

CHAPTER 2

Land Value Taxation

2.1 Introduction

Chapter 1 motivated and described a liberal theory that is able to provide an ethical foundation to neoclassical economics. This theory is built around the notion that individuals own themselves and the proceeds of their efforts, while natural opportunities are common property.⁴⁴ This chapter examines the treatment of natural opportunities in economic theory, and surveys the applications of land value taxation around the world.

Classical economists identified land, labor, and capital as the three factors of production. Under ‘capital’ they understood all means of production that have been created through human effort, while they used ‘land’ and ‘labor’ to describe natural resources that were not created through human effort. ‘Land’ can therefore be understood as a synonym for natural opportunities.

Neoclassical economic theory, however, disregards the differences between natural opportunities and capital, and combines them into a single factor of production. Beginning in the 1970s, the difference between labor and capital has been blurred by the inquiry into how labor productivity is enhanced by investments in education and training. Capital is therefore frequently divided into intangible capital and tangible capital. The intangible forms of capital consist of human skills (human capital) and social infrastructure (social capital), while tangible capital consists of all remaining factors of production except labor, so that it is also used to describe natural opportunities. Yet natural opportunities, which include soil, raw materials, water, air, the radio spectrum, in short: all things that exist without being created through human effort, possess economic properties that are sufficiently different from the economic properties of human-made things, to warrant doubts about the usefulness of combining both into a single factor of production.⁴⁵

⁴⁴ In Section 1.3 natural opportunities were defined as natural resources that are not embodied in human beings.

⁴⁵ Gaffney (1994) lists ten differences that separate land, understood as ‘natural opportunities’, from capital as it is commonly understood in economic theory.

The main difference between natural opportunities and capital lies in the fact that the former is neither produced nor reproducible, while capital can be (re)produced if the incentive to do so is strong enough. In addition, all capital will depreciate, and ultimately become obsolete. Natural opportunities, on the other hand, can be divided into exhaustible and non-exhaustible resources, and while the supply of exhaustible resources decreases with use, the supply of non-exhaustible resources is (by definition) constant over time: they neither wear out, nor do they depreciate as a function of time. In other words, their supply is perfectly inelastic.

Land, understood as ‘site’, is one of the main components of non-exhaustible natural opportunities. Some economists deny the inelasticity of land, and refer to supply as an offer to either sell the land or to put land to a different use.⁴⁶ However, this view is inadequate, because it does not take account of the aggregate non-reproducibility of land.

In Chapter 1 I have motivated the ethical aspects of a tax on land value to compensate people who use less than their share of this natural opportunity. The next section examines the efficiency aspect of a tax on land value by surveying the economic theory of land value taxation. Section 3 summarizes the empirical literature that deals with the economic effects of land value taxation, and motivates the empirical research that is the focus of the following five chapters.

2.2 Economic theory of land value taxation

Economic theory shows that under the assumption of perfect markets, a tax on any good with perfectly inelastic supply and non-zero elasticity of demand will be born entirely by the supplier of the good; it cannot be shifted to its user because any increase in the price would lead to an excess supply of the good; in a competitive market the demand for units that are offered at a price above the market price will drop to zero. Therefore a tax on land has to be paid in full by the owner of the land. Given that the supply of land is fixed, the tax does not have any substitution effect and therefore no deadweight loss, which makes it an ideal tax from an efficiency point of view.⁴⁷

⁴⁶ See for example Goldberg and Chinloy (1984), p. 123, and Hirshleifer (1988), p. 367.

⁴⁷ Any tax on a good with elastic supply and demand results in a deadweight loss due to the fact that the tax leads to a higher market price which discourages consumption of the good, and leads to its substitution by similar goods. The deadweight loss is the decrease in consumer’s and producer’s surplus, which is a result of the distortion of the efficient (utility and profit maximizing) allocation of resources that would have prevailed without the tax.

Even though most economists agree that a tax on land cannot be shifted, the conditions for a tax on land to be neutral are not generally understood. A tax on land is neutral when markets are perfect, provided only that the tax does not vary with the actions of the owner, and that it is not higher than the rent of land, because the existence of the tax does not alter the optimal economic decisions for economic agents. A number of authors have claimed that a tax on land changes the optimal time of development of land. Their result follows from incorrect computations of the value of land and from the use of incorrect tax bases. For example, Shoup (1969, 1970) shows that a tax increases the rate at which the value of land will be growing when development is optimal, but he fails to take into account that the tax also changes the growth path of the value of land over time. Bentick (1979a, 1979b) specifies the tax base as the price of land at its actual time of development, instead of as the land's sale value if it were unimproved, and Skouras (1978) assumes that the tax depends directly on the development status of the land. It is obvious that if the owner can alter the value of the land through development, a tax on its value will not be neutral. But the value of land ought to be understood as the price for which it would sell if it were unimproved, which means that the owner of land cannot change the tax base by using the land in a different way.⁴⁸ Any action that was optimal before the tax will remain optimal after the tax has been introduced. Correct proofs that there is no effect on the optimal time of development of a tax levied on the value land would have if unimproved go back at least to 1910.⁴⁹

Even though a tax on land does not have any distorting substitution effects, it can nevertheless have interesting income effects in a general equilibrium setting.⁵⁰ As the introduction of a tax on land will decrease the sale value of land, it will also decrease the total value of assets that are available for investment. Feldstein (1977) and Eckart (1983) show that this will lead to an increase in the demand for capital, and therefore to higher investment and lower interest rates. In addition, the tax decreases the sale value of the land without affecting its riskiness relative to the riskiness of capital, so that investors will rearrange their portfolios to hold a larger share of land, which in turn will increase the sale value of land. Eckart (1983), however, points out that this portfolio effect will persist only if the proceeds of the tax are not used to finance local public goods; Fane (1984) shows that the portfolio effect will also disappear if the tax is completely compensated.⁵¹

⁴⁸ Tideman (1996), p. 2.

⁴⁹ Anderson (1910).

⁵⁰ See Tideman (1994) for a summary of the literature on the income effects of land value taxation.

⁵¹ A completely compensated tax is a tax for which the government reimburses the owners of land by transferring to them the proceeds of bonds which are issued at the time the tax is levied; the tax proceeds are then used to finance the interest payments on the bonds.

While a tax on land is neutral when markets are perfect, it can help to overcome inefficiencies in imperfect markets by reducing adverse effects of land speculation. Brown (1927) pointed out that the participants in the market for land may have different beliefs about the future development of the value of land. Those who expect land to appreciate most in value have an incentive to bid the highest price for it, and to leave the land undeveloped to avoid future demolition cost. By increasing the cost of leaving land undeveloped, a tax on land will lead to a larger reduction in the return to land for those who want to leave the land undeveloped than for those who want to develop the land earlier, and therefore make more land available for development. This efficiency improvement can be understood as a reduction in the negative effects of the ‘winner’s curse’. Milgrom and Weber (1982) introduced this term to describe their observation that in a world with different beliefs, the highest bid for a good is usually offered by the person who made the biggest upward error in assessing the good, and who subsequently incurs a loss after acquiring it. As a tax on land disproportionately reduces the return for people who most overappraise land, it will tend to put more land into the hands of people who appraise the land more accurately.

A tax on land can also help to reduce the effect of imperfections in the lending market. Gaffney (1962, 1973) points out that it is usually difficult for lenders to identify the riskiness of different investments, and this imperfection in information leads to a higher interest rate for poor people than for rich people. Rich people find it therefore less difficult to acquire assets, for example land, than poor people. Gaffney also suggests that investment in land is very attractive to people with low discount rates and high opportunity cost of time, because land does not require much attention because its value will not decrease if the investor does not attend to it regularly. If this suggestion is correct, and if the discount rate of rich people is relatively low due to their low interest rate in the lending market, and their opportunity cost of time is relatively high, then the difference in the interest rates causes a large fraction of the land to be held by rich people. Because a tax on land value reduces the future return of the land, it gets capitalized into the amount that people are willing to bid for the land. Gaffney shows that the tax reduces the bids of people with low discount rates by more than it reduces the bids of people with high discount rates. This makes more land available to people with high discount rates, and ameliorates the distorting effect of the imperfections in the lending market.

Further theoretical aspects of the taxation of land value are still contested in the literature.⁵² Important issues are the effects of land value taxation on urban renewal,⁵³ the ade-

⁵² See Feder (1992), pp. 87-91, for a list of 25 unsettled issues. Wyatt (1994) discusses different arguments regarding land value taxation, and, albeit he presents the issue poorly, supplies an extensive four and a half page list of references.

⁵³ Gaffney (1952), Gaffney (1964), Gaffney (1969), Gaffney (1989), Wyatt (1994).

quacy of land taxes for financing local public goods,⁵⁴ and the question of whether a tax on land would create enough revenue to replace all other taxes.⁵⁵

While these topics are of theoretical nature, the empirical question of whether land value taxation *does* have positive effects once it has been implemented is also not settled. Several countries have implemented some form of land value taxation since the late nineteenth century, but no decisive evidence has been presented yet that any positive development in these countries can be traced back to the fact that they levy a tax on land value. The remainder of this chapter gives a brief survey of the countries that have decided to tax land, and discusses some of the empirical literature.

2.3 Application of land value taxation

2.3.1 Land value taxation outside the United States

Australia is currently the only country that levies a property tax only on land but not on structures in some of its states. The tax was introduced on the national level in 1910, but since 1952 it has been used only on the state and local levels. At the state level it is used in the Capital Territory and in all states except in the Northern Territory, and it amounts to between 3.8 percent and 9.7 percent of revenue. Yet land value alone is taxed only in the states of New South Wales and Queensland and in the Capital Territory, while the other states have adopted a mixture of taxes on unimproved land, the rental value of land and buildings, the improved value of land and buildings, or improved land value. The state of New South Wales imposes the tax at a 1.5 percent flat rate on land value in excess of \$160,000, while the other states use progressive rates or percentages on various ranges of value.⁵⁶

The earliest study of the impact of land value taxation on the development of Australian states that I could find was done by Hutchinson (1963), who (informally) compares three states that levy the property tax on unimproved land value with three states that levy the tax on the net annual value of land and improvements. He finds that the tax on unimproved land value has a significantly positive impact on the value of construction, but he uses the local tax base as the only independent variable in his analysis, which limits the explanatory power of his study. In 1964 A.Woodruff and L.Ecker-Racz undertook an informal and widely cited

⁵⁴ See Arnott and Stiglitz (1979), Feder (1992), pp. 59-63, and Tideman (1994), pp. 124-129, for discussions of the literature on land value taxes and public goods.

⁵⁵ Cord (1985), Buurman (1990).

⁵⁶ Youngman and Malme (1994), p. 78-82.

study of the effects of the tax on land use in New Zealand and Australia, and described the various rates and methods of assessing the land between 1910 and 1964. They were unable to detect much of an economic or social impact of the tax, even though they concluded that the tax was very effective in changing the distribution of land ownership in Australia, helping to break up most of the large estates that existed at the beginning of the twentieth century.⁵⁷ Harvey and Clark (1964) offer a similar but briefer description, and they are equally unable to detect any visible impact on urban development.

Only two formal studies of the impact of the land value tax on construction activity in Australia have been undertaken so far. Edwards (1984) examines the effect of the tax on the average value of construction, and on the stock of dwellings between 1951-52 and 1964-65; her least squares analysis supports Hutchinson's results, but she admits that it also suffers from some unsettled problems of omitted variables, autocorrelation and multicollinearity. Lusht (1992) uses an ordinary least squares analysis to model the differences between 54 Local Government Authorities (LGA) in the Melbourne Statistical District in 1984; 27 LGAs used site value taxation, and the other 27 taxed the total real estate capital value. He finds that site value taxation has a significantly positive impact on the value of residential stock per acre, the number of residential units per acre, the number of total units per acre, the population density, the value of all improvements per acre, and the number of value of all single-family construction permits.

Starting in the mid 1980s, the appropriateness and fairness of the tax on land value has frequently been questioned by Australians. When the tax was implemented in 1910, most of the land was divided in a few large estates, and the tax was regarded as a fair tax on wealth, but now land ownership is distributed more evenly among the population. As a result of cyclical property booms, which have no effect on the owners' incomes or ability to pay, the taxpayer's liability has increased tremendously.⁵⁸ During the campaign the tax on land has therefore been labeled regressive. Yet Gaffney (1973) shows that, under the assumption of correct assessment, a tax on land value is rather progressive because of the differential capitalization, which increases the bidding power of people with high discount rates. A 'poll tax' was considered as an alternative to the tax on land, but, not surprisingly, it was found to be more regressive than the tax on land value.⁵⁹

⁵⁷ Woodruff and Ecker-Racz (1969), p. 184-185.

⁵⁸ It should be noted that this is the result of a separate decision to increase tax revenue. It would have been possible to lower the tax rates during the years of property booms, which would have left the taxpayer's liability as well as the tax revenue unchanged.

⁵⁹ In 1992 New Zealand, where the land value tax was in effect since 1878 and which is also surveyed in Woodruff and Ecker-Racz (1969), decided to abolish the tax on similar grounds.

Canada also has a long history of land value taxation. Since the town of Nanaimo in the Canadian province of British Columbia completely exempted improvements from the property tax in 1874, many other Canadian municipalities either adopted a tax on land alone, or decided to tax land at higher rates than structures (two-rate tax).⁶⁰ Today structures are not wholly exempted anywhere in Canada, although in some provinces the rates on land are still up to 3.3 times as high as the rates on improvements.⁶¹

Denmark is currently the only European country that taxes land at different rates than structures.⁶² In 1924 a national tax on land value (Grundskyld) was introduced, and land taxes have been levied on the local level since 1926. While the tax is imposed on unimproved land, it is also levied on direct improvements to the land like drainage, sewerage and roads. Government and business buildings are taxed at a fixed rate of 1 percent of the assessed value, while the land value tax varies between 0.06 percent and 2.4 percent. Residential buildings are not taxed, but an imputed rental value is subject to the owner's income tax.⁶³

As a response to land speculation and soaring land prices, Japan introduced a Special Land Holding Tax in 1991, which is imposed at a rate of 1.4 percent of the acquisition cost on the holding of vacant land over a minimum size of 1,000 square meters. However, this tax is subject to numerous exemptions for housing, agriculture and business purposes, and its impact on land price escalation is expected to be minimal.⁶⁴

Several developing countries have also implemented special taxes on land value. Since 1916 South Africa has allowed its local governments to use a differential taxation of land;⁶⁵ Chile switched its property tax to a tax levied solely on land value in 1957, although it reintroduced the tax on structures in 1977.⁶⁶ Jamaica introduced a tax on land value in 1957

⁶⁰ Owens (1955), pp. 61-78.

⁶¹ Netzer (1966), p. 203, and Youngman and Malme (1994), p. 94.

⁶² Britain introduced a tax on land value with the Town and Country Planning Act in 1947, but it was modified whenever the political government changed, and was finally repealed in 1985 (Blundell, 1994, pp.157-169). France imposes a special tax on land without buildings on the basis of rental value, but rental value has not been reassessed since 1961 (Youngman and Malme, 1994, pp. 125-126).

⁶³ Kristensen (1955), pp. 51-58, and Youngman and Malme (1994), p. 117.

⁶⁴ Youngman and Malme (1994), p. 154.

⁶⁵ Madsen (1955), Gorven (1963), McCulloch (1979).

⁶⁶ Strasma (1969), Youngman and Malme (1994), pp. 105-115.

as well.⁶⁷ Since 1965 Thailand uses a tax on land on which no commercial structures are located.⁶⁸ Taiwan levies a land value tax on sites in certain urban areas.⁶⁹ Like Japan, South Korea introduced a special tax on vacant in 1989 to discourage monopolistic accumulation of land.⁷⁰

I was unable to find any serious empirical study, with the exception of Edwards (1984) and Lusht (1992) regarding the effects of the land value tax in any of these countries. However, more work has been done with respect to site value taxation in the United States, which is examined in the following section.

2.3.2 Land value taxation in the United States

2.3.2.1 History of land value taxation in the United States

In the eighteenth century the public land policy in the United States tended to encourage large holdings of land by individuals. When the United States acquired California in 1846, most of the usable land was in the hands of few Mexican land grantees with average land holdings of 10,000 acres.⁷¹ New settlers soon called for a land reform to break up the big ranches and railroad holdings, but it was not until 1878 that California revised its constitution. Although the convention did not adopt any of the reform proposals, the new constitution of 1879 still stated that “the holding of large tracts of land, uncultivated and unimproved, by individuals or corporations, is against the public interest, and should be discouraged by all means not inconsistent with the rights of private property.”⁷²

Following the publication of Henry George’s book *Progress and Poverty* in 1879, which blamed the concentration of land and natural resources in the hands of few individuals for the fact that poverty persisted despite material progress, and proposed a tax on the value of

⁶⁷ Holland (1969) and Risdén (1979). Follain and Miyake (1986) calculate a general equilibrium model with imputed values for the Jamaican economy, and conclude that the land value tax yields smaller gains than a capital tax would yield in terms of revenue potential and overall welfare.

⁶⁸ Pillai (1987), Phang (1996).

⁶⁹ Harriss (1979).

⁷⁰ Youngman and Malme (1994), p. 179.

⁷¹ Young (1916), p. 29.

⁷² Constitution of California of 1879, Article XVII, Section 2.

land as a remedy, ‘single-tax movements’ started in various states in the United States.⁷³ At the turn of the century, several cities adopted taxes on land value, but in most of them the tax was abolished after some time.⁷⁴ Currently only the idealistically inspired corporations of Fairhope, Alabama, and Arden, Delaware, levy a tax on land but no tax on structures (land-only tax), while the state of Pennsylvania allows its cities to levy taxes at different rates on land and on structures (two-rate taxes). Fairhope and Arden were founded as ‘single tax colonies’, and their original populations were interested in and committed to the use of land value taxation as the major source of local revenue. Because of this common interest of their inhabitants, it is very difficult to compare these places with other municipalities whose populations have different and more heterogenous approaches to taxation. But this difficulty does not exist in Pennsylvania, where the people who live in different cities are probably very similar. In addition, Fairhope and Arden used a single tax since they were founded; all land in Arden is subject to the land value tax, which makes it impossible to examine how the introduction of a tax on land value changes the economic climate. The area of Fairhope is interspersed with land that does not belong to the colony, and that is therefore not subject to the land value tax. A comparison of the economic development of Fairhope with the interspersed plots of flat-taxed property would be interesting, but no empirical study of the effects of the single tax in Arden and Fairhope has been made so far.

However, several studies have been undertaken to determine the effects of the two-rate tax on the development of Pennsylvania’s cities; the vast majority concentrate on the effects of the two-rate tax on the development of the city of Pittsburgh, which started taxing land and structures at different rates in 1913. Before reviewing these studies, it is informative to briefly examine Pittsburgh’s tax history in order to understand the reasons for the implementation of the two-rate tax in Pennsylvania.⁷⁵

⁷³ The term ‘single tax’ originated in 1887, based on a passage in *Progress and Poverty*, where George refers to “the effect of substituting for the manifold taxes now imposed a single tax on the value of land” (Young, 1916, pp. 109-111).

⁷⁴ Young (1916), pp. 141-229, Goodale (1955), pp. 128-132, Thompson (1955), pp. 125-127. In 1963 Hawaii started to tax urban land at a higher rate than structures, but since 1969 this two-rate tax applies only to apartments and hotels (see Edwards, 1984, p. 482, endnote 2). In 1973 the voters in Oregon decided not to implement a proposed site value tax (see Lindholm, 1974, and Lindholm and Sturtevant, 1982).

⁷⁵ A very detailed description can be found in Williams (1962, 1963), but I discovered this source too late to implement it into this dissertation.

2.3.2.2 History of land value taxation in Pennsylvania

Beginning in 1867, when its city boundaries were being enlarged, Pittsburgh's real estate was classified as either 'full city', 'rural or suburban', or 'agricultural', and plots so classified were taxed at full rates, two-third rates, or half rates, respectively.⁷⁶ Taxes were seen as payments for urban services like city lighting, police and fire protection and sanitation, and it seemed to be only fair that rural and farm areas that did not fully receive the benefit of these urban services should be taxed at lower rates. But as a result of the city's growth, many lots which were not classified as 'full city' and were therefore not taxed at the full rate, became much sought-after locations. By 1910 over one-fourth of Pittsburgh's real estate was relieved of at least one-third of its tax rates. Many of these low-tax lots remained unimproved in the hands of land speculators;⁷⁷ in 1911 Pittsburgh's land values were estimated to be higher than in every other American city except New York.⁷⁸ To reduce the incentive for land speculation, this system of classifying and taxing land at different rates was abolished in 1911, and the burden of taxation resting on residential and undeveloped areas increased tremendously.⁷⁹

Beginning in 1908, several attempts were made in Pennsylvania and New York to either partly or fully exempt improvements from taxation.⁸⁰ A lighter tax on buildings was supposed to stimulate their construction and to remedy the housing problem of the large cities. But in New York the implementation of a land-only or two-rate tax was finally defeated in 1916 on the grounds that such a tax would put an unfair burden on the owners of small and less developed real estate.⁸¹ This concern was not shared by the Pittsburgh Civic Commission, which in 1911 recommended taxing all buildings in the city at half the rate of the land. In 1913 a bill was passed which prescribed a gradual reduction of the tax rate on buildings to half of the tax rate on land over the following 11 years. But to inaugurate this change it was necessary to provide for a similar change in the tax rate in another city.⁸² To permit different rules for different cities without violating constitutional limitations that prohibit laws that

⁷⁶ Harrison (1915), p. 1.

⁷⁷ Examples are given by Harrison (1915), p.2, and Young (1916), p. 211.

⁷⁸ Holdsworth (1912), as quoted in Young (1916), p. 211.

⁷⁹ According to McMahan (1930) this resulted in an estimated increase of 50 percent in taxes on property.

⁸⁰ New York experienced two earlier attempts to implement a single tax in 1886 and 1897 during Henry George's mayoral election campaigns (Young, 1916, p. 228).

⁸¹ Young (1916), p. 228.

⁸² Williams (1955), p. 93.

apply only to a single city, all cities in Pennsylvania are divided into three classes, according to their populations.⁸³ Philadelphia is the only first-class city, Pittsburgh and Scranton are second-class cities, and the other 53 cities in Pennsylvania are defined as third-class cities. It was therefore necessary to make the two-rate law effective for both second-class cities, Pittsburgh and Scranton. However, much more attention has focused since on the change in Pittsburgh, and in the literature the law is generally called the “Pittsburgh Graded Tax Plan”. In 1914-15, the tax rate on buildings in both cities dropped to 90 percent of the rate on land, in 1916-18 to 80 percent, in 1919-21 to 70 percent, 1922-24 to 60 percent, and in 1925 to the final 50 percent of the rate on land. In 1915, after a change in mayors in Pittsburgh, an attempt was made to abolish the new tax principle because it was claimed that it represented an unfair discrimination against the owners of land. The bill was vetoed by the governor on the ground that it had not been in effect long enough to determine whether it had actually done any harm.⁸⁴

It is important to note that the different tax rates in Pennsylvania apply only to city taxes, while, at least until 1992, all school districts and the counties levy taxes at the same rate on land as on structures.⁸⁵ For example, in 1930 Pittsburgh’s city tax on land was \$25 per \$1,000 assessed value and \$12.50 per \$1,000 assessed value on buildings. The school district imposed an additional \$11.50, and the county an additional \$7.38 equally on land and on structures. This amounted to a total tax rate of \$43.88 per \$1,000 assessed value on land, and to \$31.38 on structures. Land was therefore taxed not at twice the rate on structures, but only at 1.4 times the rate on structures. Even though the city property tax is notably higher than the other two taxes, the overall impact is lower than is often stated.⁸⁶

⁸³ Holdsworth (1912), pp. 203-204, as quoted in Young (1916), p. 210.

⁸⁴ Young (1916), p. 215.

⁸⁵ In 1992 a law was passed that also allowed school districts to switch to the two-rate system, but so far only the school district of Aliquippa has decided to implement the system.

⁸⁶ Only since 1979, after several changes in the city’s tax rates, has the overall tax rate on land been more than twice the rate on structures.

2.3.2.2 Empirical work on land value taxation in Pennsylvania

All empirical studies of the economic impact of Pittsburgh's two-rate tax that were undertaken before 1982 are purely descriptive, and their authors are openly biased either in favor or against a higher tax on land than on buildings. McMahon (1930) focuses on the overall tax burden on owners of land at different locations, and cites various examples of specific locations which improved in value since 1925, and which showed high construction activity. He claims that most owners of housing properties paid lower taxes than they would have under the flat tax system. Still he is unable to find clear evidence that the increased construction was due to the two-rate tax. Daume (1930) compares the value of construction and the increase in land value in Pittsburgh with figures for various other cities in the United States. He concludes that Pittsburgh showed only an average improvement during the period between the first and the second World War, and that it merely participated in the general prosperity. Richman (1965) examines the ratio of land value to the market value of real estate, and finds that in 1958 Pittsburgh's ratio of the value of structures to land value was below the United States average. The two-rate tax did not seem to have reduced Pittsburgh's land value, and Richman concludes that the two-rate tax did not have any significant economic effects. Batt (1995), on the other hand, compares Pittsburgh with Cleveland, Ohio and Buffalo, New York, and finds that between 1981 and 1994, the ratio of the value of structures to the value of land in Pittsburgh has increased by a much larger factor than the ratio in the two other cities.⁸⁷

The fact that only two cities adopted the two-rate tax at the same time, and that the tax was introduced gradually over an eleven year span of time, makes it very difficult to separate the influence of the tax change from other economic influences, especially in purely descriptive studies.⁸⁸ An attempt was made to extend permission for two-rate taxes to all third-class cities in 1915, but this did not happen until 1951.⁸⁹ Since then, all third-class cities have had the option of setting the tax on land at any multiple of that of buildings, but at that time none of these cities chose to implement a two-rate tax. In 1974, however, Harrisburg implemented a ratio of city land taxes to building taxes of 1.35:1, in 1979 Pittsburgh changed its tax ratio to 5.07:1, and by 1992 a total of 17 cities had adopted a different tax on land than on buildings. Yet a simple comparison of the tax differential would be meaningless, because cities differ in their ratios of assessed value to market value. It is therefore necessary to adjust the difference in the tax rates by the assessment rates to obtain a basis for a comparison (see

⁸⁷ However, limitations in his data set (he was only able to find three years of data for Buffalo) make his findings less conclusive than they might appear to be.

⁸⁸ Heilbrun (1966), pp. 111-112.

⁸⁹ Young (1916), p. 215, Williams (1955), pp. 104-105.

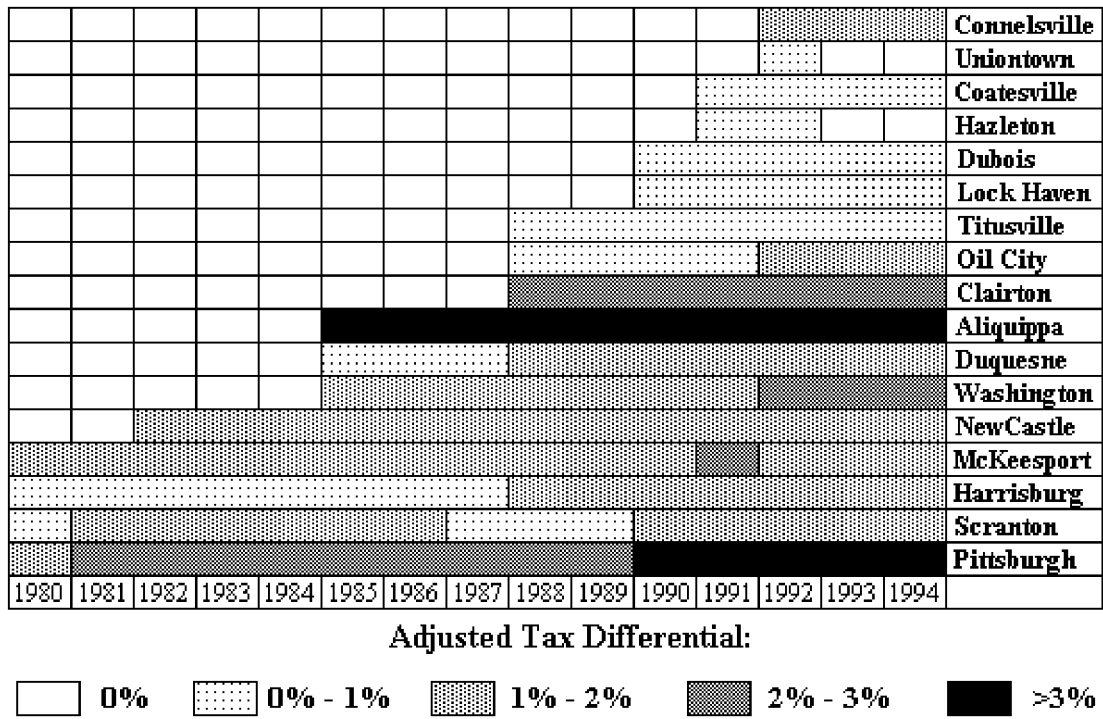


Figure 2.1 Cities with two-rate taxes between 1980 and 1994

Figure 2.1). The adjusted tax differential in the figure is the difference between the tax on land and the tax on buildings, multiplied by the city's property assessment rate. In 1993 Uniontown and Hazleton abolished the dual rates after they had been in effect for only one and two years, respectively, so that currently 15 cities in Pennsylvania use two-rate taxes. Other cities have considered adopting the two-rate tax, but no others have decided to implement it yet.⁹⁰

Although economic theory predicts that a tax shift from structures to land will increase general building activity as well as the value of construction, this prediction is not obvious for the available data. Tables A.1 and B.1 in Appendix A and B show the number of building permits and the value per permit for various construction categories in the 15 two-rate cities between 1980 and 1994. The introduction of the two-rate tax is not accompanied by a change in construction that could easily be seen from the data, so that a more subtle analysis to detect the impact of the two-rate tax becomes necessary.

⁹⁰ In 1988 the mayor of Philadelphia proposed a switch to the two-rate tax system, but his plan was rejected by the city council on the ground that the two-rate tax was not well understood (Philadelphia Inquirer, May 13, 1988, quoted in Feder, 1992, p. 10).

Mathis and Zech (1982) undertook a statistical comparison of 27 cities in Pennsylvania, using data from the mid and late 1970s when only three cities had adopted two-rate taxes. Their OLS analysis uses the mean and the median per capita value of construction between 1976 and 1978 as dependent variables in their two regressions, and median income in 1970, the vacancy rate for rental units in 1970, the average wage of construction workers of the tax rate on land to the tax rate on structures in 1977 as independent variables. They find that the first three variables have a significant impact on construction value per capita, but the tax-differential variable is statistically insignificant.⁹¹ Their study was criticized by Coffin and Nelson (1983) for measuring construction per capita rather than per acre, for measuring taxes by the ratio of land tax to construction tax instead of the absolute values of the two taxes, and for not using separate equations for different types of construction. In addition Coffin and Nelson suggest a time series rather than a cross sectional analysis. In Mathis and Zech's reply in 1983, construction per acre is used as the dependent variable, but the influence of taxes is still statistically insignificant, and the explanatory power of their analysis falls by about 50 percent.

Liu (1985) criticises the econometric techniques of Mathis and Zech. He points out that a simultaneous equations system would have been more appropriate, that they should have used more current data instead of control variables which are lagged by several years, and that the potential problems of multicollinearity among the regressors and of heteroskedasticity are not addressed. Mathis and Zech agree in their reply that a simultaneous equations system and the use of non-lagged variables would be a good refinement, but that the lack of available data made this refinement impossible at the time when they undertook their analysis. They also claim that multicollinearity and heteroskedasticity did not cause any difficulty in their analysis.⁹²

Tideman and Johnson (1995) use data between 1981 and 1992 for all of Pennsylvania's 56 cities and a fixed effect OLS model to examine the impact of the percentage difference between the tax on land and the tax on structures on the log of the construction value per person. They do not consider the possibility of serial correlation or heterogeneity in their data, and their analysis does not show a statistically significant impact of the two-rate tax. They point out that their concluded statistical insignificance does not preclude economic significance, given the standard error on their estimated tax differential variable.

⁹¹ It is important to remember that this result cannot be interpreted as the two-rate tax having no effect at all, but only that Mathis and Zech could not show that the impact is different from zero. Their estimated value for the tax differential coefficient is -0.5180, with an estimated standard error of 1.1821. This yields a 95 percent confidence interval of [-2.835, 1.799], so that a positive impact is possible.

⁹² Mathis and Zech (1985).

Three studies have examined the effect of site value taxation on the urban development in Pittsburgh alone. Pollakowski (1982) uses data between 1976 and 1980 to determine the impact on the number of property transactions, and does not find any significant effect. Bourassa (1987) develops a model with two equations to describe the demand and the supply of new housing. His data extend from 1978 to 1984; to obtain a larger set of observations he uses monthly instead of yearly data.⁹³ He uses the value per building permit as the dependent variable; as independent variables he uses the consumer price index (CPI) for shelter, the CPI for non-shelter, the CPI for home heating fuels, resident employment, the home mortgage interest rate, the estimated dollar value of city subsidized mortgages for new housing, an index for residential construction costs, the dollar value of residential rehabilitation projects, the nominal land tax rate and the nominal improvement tax rate. His OLS model does not incorporate the possibility of heteroskedasticity or serial correlation. He finds the land tax rate to be significant at the 10 percent level with a negative coefficient, but in his study it is collinear with his other explanatory variables, so that it can not be considered a significant determinant of housing construction. The improvement tax rate is significant and negative at the 1 percent level. However, when he undertook the same analysis for two other two-rate cities, McKeesport and NewCastle, neither the land tax rate nor the improvement tax rate had a statistically significant impact on the value of construction.⁹⁴

Oates and Schwab (1996) compare the development of non-residential construction in Pittsburgh between 1960 and 1989 with that of 14 other cities. All examined cities are located in the so-called 'American rust belt'. They show that Pittsburgh and Columbus were the only cities with an increase in the average value of building activity in the 1980s compared to the 1970s; Pittsburgh's increase of 70 percent is more than twice as large as the increase in Columbus. In the late 1970s Pittsburgh started a major urban renewal program, of which the increase in the land tax rate was a part. Oates and Schwab find that this program has been very effective, but they are unable to relate this effectiveness to any single component. Weir and Peters (1986) point out that part of the program consisted of tax abatements for residential and non-residential construction; the city decided not to tax the additional value for the first three years after the improvement took place. They conclude that the increase in the two-rate tax did not play a role in Pittsburgh's building boom. However, this conclusion should not be interpreted as meaning that shifts from building taxes to land taxes are ineffective, because the tax abatement on construction increases the tax differential between the tax on land and the tax on improvements by far more than the usually published value; if the tax abatement has a strong effect on development, then this does not diminish but, on the contrary, support the proposition that shifting taxes from buildings to land promotes construc-

⁹³ His source is the Bureau of Building Inspection, Department of Public Safety, City of Pittsburgh.

⁹⁴ Bourassa (1990).

tion.⁹⁵

The results of all of the surveyed econometric studies of two-rate taxes in Pennsylvania are summarized in Table 2.1. For each analysis the table shows the dependent variable, how the two-rate impact is measured, the estimated value of the two-rate coefficient, the R^2 , the number of explanatory variables used and the type and period of the analysis. All of these studies use data on the value of construction (either the total value or the value per capita) as the dependent variable. Yet because it often happens that municipalities issue no building permits in a particular year, the distribution of the value of permits has a mass point at zero and is definitely not normal. The complexity of the distribution of the total value of permits suggests taking advantage of the fact that the U.S. Bureau of the Census publishes monthly data regarding the *value* and the *number* of building permits for municipalities in the United States.⁹⁶ Thus one can analyze separately the number of permits and the value per permit before multiplying them together to get the impact of the tax on the total value of permits.

However, the use of the number of building permits raises some technical questions. The dependent variable is now a count variable - a nonnegative integer - as opposed to a real number. The following chapter reviews the econometrics literature on count data, and shows how the analysis of the number of building permits in Chapter 5 relates to previous work. Although they are convenient to work with, none of the commonly used discrete distributions for count data are necessarily good approximations of the true distribution. The next chapter also describes an approach that makes use of other possible discrete distributions. One of these is used for the analysis of the number of permits in Chapter 6. Finally, Chapter 7 describes an improved analysis of the value of construction per permit.

⁹⁵ This assumes that it is in Pittsburgh's interest to finance its public programs through taxation (of land, because improvements are not taxed), and not to rely solely on intergovernmental grants.

⁹⁶ The data are described in more detail in Section 4.2.

Table 2.1 Summary of previous OLS studies of two-rate taxes in Pennsylvania

Study	Dependent Variable	Definition of the tax parameter τ	Coefficient of τ	95% Confidence Interval	R ² # vars.	Type of Analysis	# of municip. Time period
Mathis and Zech (1982)	log(mean value of construction per capita)	log(ratio of city tax on land to city tax on structures)	-0.5180	[-2.835, 1.799]	0.502 6 vars.	Cross-Section	27 municipalities (3 two-rate cities) 1977
	log(median value of construction per capita)		-0.7328	[-3.040, 1.574]	0.495 6 vars.		
	log(mean value of construction per capita)	log(ratio of city and county tax on land to city and county tax on structures)	0.3933	[-5.925, 6.712]	0.393 6 vars.		
	log(median value of construction per capita)		0.1090	[-6.212, 6.430]	0.486 6 vars.		
Mathis and Zech (1983)	log(mean value of construction per square mile)	log(city tax on structures)	0.1580	[-1.839, 2.155]	0.264 6 vars.	Cross-Section	27 municipalities (3 two-rate cities) 1977
	log(median value of construction per square mile)		0.3860	[-1.558, 2.3299]	0.269 6 vars.		
	log(mean value of construction per square mile)	log(city and county tax on structures)	-1.2848	[-3.602, 1.032]	0.303 6 vars.		
	log(median value of construction per square mile)		-0.9907	[-3.279, 1.297]	0.288 6 vars.		

Table 2.1 continued

Study	Dependent Variable	Definition of the tax parameter τ	Coefficient of τ	95% Confidence Interval	R ² # vars.	Type of Analysis	# of municip., Time range
Bourassa (1987)	log (value of construction)	log(nominal tax on land)	-0.41	[-0.875 , 0.055]	0.98 11 vars.	Time Series	Pittsburgh 1978-1984 (monthly data)
		log(nominal tax on structures, adjusted for tax abatement)	-2.36	[-3.477 , -1.243]			
Bourassa (1990)	log (value of construction)	log(nominal tax on land)	0.03	[-0.166, 0.226]	0.98 8 vars.	Time Series	McKeesport 1978-1986 (monthly data)
		log(nominal tax on structures, adjusted for tax abatement)	0.05	[-0.417 , 0.517]			
Tideman and Johnson (1995)	log (value of construction per capita)	log(nominal tax on land)	-0.03	[-0.265 , 0.205]	0.99 8 vars.	Time Series	New Castle 1979-1986 (monthly data)
		log(nominal tax on structures, adjusted for tax abatement)	0.10	[-0.270 , 0.470]			
		difference between tax on land and tax on structures, adjusted for the ratio of assessed value to market value	0.1667	[-0.118 , 0.451]	0.406 66 vars.	Panel Data	54 cities (15 two-rate cities) 1980-1992 (yearly data)

Notes: 1. None of these studies reports any examination of their data regarding heteroskedasticity or serial correlation.

2. I was unable to obtain a copy of Pollakowski (1982) and to examine his analysis.

3. The other studies that are mentioned in the text are descriptive, and do not attempt to estimate the impact of the two-rate tax on construction.