset a locality's cost disadvantage because of high transportation costs will not cause firms to move there. But a tax decrease in a different locality having good transportation facilities may cause firms to move in.

Finally, what if capitalization is again introduced? If property values in different communities previously capitalized variations in tax levels, then Proposition 13 will wipe out these differentials, leaving only production and transportation cost differences determining land values. With capitalization, firms located in previously high-tax communities will pay lower taxes but higher rents, and firms located in previously low-tax communities will pay the same or lower taxes and rents. But if rents are fixed by long-term contracts while taxes vary, then previously high tax communities will still become more desirable locations relative to previously low-tax communities, as long as the existing leases remain in force.

4.3.2 A Tiebout Theory of Firm Location

The theory discussed above assumes that the level of property taxes in any jurisdiction is independent of the level of the public services provided. The opposite approach assumes that property taxes are levied by local governments providing public services and that local taxes are the sole or a major source of revenue used to finance public services. From the viewpoint of local residents, a change such as Proposition 13, which forces uniformity of property tax levels, will also force changes in the level of public services provided. This results merely from the arithmetic of balancing budgets for local governments. However, from the viewpoint of firms, whose contribution to the overall revenues and expenditures of local governments is likely to be small, simple considerations of arithmetic play a smaller role. However, competition across communities may nevertheless force local governments to change the levels of public service provided to firms when tax revenues change. The assumption of intercommunity competition providing a link between local taxes and expenditures stems from the work of Tiebout (1956).

Suppose community i contains n_i households and has average (equalized) assessed value per housing unit of $\bar{H}_i$. Suppose it also contains m_{ij} firms in industry j having average (equalized) assessed value per firm of $\bar{F}_{ij}$. Suppose the community's tax rate before Proposition 13 was t_i. Then total property tax revenues, T_i, equal to total expenditures on local public services are

$$T_i = t_i[n_i\bar{H}_i + \sum_j m_{ij}\bar{F}_{ij}]. \tag{1}$$

In this context, the immediate effect of Proposition 13 is to replace t_i with a fixed statewide property tax rate, $\bar{t}$, which is less than any t_i value. If $n_i, \bar{H}_i, m_{ij}$, and $\bar{F}_{ij}$ remain the same, then expenditures on public services increase or decrease by $(t_i - \bar{t})/t_i$ or by τ_i percent. But changes in expenditure levels may affect firms versus households in the same locality differently.

Local public services vary between those that are more or less Samuelsonian public goods and benefit all households and firms in a community (roads are an example), and those that are more or less private goods provided to individual households or firms (trash collection is an example). Services in the latter category may be provided only to households (education) or only to firms (special police protection). Thus an increase or decrease in the local tax rate of τ_i percent could cause services to firms to rise or fall by the same percentage as services to households—if, for example, all local public services were Samuelsonian or all were private but the share of expenditures devoted

to services to firms remained unchanged. In either of these cases, offsetting changes in taxing and spending levels would tend to have little effect on the relative attractiveness of different localities, particularly if firms can offset changes in public service levels by increasing or decreasing their use of private services that substitute for publicly provided goods. An example of this might be firms using more private security guards if police protection is cut back.[5]

However, the share of expenditures devoted to services to firms versus households may change if tax rates change. One possibility is that changes in tax revenues—up or down—will mostly be absorbed by changes in the level of such services as education, parks, and recreation, which benefit households. Services such as roads, police, and fire protection, which benefit firms, are less likely to be cut if tax revenues fall or to be raised if revenues rise. In this case, if a change such as Proposition 13 causes a community's tax rate to fall by τ_i percent, then firms' tax payments will fall by τ_i percent but the value of services provided to them will fall by less. Thus the tax price of local public services in that community will fall and firms will have an incentive to move there. Conversely, if the change causes a community's tax rate to rise by τ_i percent, then firms' tax payments will rise by τ_i percent, but the value of services provided to them will rise by less. Thus the tax price of local services will rise and firms will have an incentive to move out. In this scenario, Proposition 13 will cause previously high-tax communities to become relatively more attractive to firms, while previously low-tax communities will become relatively less attractive to firms.

Other possibilities also exist. Communities might prefer to cut back services to firms rather than households, because the tax price to firms of substituting private for public goods is more favorable than that for households. For example, firms can deduct from taxable profits the cost of either paying higher property taxes to finance a larger police force or paying the salary of a private security guard if police protection is cut back. But households cannot deduct the cost of summer camp for their children if cutbacks in property taxes (which are deductible for households that itemize) cause summer public school classes to disappear. This suggests a tax incentive for communities to cut back services to firms if property tax revenues fall and not increase services to firms if property tax revenues rise. However some services are difficult to cut—either because they are Samuelsonian public goods or because there are no private services that can be substituted for public goods.

I have shown that a Proposition 13–type change in a Tiebout context is likely to cause offsetting changes in local tax and expenditure levels. If the changes offset each other completely, then firms will have little

or no incentive to move. If they offset each other but not completely, then firms will have an incentive to move to communities having a more favorable tax price per unit of public services and away from communities whose tax price rises. In this case, however, location effects are of second-order importance and incentives for firms to move are likely to be quite muted.

4.3.3 A Tiebout Theory of Firm Location with Zoning

In actuality, local governments exert much more direct control over firms' location choice than by setting the tax price for public goods. Zoning is often used to set aside areas where firms can locate and zoning maps are often quite specific concerning which types of firms are allowed in which zones. Firms may be excluded completely if they generate excessive noise or traffic or emit pollutants above a fixed standard. Buffer strips or extensive landscaping may be required of firms permitted to enter. Communities wishing to exclude particular firms or all firms may refuse to grant sewer permits or may require bribes of various sorts in return for zoning variances. Certain types of firms may be excluded regardless of circumstances. Wealthy communities may exclude all types of firms, preferring a completely residential environment. Bargaining on a case by case basis is often the rule.

Fischel (1975) and White (1975a and 1975b) have developed models in which there is intercommunity competition for firms, similar to that for high-income households. Communities are willing to accept firms as long as the property taxes paid by a new firm equal the sum of (1) the marginal cost to the community of supplying local public services to the firm and (2) the value to residents of the loss in environmental amenities due to the firm locating there. Communities are assumed to be willing to allow firms to enter as long as their tax payments equal or exceed this level. Intercommunity competition should drive taxes down to equality with marginal public service plus amenity costs, except that communities having monopoly control of some scarce resource will receive taxes greater than this level. In this scenario, when communities admit firms, their residents are compensated for the negative environmental impact by enjoying a lower price per unit of local public goods.

There are two variants on this theme. In the first, property taxes are individually negotiated with each firm and bear no relation to the market value of property used by the firm. In the second, discussed in the next section below, property taxes are levied on the actual value of property used by the firm.

Suppose that a particular firm in industry j wishes to locate in community i. The value of its environmental or disamenity effect is E_{ij} per year. The marginal cost of public services provided to the firm is C_{ij}.

Then to allow the firm to enter, the community will demand a yearly tax payment of $T_{ij} \geq E_{ij} + C_{ij}$. If there is intercommunity competition for firms, T_{ij} will be driven down to equality with $E_{ij} + C_{ij}$.

In this context, each community's property tax rate is determined by the requirement of a balanced budget relating the community's property tax revenues to its overall expenditures. This tax rate, t_i, by assumption must be applied uniformly to both residential and business property. Therefore to raise tax revenues T_{ij} from firm j, the tax assessor in community i sets a taxable value on the firm's capital (building) plus land of F_{ij}, where

$$F_{ij} = T_{ij}/t_i \geq (E_{ij} + C_{ij})/t_i. \tag{2}$$

F_{ij} will generally differ from the actual market value of capital and land used by the firm.

Under these assumptions, the property tax is actually a bribe in disguise, related only in a formal way to the firm's use of property. Here the form of the tax has no deterrent effect on any particular firm entering any particular community. However, the determination of E_{ij} and C_{ij} will depend on many factors, including the number of firms already in the community, the community's income level and its character, the amount of vacant land in the community, and what public services the community provides to the firm. For particular types of firms, E_{ij} will be higher for high-income communities and is likely to rise at an increasing rate as the number of firms in a community rises. But E_{ij} may be lower if the community has vacant land, so that firms can be buffered from nearby residents. Finally, note that E_{ij} may be zero (or even negative) for particular communities. An extreme example is provided by the Asarco plant in the state of Washington, where use of asbestos endangers the health of local residents, but the community nonetheless opposes closing down the plant because the jobs it provides are valued.

In this scenario, high-income communities will admit only nonpolluting firms, such as office or research facilities or perhaps shopping malls. Since E_{ij} is higher in general in high-income than in low-income communities, all firms (including nonpolluting firms) will tend to prefer to locate in low-income communities. Exceptions to this rule would occur only if particular firms had lower production costs or higher revenues in high-income communities. Examples might be stores selling luxury goods, which value proximity to high-income customers, or office or research operations that value short commuting trips for their high-income workers.

How would a Proposition 13 change location incentives in this type of model? If Proposition 13 only changed tax rates from t_i to a uniform $\bar{t}$, then communities could reestablish the previous level of tax pay-

ments merely by setting a new assessed value for each firm, F_{ij}', where

$$F_{ij}' = T_{ij}/\bar{t} \geq (E_{ij} + C_{ij})/\bar{t}. \tag{3}$$

In this case the same tax revenues would be collected from firm j by community i, with a higher assessed value offsetting a lower tax rate.

However, Proposition 13 also mandated a system of market value assessment (actually 1975 market value rising at 2% per year or the most recent sale price) for all properties. This latter provision causes problems for communities. With assessed value now set equal to market value, F_{ij}^m, firm i in community j pays property taxes equal to $\bar{t}F_{ij}^m$. For particular firms, the new property tax payment will differ little if any across communities, since only differences in the value of land or the capital/land ratio can cause variation in tax liability.

The firm's new level of property taxes differs from the old payment, T_{ij}, by

$$(\bar{t}F_{ij}^m - t_iF_{ij})/t_iF_{ij}, \tag{4}$$

in percentage terms.

For particular firms, the new level of tax liability can be either higher or lower than the old. Under Proposition 13, the property tax rate fell for all counties, i.e., $\bar{t} < t_i$ for all i. (See the discussion below of table 4.1.) However, the relation between pre–Proposition 13 F_{ij} and post–Proposition 13 F_{ij}^m is more difficult to predict. F_{ij} would tend to be higher for firms with more adverse environmental effects, for firms receiving higher levels of public services, for firms in communities with lower property tax rates, or for firms using little land and/or capital. For firms in these situations, property tax payments fall after Proposition 13. For other firms, however, F_{ij}^m may exceed F_{ij}, in which case property tax payments could either rise or fall. Thus communities' tax revenues from firms could either rise or fall as a result of Proposition 13.

I have shown that Proposition 13 caused communities to incur windfalls on property tax receipts from firms. These windfalls could be positive or negative. Since the pre–Proposition 13 system of setting an artificial assessed value on different firms to generate the correct bribe cannot be reestablished, communities and firms in this case are thrown out of equilibrium by Proposition 13. They are likely, therefore, to engage in nonmarket means of persuasion to move toward a new equilibrium. Communities may apply pressure selectively to firms that are now paying taxes less than $E_{ij} + C_{ij}$ either to reduce their pollution levels or to move out. Firms paying taxes greater than $E_{ij} + C_{ij}$ may pressure communities to allow them to pollute more or to expand on

site. As an alternative, they may threaten to move. Communities may impose new user fees on firms already there and development fees on firms seeking to move in. They may also use zoning variances, building code regulations, and building inspections more or less rigorously than before, depending on whether the community wants to encourage new firms to enter or existing firms to leave. Thus nonmarket mechanisms are likely to become more important as the firm location pattern moves toward its new post–Proposition 13 equilibrium.

4.3.4 A Tiebout Theory of Firm Location with Pollution and Market Value Assessment

Now change the assumptions concerning how property taxes paid by firms are determined. Suppose in particular that communities are forced to assess and tax firm property at market value. Then the value of firm j's property in community i, F_{ij}^m, is exogenously determined. In the pre-Proposition 13 world, the tax revenue received by community i is $t_i F_{ij}^m$. In this case, communities have an incentive to use their zoning power to select particular types of firms. Assume that communities compete for firms based on their marginal disamenity costs. Also assume that the marginal cost of local public goods supplied to firms is zero, i.e., $C_{ij} = 0$.

Firms are now assumed to use land (L_j), capital (K_j), and environment (E_j) to produce their output (Q_j). Rather than follow the usual approach of viewing, say, smoke emissions as a joint product with output of the firm's production process, I instead treat the environmental amenity level as an input in the production process. In other words, environment is used up at varying rates per unit of output by different types of firms.

Suppose each community levies a property tax on the firm which is intended to compensate residents for loss of environmental quality. Assume that each community sets a constant per unit price, $\emptyset_i$, as its opportunity cost of environmental quality loss per unit of the input E_j. $\emptyset_i$ will be higher for wealthier communities or those for which there is inelastic demand for land. The community wishes to raise property tax revenues from firm j equal to the opportunity cost of environmental quality loss due to the firm. Thus

$$t_i F_{ij}^m = T_{ij} = \emptyset_i E_j. \tag{5}$$

If each community has a predetermined, fixed property tax rate, t_i, then it can only raise taxes equal to $\emptyset_i E_j$ from the firm if the community's tax rate t_i equals the value of the loss of environmental quality caused by the firm divided by the market value of the firm's land plus capital or

$$t_i = \emptyset_i E_j / (p_L L_j + p_K K_j), \tag{6}$$

where p_L and p_K are (constant) prices per unit of land and capital.

This means that firms in a metropolitan area will tend to locate in different communities depending on the relationship between firms' use of the environment relative to other private inputs versus the community's tax rate. Firms making relatively intensive use of the environment will tend to locate in high-tax-rate communities, while firms having little or no polluting effect will locate in low-tax-rate communities. In this model, each community is predicted to contain firms in only one or a few industries. Further, firms having extremely high pollution levels may not be able to find any community willing to admit them unless they introduce pollution controls, while very clean firms may pay property taxes in excess of $\emptyset_i E_j$ even in the lowest-tax-rate community.

For the Cobb-Douglas production function, $Q_j = E^{\alpha_j} L^{\beta_j} K^{1-\alpha_j-\beta_j}$, the resulting stratification effect is quite straightforward. In this case, equation (6) becomes

$$t_i = \alpha_j / (1 - \alpha_j). \tag{7}$$

Thus firms stratify across communities depending only on the community's tax rate and the firm's level of α_j. Firms in industries with higher α_j values locate in communities with higher tax rates. Here firm location can be predicted simply by ranking communities by their tax rates and firms by the α_j value pertaining to that industry.

Now suppose Proposition 13 again replaces the set of community tax rates t_i with a uniform tax rate $\bar{t}$. Communities have now lost both degrees of freedom in taxing firms—they can vary neither F_{ij}^m nor $\bar{t}$. All firms using property of market value F_{ij}^m must pay the same amount in property taxes regardless of where they locate. The change in tax revenues received by community i from firm j is (in percentage terms) $\tau_i = (\bar{t} - t_i)/t_i$. This differs from the change in tax revenues under the negotiated property tax system. Since $\bar{t}$ is less than t_i for all communities, property tax payments by all firms fall, although by varying amounts. Since high-income communities generally have lower property tax rates than low-income communities, the latter are likely to suffer larger losses of property tax revenues from firms as a result of the Proposition 13–mandated reduction in t_i.

The relocation incentives of firms in this situation are again difficult to predict. First, the stratification effect described above should gradually disappear, with firms in different industries no longer tending to segregate themselves in particular communities. Second, communities generally are likely to exert direct pressure on firms, by cutting services, by forcing them to reduce pollution, or by encouraging them to move out. Finally, low-income communities are likely to become rel-

atively more attractive to firms, both because their property tax rates have fallen the most and because these communities have low $\emptyset_i$ values.

To summarize this section, we have postulated several theories that predict quite different firm location effects as a result of Proposition 13. First, the pure tax approach predicted that firms would react to the change by moving into communities whose tax rate decreased the most and out of communities whose tax rate rose or fell by relatively small amounts. In this model, the prediction is the same for firms in all industries.

Second, the Tiebout theory of firm location predicted that the location effects of Proposition 13 would be much weaker. Here tax reductions are likely to be offset by reductions in the level of public services provided. If these two effects offset each other, then firms have no incentive to move. If the tax reduction is larger or smaller than the value of the service reduction, then firms have incentives to move toward (away from) communities whose tax per unit of public service has fallen (risen) the most. However, relocation incentives are second order here and any effects are likely to be small.

Third, the Tiebout theory of firm location under zoning suggests that, after Proposition 13, communities will incur positive or negative windfalls vis-à-vis firms within their boundaries, since tax revenues will rise or fall relative to firms' environmental amenity and marginal public service cost. This means that communities will exert selective pressures on firms to move out and/or may encourage other firms to move in. The effects are likely to differ by industry, with the environmentally worst firms under the most pressure to relocate. Also, communities whose tax revenues from firms have fallen the most are likely to exert nonmarket pressures on all firms within their boundaries. But such pressures may be difficult to detect, since they could take the form either of firms moving out or of firms abating their adverse environmental effects. In general, the effects of Proposition 13 under the zoning model will differ by type of firm and type of community.

4.4 Estimation

The basic specification of the model to be tested is:

$$\dot{A}_{ij} = \alpha + \beta \Delta t_i + \gamma \dot{A}_{US,j} + \delta \dot{E}_{i,t-1} + \psi T/R_i + \epsilon_{ij}, \tag{8}$$

where $\dot{A}_{ij}$ is the percent change in a measure of the activity level of firms in the jth industry in the ith locality between 1977 and 1981 and Δt_i is the change in the property tax rate in locality i during the same period. ϵ_{ij} is the error term. (The other variables are discussed below.) β can thus be interpreted as the percent change in activity per one percentage point change in the tax rate. It is expected to have a negative

sign. For example, if $\beta = -5$, then a reduction in the property tax rate from 2% before Proposition 13 to 1% after would be associated with a 5% increase in the level of firm activity, or from, say, 100 firms before to 105 firms after.

Because of the variety of theories posited above concerning communities' and firms' responses to changes in the property tax structure, the tax coefficient β in (8) is subject to a variety of interpretations. If capitalization is important, then β measures firms' response to tax changes net of capitalization. If zoning policies by communities are important, then the tax change is likely to be correlated with the strength of communities' zoning response. Then β will measure the combined effects of property tax changes under Proposition 13 and the resulting changes in communities' zoning policies. Finally, if public service levels provided to firms change as a result of Proposition 13, then β will measure the net effect on firm activity of tax and service level changes. (I attempt to correct for the latter by introducing a measure of fiscal sensitivity to property tax revenues directly—see below.)

The data used to measure firm activity A_{ij} are countywide and come from County Business Patterns (CBP).[6] For each SIC code, CBP data are available concerning the number of firms in the county, total number of employees, and total yearly payroll. Equation (8) is estimated separately for each of these three activity measures. CBP data have the advantage that they measure all sources of change in firm activity levels: expansions, contractions, relocations, and firm births and deaths are all included. Data from two-digit SIC codes (broad industrial classifications) are used, since the more disaggregated four-digit SIC codes contain many zero values for individual counties. The sample of SIC codes used contains manufacturing firms, firms in transportation and communications, firms providing financial services, firms in wholesale and retail trade, construction, and the service sectors. Primary industries (mining, farming) are excluded on the grounds that they are spatially tied. Also government industries such as the Postal Service and education and social services are excluded since public property is exempt from the property tax. The years used were 1977, the last year before Proposition 13 took effect, and 1981, the most recent year for which CBP data are available. Table 4.1 gives mean values for all variables and table 4.2 lists the set of SIC codes used.

Countywide average property tax rates and assessed value/market value ratios for 1977 were obtained from the State Board of Equalization, state of California, for thirty of California's fifty counties.[7] The resulting equalized property tax rates for each county are given in table 4.3 for 1977.[8] Since Proposition 13, the Board has not attempted to construct average assessed/market value ratios for counties. These can still vary across counties, either because of varying rates of capital

Table 4.1 **Means and Standard Deviations of Variables**

	Manufacturing		Retailing/Services	
	Mean	Standard deviation	Mean	Standard deviation
Proportional change in number of firms, 1977–81, California counties	.079	.258	.095	.284
Proportional change in number of employees, 1977–81, California counties	.355	.911	.359	.559
Proportional change in payroll, 1977–81, California counties	.817	1.19	.770	.878
Proportional changes in number of firms, 1977–81, U.S.	−.021	.073	.024	.116
Proportional change in number of employees, 1977–81, U.S.	.042	.074	.207	.164
Proportional change in payroll, 1977–81, U.S.	.427	.113	.588	.215
Proportional change in employed labor force, 1973–77, California counties	.226	.091	.229	.086
Property tax revenues/total revenues, 1977, California counties	.383	.058	.379	.056

appreciation or varying rates of turnover since 1978. However, from the point of view of a firm considering relocating to or within California, this omission does not seem to be a serious problem. If the firm purchases property, then the sale value will become the new assessed value, while if the firm rents property, then the rent level will capitalize any tax savings from a lower assessed value. In either case, the (perhaps implicit) property tax liability faced by a relocating firm should be constant anywhere in California.

The (uniform) tax rate used for 1981 was 1.144%.[9] Changes in tax rates for individual counties after Proposition 13 are also given in table 4.3. The sample thus consists of thirty counties times fifty-four SIC

Table 4.2 SIC Codes Used in Regressions

Manufacturing	
2000	food and kindred products
2100	tobacco manufacturers
2200	textile mill products
2300	apparel and other textile products
2500	furniture and fixtures
2700	printing and publishing
2800	chemicals and allied products
2900	petroleum and coal products
3000	rubber and miscellaneous plastic products
3100	leather products
3200	stone, clay and glass products
3300	primary metal products
3400	fabricated metal products
3500	machinery, except electrical
3600	electric and electronic equipment
3700	transportation equipment
3800	instruments and related products
3900	miscellaneous manufacturing industries
Retail and wholesale trade, services, transportation, construction	
4200	trucking and warehousing
4500	transportation by air
4700	transportation services
4800	communication
5000	wholesale trade—durable goods
5100	wholesale trade—nondurable goods
5200	building materials and garden supplies
5300	general merchandise stores
5400	food stores
5500	automotive dealers and service stations
5600	apparel and accessory stores
5700	furniture and home furnishings stores
5800	eating and drinking places
5900	miscellaneous retail
6000	banking
6100	credit agencies other than banks
6200	security, commodity brokers and services
6300	insurance carriers
6400	insurance agents, brokers, and service
6500	real estate
6600	combined real estate, insurance
6700	holding and other investment offices
7000	hotels and other lodging places
7200	personal services
7300	business services
7500	auto repair, services, and garages
7600	miscellaneous repair services

Table 4.2 (continued)

Retail and wholesale trade, services, transportation, construction	
7800	motion pictures
7900	amusement and recreation services
8100	legal services
8900	miscellaneous services
1500	general building contractors
1600	heavy building contractors
1700	special trade contractors

codes. Eliminating observations for which the activity measure was zero or missing in either 1977 or 1981, the actual sample size used in the regressions is 1156 observations.

Several other variables were also used in the estimations. First, the period 1977–81 was one of recession in many industries. To correct for overall macroeconomic trends in each industry, I introduce the variable $\dot{A}_{US,j}$, the percent change in activity nationally in industry j. Activity nationally is measured by the same three variables over the same time period as are used in constructing $\dot{A}_{ij}$, except that the U.S. summary of the County Business Pattern data is used. (Thus when the percent change in number of firms in county i in industry j is being explained, the recession correction variable is the percent change in number of firms in the United States in industry j and similarly for the other two activity measures.) Note that if the coefficient of $\dot{A}_{US,j}$ equals one, then activity in county i in industry j has increased or decreased since 1977 at the same rate as it did nationally.

Second, to allow for differences in the rate of overall economic growth of different localities, which may be correlated over time, I introduce the variable $\dot{E}_{i,t-1}$, the rate of increase in the employed labor force in county i over the period before the adoption of Proposition 13. $\dot{E}_{i,t-1}$ is measured for the years 1973–77 and is also taken from County Business Patterns.

Finally, in an attempt to measure how the provision of local public services has been affected by the adoption of Proposition 13, we used as an additional variable the ratio of property tax revenues to total revenues in 1977. This variable, denoted T/R_i, was intended to measure the sensitivity of different areas' fiscal structure to reductions in property tax revenue. Higher values of this variable would indicate greater likelihood of extensive service reductions following Proposition 13. To the extent that firms are attracted to areas where better public services are provided (holding firms' own taxes constant), higher values of T/R_i would discourage firms from locating there. The data are taken from the 1977 Census of Governments and are listed in table 4.3.[10]

Table 4.3 **Equalized Property Tax Rates in Thirty California Counties and the Ratio of Property Tax Revenues to Total Government Revenues**

	1977 equalized tax rate	Percent change 1977–81	1977 property taxes/ total revenue
Alameda	.0257	−55%	.41
Butte	.0156	−27%	.40
Contra Costa	.0222	−48%	.50
Fresno	.0174	−34%	.33
Humboldt	.0129	−11%	.35
Kern	.0134	−15%	.39
Los Angeles	.0215	−47%	.40
Marin	.0188	−39%	.52
Mendocino	.0186	−38%	.38
Monterey	.0174	−34%	.38
Napa	.0160	−29%	.42
Orange	.0149	−23%	.43
Placer	.0180	−36%	.32
Riverside	.0194	−41%	.33
Sacramento	.0227	−50%	.30
San Bernadino	.0212	−46%	.34
San Diego	.0182	−37%	.36
San Francisco	.0199	−43%	.36
San Joaquin	.0207	−45%	.32
San Luis Obispo	.0137	−16%	.43
San Mateo	.0153	−25%	.45
Santa Barbara	.0153	−25%	.37
Santa Clara	.0197	−42%	.38
Santa Cruz	.0174	−42%	.44
Shasta	.0139	−18%	.38
Solano	.0187	−39%	.32
Sonoma	.0196	−42%	.35
Stañislaus	.0191	−40%	.32
Tulare	.0152	−25%	.27
Ventura	.0197	−42%	.40
Yolo	.0202	−43%	.45
Mean	.0181	−35%	.38

The relationship between the number of employees and the payroll measures of firm activity allows investigation of the issue of whether property tax changes cause offsetting changes in wage levels. Suppose we denote the first activity measure (number of firms) as $\dot{A}^1_{ij}$, the second activity measure (number of employees) as $\dot{A}^2_{ij}$, and the third activity measure (payroll) as $\dot{A}^3_{ij}$. Then we have

$$\dot{A}^2 = \frac{N_2 - N_1}{N_1} \text{ and} \tag{9}$$

$$\dot{A}^3 = \frac{w_2 N_2 - w_1 N_1}{w_1 N_1}, \tag{10}$$

where N_2 and N_1 are number of employees in 1981 and 1977, respectively, and w_2 and w_1 are wage rates in 1981 and 1977, respectively. The i and j subscripts have been dropped temporarily. From (8), we have $\partial \dot{A}^2/\partial \Delta t = \beta_2$ and $\partial \dot{A}^3/\partial \Delta t = \beta_3$, where β_2 and β_3 are the coefficients of Δt in the equations explaining number of employees and payroll. We can differentiate (9) and (10), assuming that w_1, N_1, and t_1 are fixed and defining Δt as $t_2 - t_1$. Substituting, we get a relationship between the estimated effects of the property tax change on number of workers and payroll and the implied effect of the tax change on wage rates, or:

$$\eta = \frac{w_1 N_1}{w_2 N_2} \beta_3 - \frac{N_1}{N_2} \beta_2, \tag{12}$$

where η is the percent change in w_2 (post–Proposition 13 wage rates) per percentage point change in the property tax rate. Thus by estimating equation (8) for the number of employees and payroll measures of activity, we can indirectly examine whether there were wage capitalization effects of Proposition 13.

The theories discussed above suggest that responsiveness to property tax changes might differ for firms in different types of industries. In particular, if zoning is an important factor in firms' location decisions, then firms in polluting industries may have very restricted options since they are excluded from many localities. These firms are less likely to react to the change in property taxes. Other firms will be more or less welcome in their pre–Proposition 13 locations after the change, depending on whether their new levels of property tax payments exceed or fall short of their disamenity plus local public service costs. Also, retailing firms and service firms face a different problem in moving from manufacturing firms, since their markets are spatially defined. If they move, they must develop a new customer base. On the other hand, these firms often have little invested capital, which makes moving easier for them than for firms with a more substantial capital investment.

To investigate these issues, the sample was subdivided into two groups: manufacturing firms and firms in retail trade and services. The latter group also includes firms in construction, transportation, and wholesale trade. (See table 4.2.) Equation (8) was estimated for the entire sample and for each subsample; in each case for all three activity measures. Chow tests on all three activity measures rejected the hypothesis of a common relationship; therefore only the separate results for the two subsamples are reported.

Tables 4.4 and 4.5 give the results. Examining the results for the property tax variable, Δt_i, its sign is consistently negative (except in the regression explaining changes in the number of manufacturing firms). It is significantly negative in all three regressions explaining service and retailing activity, but is never significant in the regressions explaining manufacturing activity. Thus the results provide support for

Table 4.4 **Regression Results Explaining Firm Activity Levels in California—Manufacturing Sectors**

	Activity measure ($\dot{A}_{ij}$)		
	Percent change in number of firms	Percent change in number of employees	Percent change in payroll
Constant	.224*	.132	−.317
	(.106)	(.399)	(.566)
Δt_i	1.38	−5.81	−15.5
	(4.89)	(18.4)	(23.7)
$\dot{A}_{US.j}$	1.06*	1.87*	1.70*
	(.186)	(.687)	(.578)
$\dot{E}_{i,t-1}$	.246	1.56*	2.12*
	(.165)	(.616)	(.798)
T/R_i	−.439	−.632	−.424
	(.237)	(.887)	(1.15)
R^2	.11	.04	.05
F	9.6	3.7	4.0
N	329	329	329
SSR	19.6	275.4	461.8

NOTE: Standard errors are in parentheses. Asterisks indicate significance at the 95% level.

the hypothesis that property taxes are a significant determinant of the level of firm activity for retailing and service firms, but not for manufacturing firms. In the retailing-services sector, a property tax decrease of one percentage point (which is close to the average impact of Proposition 13) causes an increase of about 6% in the number of firms, an increase of 6% in employment, and an increase of 15% in payroll. The results here thus do not support the usual presumption in the literature that manufacturing firms are more tax sensitive and footloose than retailing or service firms. While the coefficients of Δt_i are of similar magnitude in the regressions explaining the number of employees and payroll for manufacturing firms, they are never significant.

We can use these results and information in table 4.1 to calculate the wage capitalization effect described in equation (12) for the retailing-services sector. Substituting and using the values $N_1/N_2 = .74$ and $w_1N_1/w_2N_2 = .56$, we find that $\eta = -1.7$. Thus the same one-percentage-point decrease in the property tax rate implies an increase in wage rates of about 1.7%. Part of the benefit from the property tax reduction thus goes to workers in the form of higher wages.

The other variables have the expected signs and are generally significant. Both sets of regressions have elasticities of firm activity in California with respect to changes in activity nationally which are con-

Table 4.5 **Regression Results Explaining Firm Activity Levels in California—Service and Retail Sectors**

	Activity measure ($\dot{A}_{ij}$)		
	Percent change in number of firms	Percent change in number of employees	Percent change in payroll
Constant	− 0.100*	.276*	−.883*
	(.0440)	(.105)	(.163)
Δt_i	−6.14*	−9.21*	−15.05*
	(1.97)	(4.66)	(6.87)
$\dot{A}_{US,j}$	1.17*	.666*	1.32*
	(.0470)	(.0774)	(.0898)
$\dot{E}_{i,t-1}$	.436*	.715*	.869*
	(.0681)	(.161)	(.237)
T/R_i	.0460	.617*	1.43*
	(.0999)	(.236)	(.348)
R^2	.45	.11	.23
F	166.9	25.9	62.2
N	826	826	826
SSR	21.4	119.7	259.9

NOTE: Standard errors are in parentheses. Asterisks indicate significance at the 95% level.

sistently greater than unity. The lagged county employment variable is significant in all but one regression and is always positive. In the manufacturing regression it is generally greater than unity, while in the retailing-services sector regressions, it is always less than unity. The tax sensitivity variable has the expected negative sign in the manufacturing regressions, but is positive in the retailing-service sector regressions.

In conclusion, the empirical results provide support for the hypothesis that property taxes have a significant negative effect on firm activity levels in the services and retailing sector. A decrease of one percentage point in the property tax rate, about the change that occurred in California after Proposition 13, is associated with an increase of 6% in number of firms, 9% in number of employees, and 15% in payroll. The results suggest that the property tax drop also caused wages to rise slightly in these sectors, by about 1.5%. However, the study did not find any significant effect of property taxes on firm activity levels for manufacturing firms. It seems possible that these firms adjust to tax change only with a longer lag than the four years reflected in the data, perhaps because they have capital invested in their current locations that would decline substantially in value if moved. Retailing and service

firms, in contrast, are more likely to be able to pick up their capital and take it with them.

Notes

1. Proposition 13 exempted school district debt service obligations contracted before 1978 from the 1% property tax levy. These amounts are added to the basic property tax.
2. See Isard (1956). A recent reference is Oster (1979).
3. See White (1976) and Moomaw (1980).
4. See Oakland (1978) and Wasylenko (1981b) for surveys of the empirical literature and further references.
5. See White (1979), which develops a theory of how governments respond to exogenously imposed tax cuts by reducing spending on various services depending on the substitutability of private for public inputs in producing "quasi-public goods."
6. These data are published annually by the Bureau of the Census.
7. I am grateful to Jeff Reynolds, Statistical Research and Consulting Division, California State Board of Equalization, and to Howard Chernick for providing data.
8. Before Proposition 13, state guidelines called for an assessed value/market ratio of .25, but many counties had lower ratios. The equalized property tax rates are the product of the assessed value/market value ratio and the statutory tax rate.
9. Obtained from the State Board of Equalization.
10. Several other fiscal variables were also tried, with similar results. These included the percent increase in total county expenditure over the period 1977–81 and the level of total government revenue per capita in 1977.

References

Bartik, T. J. 1984. Business location decisions in the United States: Estimates of the effects of unionization, taxes and other characteristics of states. Working paper no. 84–W05 Department of Economics, Vanderbilt University.

Carlton, D. W. 1979. Why new firms locate where they do: An econometric model. In W. C. Wheaton, ed., *Interregional movements and regional growth, COUPE papers on public economics 2*. Washington, D.C.: Urban Institute.

Dorf, R. J., and M. J. Emerson. 1978. Determinants of manufacturing plant location for nonmetropolitan communities in the west north central region of the U.S. *Journal of Regional Sciences* 18:1.

Epping, G. M. 1982. Important factors in plant location in 1980. *Growth and Change* 13:1.

Fischel, W. A. 1975. Fiscal and environmental considerations in the location of firms in suburban communities. In E. S. Mills and W. E. Oates, eds., *Fiscal zoning and land use controls*. Lexington, Mass.: Lexington Books.

Fox, W. 1981. Fiscal differentials and industrial location: Some empirical evidence. *Urban Studies* 18: 105–11.

Grieson, R. E., W. Hamovitch, A. M. Levenson, and R. D. Morgenstern. 1977. The effect of business taxation on the location of industry. *Journal of Urban Economics* 4: 170–85.

Isard, W. 1956. *Location and space-economy.* Cambridge: MIT Press.

Ladd, H. F. 1975. Local education expenditures, fiscal capacity, and the composition of the property tax base. *National Tax Journal* 28, no. 2: 145–58.

Moomaw, R. 1980. Urban firm location: Comparative statics and empirical evidence. *Southern Economic Journal* 47: 404–18.

Moore, B., and J. Rhodes. 1976. Regional employment policy and the movement of manufacturing firms to development areas. *Economica* 43: 17–31.

Oakland, W. H. 1978. Local taxes and intraurban industrial location: A study. In G. Break, ed., *Metropolitan financing and growth management policies.* Madison: University of Wisconsin Press.

Oster, S. 1979. Industrial search for new locations: An empirical analysis. *Review of Economics and Statistics* 61: 288–92.

Papke, L. E. 1984. The measurement and influence of interstate tax differentials on industrial activity. Mimeographed.

Schmenner, R. W. 1978. The manufacturing location decision: Evidence from Cincinnati and New England. Report to the U.S. Department of Commerce, Economic Development Administration.

Tiebout, C. 1956. A pure theory of local expenditures. *Journal of Political Economy* 64: 416–24.

Wasylenko, M. 1981a. Evidence on fiscal differentials and intrametropolitan firm location. *Land Economics* 56: 339–49.

———. 1981b. The location of firms: The role of taxes and fiscal incentives. In R. Bahl, ed., *Urban government finance: Emerging trends. Urban Affairs Annual Review,* 20.

Wheaton, W. C. 1983. Interstate differences in the level of business taxation. *National Tax Journal* 36: 83–94.

White, M. J. 1975a. Firm location in zoned metropolitan areas. In E. S. Mills and W. E. Oates, eds., *Fiscal zoning and land use controls.* Lexington, Mass.: Lexington Books.

———. 1975b. Fiscal zoning in fragmented metropolitan areas. In E. S. Mills and W. E. Oates, eds., *Fiscal zoning and land use controls.* Lexington Books.

———. 1976. "Firm Suburbanization and Urban Subcenters," *Journal of Urban Economics* 3:323–43.

———. 1979. Government response to spending limitations. *National Tax Journal* (supplement) 32: 201–10.

Comment Sharon Bernstein Megdal

Michelle White examines the outcome of a natural experiment, California's implementation of Proposition 13, in her study of the effect of property taxes on firm location. The underlying premise is that firms' location decisions are influenced by a host of factors, including production and transportation costs and taxes. The distribution of business activity over a region will change as the relative costs of doing business change. If we are interested in studying changes in business activity relative to some base, as is White, we can do so without measuring those factors that remain constant over the period of interest. It is reasonable for White to assume that relative production and transportation costs within the state of California were not affected by implementation of Proposition 13. This assumption allows her to model intercounty variation in business activity without specifying a complete model of firm location behavior.

It is evident from White's literature survey that there is no set of consistent results regarding the effect of taxes on firm location. The studies suggest that taxes do not appear to be an important determinant of choice of location when a firm is deciding among different regions, but they may be of some importance when a firm selects a location within a region.

White's theoretical discussion, though lengthy, is rather peripheral to the empirical portion of the paper. I say this because she offers alternative theoretical models and predictions, only some of which are consistent with the central empirical hypothesis that activity growth rates will be higher where property tax decreases are greater. Given the sometimes similar and sometimes ambiguous predictions and the incongruity of some of the models, I would have liked some insight as to which model she thought most appropriately described the pre–Proposition 13 situation in California. She then could have discussed the empirical findings in the context of the predictions of the "preferred" theoretical model. A discussion of the relative advantages and disadvantages of the three measures of business activity used would also have been helpful. If the interest is in modeling the outcome of firm location choices, the first dependent variable (the number of establishments) would be preferred. If the interest is in modeling business activity in general, on the other hand, perhaps one of the other two measures better captures the relevant magnitudes.

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White's results are largely consistent with her hypotheses. Although her simple model does not explain a large proportion of the variation of the dependent variables, the results are quite reasonable both qualitatively and quantitatively. The paper represents a good first attempt at studying a complex issue; however, I would have liked more discussion and interpretation of the findings. The author presents a menu of theoretical models but does not select a model from that menu. She then presents several regression equations but offers the reader little in the way of interpretation of the results. Hence, the remainder of my comments are devoted to a discussion of her model and results, focusing on my reasons for finding the results quite reasonable but also pointing out why I find interpretation of them somewhat difficult.

What I would select from White's menu is a model with zoning, assessments not equal to fair markets values,[1] a weak relationship between property taxes paid and services received by firms, and partial capitalization of property tax differentials. According to the 1977 *Census of Governments,* which reports data for fiscal 1976–77, a year that would be expected to be indicative of the pre–Proposition 13 revenue structure, 48.1% of property taxes raised in California funded school expenditures, and 5.8% funded expenditures of special districts. County and municipal governments raised the remaining 32.1 and 14.0% respectively. Property tax revenues comprised 24% of municipal general revenue and 36% of county general revenue. The figures suggest that a substantial portion of property tax dollars paid by firms did not fund services received by firms and that services received by firms were funded to a significant extent by revenue sources other than the property tax. It is, therefore, difficult to predict the extent of service cutbacks experienced by firms as a consequence of Proposition 13.

Given these figures, the post–Proposition 13 distribution of state surplus funds, and the increased use of user charges and development fees,[2] I would predict little response of basic industry activity, such as manufacturing, to imposition of Proposition 13, which is exactly what White found. Predictions regarding the retail and service sectors, the other main grouping studied, depend upon predictions regarding basic and nonbasic employment and residential location activity. Examination of White's list of service and retail industries reveals industries whose activity levels largely depend on residential location activity, which in turn depends on the growth in and dispersion of the population. Population growth depends partly on employment growth, while the dispersion of the population depends on the relative attractiveness of alternative residential locations, as determined by numerous factors, including the proximity to employment, housing prices, the extent to which the property tax is a benefit tax, and perceptions regarding service levels. Before accurate predictions regarding nonbasic business

activity can be made, a more complete model of business and residential activity must be specified. Although this endeavor is beyond the scope of this discussion, data for the thirty-one counties studied by White reveal some interesting patterns.

The following statistics are based on county level data (not broken down by industry) obtained from *County Business Patterns*. The average four-year growth rate in the number of establishments decreased from 16.1% for the 1973–77 period to 11.3% for the 1977–81 period, while the corresponding growth rate in number of employees increased over that same period from 19.8 to 25.7%. The correlation between the 1973–77 growth rate for establishments (employees) and the 1977 countywide average property tax listed in White's table 4.3 is −0.27 (−0.22). The simple correlation between the 1977–81 growth rate for establishments (employees) and the 1977 property tax rate is 0.20 (−0.03). Finally, the correlation between the 1973–77 and 1977–81 growth rates for establishments (employees) is 0.56 (0.49). (I have not considered changes in payroll, the third of White's dependent variables, because of their heavy dependence on the salary mix of employees.) Whereas there is a positive relationship between growth in the number of establishments and the number of employees, the correlation is not perfect. The data indicate that the growth in the number of establishments may have slowed down, but employment figures suggest that larger-than-average firms opened up and/or existing establishments fared well during the 1977–81 period. Proposition 13 was implemented just before interest rates soared and just after rapid escalation of home prices in California. The high cost of living in California relative to that of other states, uncertainty surrounding the general tax and revenue situation,[3] and the general slowdown in the economy are likely responsible for a slowdown of business movement into California. Yet at the same time, the rate of employment growth increased. White's regression results indicate that employment increased more rapidly in pre–Proposition 13 high-tax counties, though the manufacturing sector coefficient is not significant. With increased employment comes increased demand for the goods and services of service and retail trade firms, which are likely to respond readily to increased demand by expansion or entry into local markets. However, the question to what extent property taxes influence the location decisions of firms is still largely unanswered. So much of the variation in the dependent variables remains unexplained. The model has not explained the variation in location activity of firms producing goods for nonlocal markets, nor has it established that taxes are an important determinant of location choices for retail and service firms. The results for the latter sectors could be reflecting residential location choices rather than firm response to tax differentials.

The problems in interpreting White's results are no different from those that arise whenever a simple structure is used to model complex phenomena. The results, for the most part, are consistent with her hypotheses. What is needed for more definitive conclusions is a more detailed model of growth and business activity in California.

I would like to discuss some other reasons, some of which have already been alluded to, for the rather poor performance of the empirical model in explaining variation in business activity. First, there are problems of data aggregation. The data are at the county level; consequently, intracounty variability in the data is masked. In addition, the dependent variable includes births, deaths, expansions and contractions, and relocations within, into, and out of the state. Some of these components would be expected to be more sensitive to relative property tax rates than others. Another problem is that the time since passage of Proposition 13 may not have been long enough for differences in manufacturing activity to be revealed. Manufacturing (re)locations are likely to involve substantial lead time. Some of the firm activity in the early part of the 1977–81 period may reflect decisions made prior to Proposition 13, while some decisions made in the period immediately following its passage may not have been realized until rather late in the 1977–81 period. Also, the uncertainty surrounding the fiscal future of California locales relative to each other and relative to those in other states may have led to postponement of relocation and/or expansion decisions. For example, increases in user and development fees and the distribution of state surplus revenues lessened the immediate impact of Proposition 13.

White's assertion that certain attributes of California's business climate could be assumed to be unchanged by Proposition 13 is reasonable; however, the business climate of California relative to the rest of the United States may have changed over this period. Thus, in addition to adjusting for the change in industry activity at the national level, controlling for the level of industry activity in California might be necessary. One way of incorporating such changes in a model explaining intrastate variation in business activity would be to redefine the dependent variable in terms of the share of state business activity. One could then examine the change in shares over time.

In summary, I think the question to what extent firm location decisions depend on property tax rates is still largely unanswered. White's model yields quite reasonable results, but further study is needed. I am not yet willing to accept or reject the hypothesis that Proposition 13's realignment of property tax rates has had an impact on firm location patterns. It may be a while before a new equilibrium is reached in California. A different data set, model, and/or patience will help shed further light on this important question.

Notes

1. See Oakland (1979, 396).
2. See Strauss, Mikels, and Hagman (1982).
3. For example, Proposition 4, which limits the growth in annual appropriations of state and local governments, was passed by initiative in November 1979, but did not take effect until July 1, 1980. Also, developers found that local jurisdictions could change development rules after commitment of funds for public improvements. (See Strauss, Mikels, and Hagman [1982].) There was also uncertainty as to the extent to which worldwide earnings of multinational corporations would be taxed under California's unitary tax. Although in *Container Corporation of America vs. Franchise Tax Board,* the United States Supreme Court recently ruled that the worldwide unitary method of taxation used by California is constitutional, it is likely that California and other states will change their methods of taxing multinational corporations because this particular tax does seem to affect location decisions of multinational firms.

References

Oakland, W. H. 1979. Proposition XIII—genesis and consequences. *National Tax Journal, supplement.*

Strauss, B., M. Mikels, and D. G. Hagman. 1982. Description of proposition 13 and 14. In J. G. Rose, ed., *Tax and expenditure limitations: How to implement and live within them.* Rutgers: Center for Urban Policy Research, the State University of New Jersey.

U.S. Department of Commerce, Bureau of the Census. *Census of Governments.* GC77(4)–2, 3, 4.

U.S. Department of Commerce, Bureau of the Census. *County Business Patterns.* CBP–74–6, CBP–77–6, CBP–81–6.