

**American Journal of Economics and Sociology, Inc.**

---

Value Capture as a Policy Tool in Transportation Economics: An Exploration in Public Finance in the Tradition of Henry George

Author(s): H. William Batt

Source: *American Journal of Economics and Sociology*, Vol. 60, No. 1, Special Issue: City and Country: An Interdisciplinary Collection (Jan., 2001), pp. 195-228

Published by: [American Journal of Economics and Sociology, Inc.](http://www.jstor.org/stable/3487951)

Stable URL: <http://www.jstor.org/stable/3487951>

Accessed: 20/02/2015 15:45

---

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



*American Journal of Economics and Sociology, Inc.* is collaborating with JSTOR to digitize, preserve and extend access to *American Journal of Economics and Sociology*.

<http://www.jstor.org>

# Value Capture as a Policy Tool in Transportation Economics

## *An Exploration in Public Finance in the Tradition of Henry George*

By H. WILLIAM BATT\*

**ABSTRACT.** Value capture is a means by which to finance capital infrastructure, particularly transportation services, in a way that allows for efficient economic performance, simple administration, financial justice, and social facility. Because American society needs to find new means to finance transportation capital investment, particularly public transit, value capture offers an essentially painless opportunity to achieve these goals. It has the ancillary benefit also of concentrating population densities in a way that makes public transit particularly viable. This study shows how value capture could have been used to finance a portion of the New York State Interstate Highway System, a nine-mile stretch of I-87 known as the Northway, from its southern terminus to the point where it crosses the Mohawk River in Albany County. This section is the most heavily traveled area of the Northway and has experienced the greatest contiguous development of any location along the Northway's 178 miles since its construction in the late 1950s. While the right of way and construction costs of this stretch were in the range of \$128 million (current dollars), the additional land value that has been generated on its account within just two miles on

\* H. William Batt, Ph.D., is the Executive Director of The Central Research Group, Inc., a non-profit grant-funded research organization specializing in public budgeting and finance in accord with sustainable development principles (Central Research Group, Inc. P.O. Box 4112, Patroon Station, Albany, New York 12204-0112). He is also a consultant to governments on property taxes, transportation finance, and land use. The GIS analysis was provided by Kathy Fisher of Applied GIS, Inc., in Schenectady, New York. The principle investigator wishes to express his appreciation also to officials of the New York State Transportation Department, especially Mr. Frank Mengel of the Office of Real Estate, and Mr. Pete Kelly of the Region One Design and Construction Unit. This paper was prepared with support from the Robert Schalkenbach Foundation, committed to disseminating the virtues of land-value taxation in all its forms.

American Journal of Economics and Sociology, Vol. 60, No. 1 (January, 2001).  
© 2001 American Journal of Economics and Sociology, Inc.

either side has totaled \$3.734 billion. This study shows that the capital finance of the Northway, at least in this area, could easily have been done by recapturing these windfall gains that fell to private landowners. One could argue that this added value, the direct result of public investment, should rightfully be returned to the public and should be recaptured to pay off the bonds that were issued to build the project, rather than left for opportunistic speculators to reap private gain. Value capture therefore offers a promising approach for funding future transportation development, leaving fees, that are presently used, to recover operating and environmental costs.

## I

### **Introduction**

THIS STUDY EXPLORES how a large infrastructure investment in the Capital Region of New York State might have been financed through value capture with greater effect and benefit than the method that was used. As with every bit of the Interstate Highway System, the chosen method was the Highway Trust Fund, established in the 1950s, which relies upon motor fuel revenues to support both capital and maintenance costs. The cost shifting and the diversion of burdens which this approach entails has resulted in a transportation system that has been expensive, inefficient, and unbalanced. An alternate approach would have been to employ a method known as value capture. This method would have better balanced costs and benefits and also discouraged the over-consumption of infrastructure and land that we have witnessed under the existing approach.

Although the interstate highway system is essentially complete and the only further costs involved for the most part are in its maintenance, value capture offers a convincing approach in ensuring that the highway system will remain adequate to serve motor vehicle needs for the indefinite future. This can be done by the inducement it offers to capitalize on the land value created in the vicinity of the access and exit nodes, and the discouragement for speculators to continue holding their parcels off the market in expectation of future gains. Indeed, value capture can be an attractive means for the capital finance of future enterprises and infrastructure, particularly if the public elects to

build transit projects to complement and redress our current over-reliance on private motor vehicle use. The record shows that the illustrations of value capture applied to date have been in the finance of public transit systems, not for highway service. But it can work for many infrastructure projects.

## II

### **Motor Vehicle Ascendancy**

IN THE POST WORLD WAR II ERA, the pent-up consumer demand of the American population was nowhere more manifest than in the acquisition of motor vehicles. At the war's end in 1946, new car sales added 2.14 million passenger cars to the 25.80 million already on the road; by 1965 total passenger car registrations had reached 75.26 million, with 9.3 million new vehicles sold just that year. Moreover, it was not only the number of cars that increased; the total number of miles driven more than doubled from 284,650 million vehicle miles in 1946 to 713,984 million in 1965. And this was just cars! All indications were that the auto trend showed no signs of leveling off, while congestion roads led to popular demand for ever more and wider roads.<sup>1</sup>

#### *The New York State Thruway*

Transportation planners, certainly dominated by highway interests—a coalition of auto-manufacturing, oil, rubber and construction industries—but in a larger sense by almost all Americans, were only too willing to mark up land maps with an ever-increasing number of lane miles of new highway. New York State was in the vanguard of those states outlining where new roads would expedite the flow of traffic, even before the passage of the National Defense Highway Act of 1956. New York State's Department of Public Works<sup>2</sup> had responsibility for about 14,000 miles of highway, with trunk lines carrying the overwhelming proportion of traffic even though they represented only about a seventh of all the roads in the state. Because the state government had the resources to finance further highway development through its power of taxation, it took the lead in proposing new projects, often bypassing more reticent local interests.

Several New York limited-access highways were long in use, even congested, by the time the 1956 highway bill was passed. Robert Moses, a towering political figure in New York for decades, had already pushed through a network of parkways in the downstate metropolitan area and Long Island well before the advent of World War II. Following the war, Governor Thomas Dewey promulgated and trumpeted the construction start of the New York State Thruway, which extends from Westchester County north to Albany before heading to Buffalo and on to the border of the state. Its first section opened in 1954, and by 1960 it was completed in its entirety. To this day, the 641-mile Thruway is the longest tollroad in the United States. It was regarded as a boon to economic development throughout the state, especially in the region of the Capital District, where it skirted the southern edge of Albany before turning west.

With the passage of the Federal Highway Act and all the new funding that went with it, a still larger network of limited access roads was laid out, nowhere more ambitious than in Albany where Governor Nelson Rockefeller had a reputation for large scale projects. In the four years immediately following the passage of the highway act, New York spent about \$250 million of state money alone to complete improvements on 5,200 miles of road, approximately a third of the state highway-parkway system.<sup>3</sup> Figure 1 shows a map of interstate urban bypass roads in Albany that the State Department of Public Works envisioned in 1961.

One can see that only about half of those lane miles were ever constructed. (See Figure 2.) The north-south crosstown arterial that was planned to transect the city of Albany at its central point was met with strong neighborhood resistance, and those familiar with the city today know the points where the imposing strips of four-lane pavement awkwardly stop. But plans to bypass the city on the north side, with a spur cutting off downtown access to the Hudson River to expedite traffic along the eastern edge, and a third north-south corridor—what would become the Northway, extending the Thruway north to Montreal—were easily acquiesced to, especially since the Federal government put up 80 percent of the cost and the state government paid the remainder. Whatever local governments' views might have been, they were unlikely to change things. In fact, the



Figure 1.

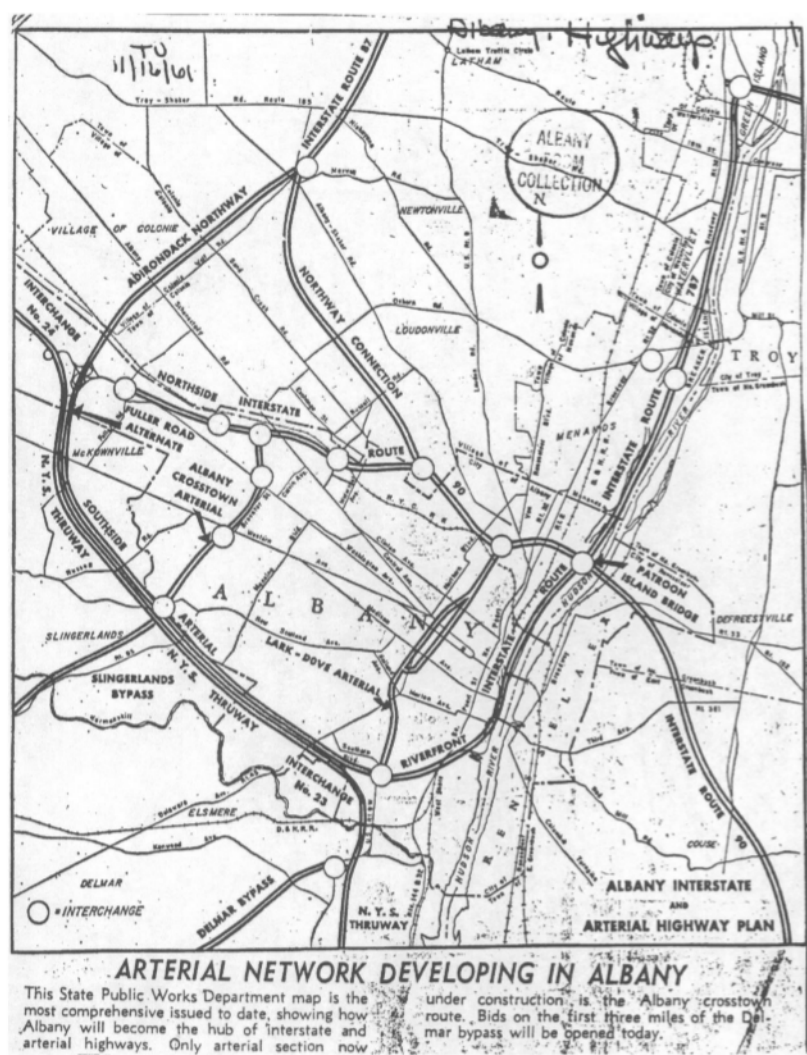
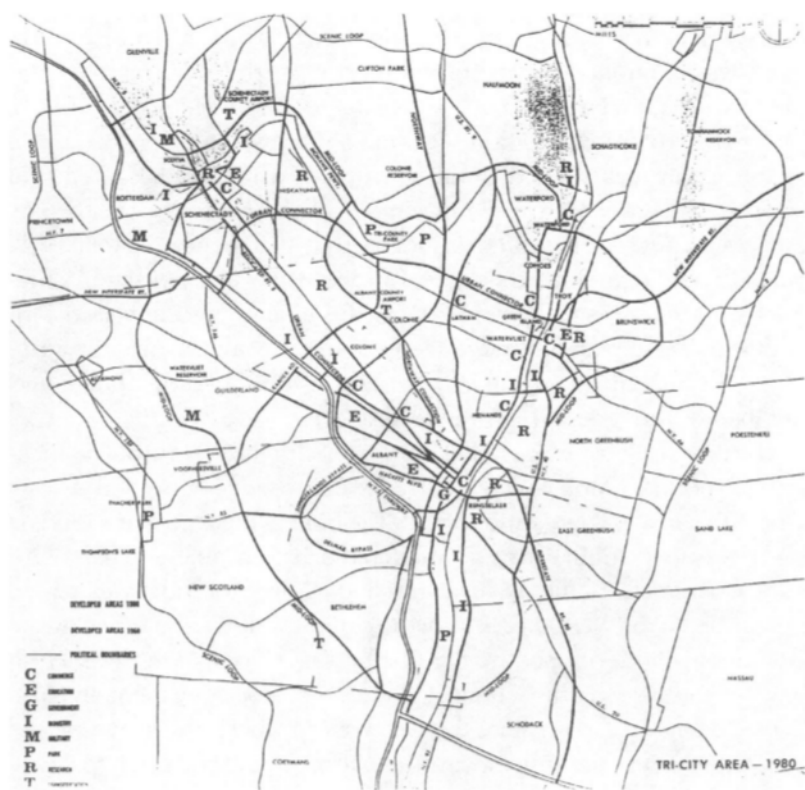


Figure 2.



Figure 3.



highway planners had visions far wider than even this. Figure 3, created in 1962, delineates a still wider design of limited access corridors envisioned for Capital District transportation by 1980. Ultimately a fair number of these were constructed.

*Influence of the Northway*

The corridor for the Northway was a foregone conclusion even before being put to paper. It was largely the work of federal and state planning offices, and it was not likely that the path of the highway could



have been much altered because the topography limited its options. It is likely, however, that knowledge of its layout and construction schedule was known to insiders well before the public, or even property owners in its path, had had opportunity to react. Local government was controlled by one of the most powerful political machines in the nation, and that machine was largely the province of one man. The mayor of Albany, Erastus Corning II, was the scion of an old WASP family, who relied upon a strongly Irish Catholic coterie for support and essential control of almost all decisions at both the city and county levels. He served as mayor from 1940 to 1982, a total of 42 years, longer than any other mayor in the nation. Dispensation of favors went to the small as well as to the mighty, and any decisions about land use planning were likely done in camera and difficult to trace. But the corridor path was set largely due to geographic limits outlined in the federal highway legislation of 1946.<sup>4</sup>

The one available place to link the New York State Thruway to an interstate north to Montreal was at the western edge of settled Albany where the area was largely farmland. The bulk of the land that would be taken was in the rural towns of Guilderland and Colonie, still part of Albany County which the mayor controlled. A sliver of Albany extended out further to the west, the locus of the earliest waterworks servicing the city, originally developed by the first Erastus Corning who was President of the New York Central Railroad and, not coincidentally, also mayor a century earlier. Since the water supply had now been replaced by a larger reservoir further away, this vacant land stood open to development. Washington Avenue, the middle of three corridors extending west of the city, would subsequently extend through the heart of this area, threatening an ecologically sensitive area of pine bush, dunes and even an endangered species of butterfly. No matter that other areas were available to settlement; Washington Avenue Extension is easily accessible to Northway and currently invites—almost demands—development on account of that very infrastructure investment, even though the Corning era passed nearly two decades ago.

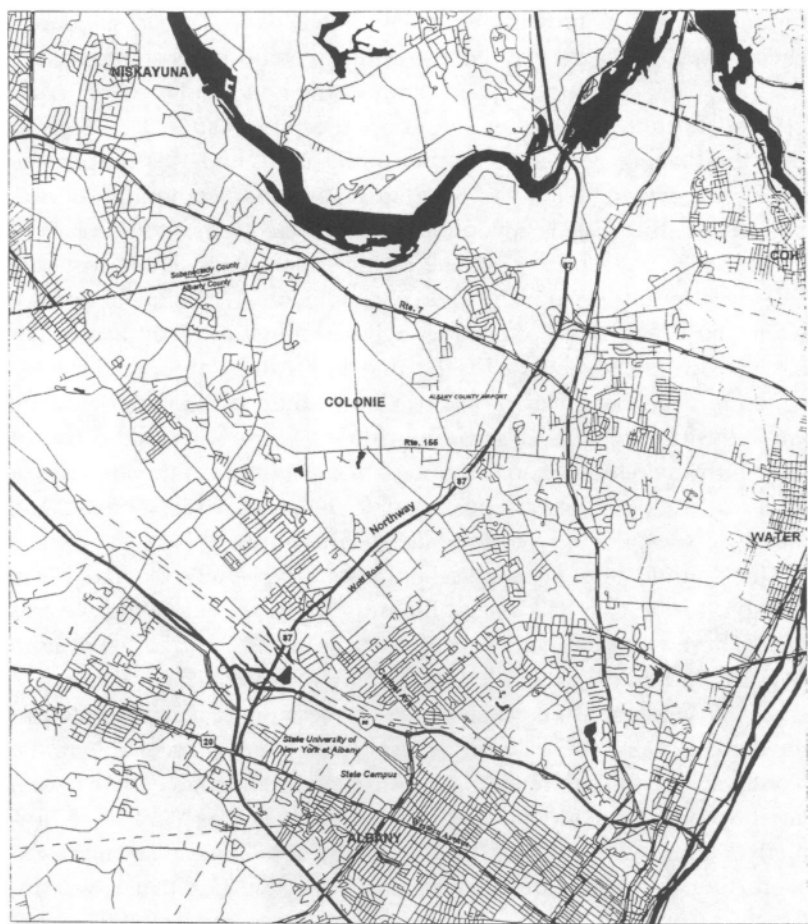
In the 1950s the land on the western edge of the city of Albany was largely truck farms. In fact it was some of the best farmland in Albany County and even in the State of New York, because it was at the confluence of the Mohawk and Hudson Rivers, largely flat alluvial terrain.

But the construction of the New York State Thruway, finished in the early 1950s, had already influenced the pace of suburban development in the area, and post-war prosperity and the boom in families further spurred the growth of housing on what was, by city standards, cheap land. The Northway's construction would further influence the pace of development. Saratoga County to the north had receded in importance with the decline of rail service, despite its attractions of thoroughbred racing and gambling. But in the 1970s and 1980s it became the fastest growing county of the State, a suburban community servicing Albany, the seat of government, Schenectady, the home of General Electric, and Troy, the home of Rensselaer Polytechnic Institute. Saratoga County epitomized the development of residential sprawl, while the downtowns of Albany, Schenectady, and Troy across the Hudson River floundered. By the mid-1990s these three cities were suffering major financial problems due to their declining commerce and industry, while the suburbs flourished. Figure 4 shows the area of the Northway discussed in this paper, from its origin at the juncture of Route 20, the old westward post road, to the point where it crosses the Mohawk River/Erie Canal nine miles to the north.

The Northway was thus linked not just to the New York State Thruway but to the two major state highway corridors extending west as well. These were the earlier-mentioned Route 20 and the even more established Route 5 which led to the City of Schenectady. Centers of capital development and major areas of economic activity shifted to the lands close by these corridors, especially to areas accessible to the Northway. Enormous retail shopping centers and office parks soon lined up on either side. Parallel to the Northway was Wolf Road, formerly a farm road, and now Albany County's "million dollar mile." Exacerbating the suburban exodus further was the fact that it was located just outside Albany city limits in the unincorporated Town of Colonie, allowing businesses to take full advantage of lower taxes than the city exacted.

The development alongside the Northway has been robust but also haphazard. At this writing, in the year 2000, the Northway's third lane is far beyond capacity to serve traffic, especially during rush hour. Even Wolf Road has become so congested that some businesses as well as some state government agencies have elected to move elsewhere, pre-

Figure 4.



sumably to less expensive space. Ironically, in an effort now to retain the value of this location, sidewalks will soon be constructed to encourage people to park their cars and walk from site to site as necessary. Meanwhile, titleholders to lands contiguous to the Northway access points have seen their properties soar in value. Sometimes the

luck fell fortuitously to farmers; others' fortunes were a result of speculative calculation. Adding to planners' challenges is the fact that the Albany County Airport, which serves the entire Capital Region, is less than a mile away and that local access roads are now being expanded and rerouted to respond to the traffic it generates. The airport terminal has just undergone major expansion; feeder traffic looms as a incipient problem. But as yet the region has not seen so much congestion that land values have been adversely affected, and the only alarms seem to be from environmentalists who note that the Capital Region is now identified by the EPA as a marginal non-attainment area for ozone.

*Interstate Highway System: Costs and Benefits*

The question is sometimes raised whether the costs of the interstate highway system are justified relative to its benefits. Defenders of highway development will always argue affirmatively, but this is not the point of this paper. It is in any case a moot question, because the nation was in a highway building mood in the 1950s and few could have foreseen the downside costs we are now experiencing, half a century later. The decision to build the interstate system under the National Defense Highway Act of 1956 was not a decision based on solid cost benefit analysis. As with most infrastructure projects in past American history, its promulgation grew out of a confluence of vested interests that could decidedly profit by the venture. Even today it is accepted conventional wisdom that highway development is an essential and integral piece of all economic development strategies. There are only a few studies that are equivocal.<sup>5</sup>

Articles and books now appear daily that consider the problems that general reliance upon motor vehicle transportation have brought about.<sup>6</sup> America faces a far greater problem because of how its landscape has been configured than most people today realize. One must first understand that an estimated 90 million Americans have been disenfranchised by not being able to drive, therefore lacking the essential mobility which this society requires for full participation. For many people, reliable cars are prohibitively expensive, and yet they are subject to the vicissitudes of auto dependability. One 1993 study concludes that "when the full range of costs of transportation are tallied,



passenger ground transportation costs the American public a total of \$1.2 to \$1.6 trillion each year. This is equal to about one-quarter of the annual GNP and is greater than our total national annual expenditure on either education or health."<sup>7</sup> Conventional American land use configurations and the automobile dependent lifestyle that goes with it sap our resources and what efforts could be used for other ventures and activities. Since so much of this activity is consumption and not production, it weakens America's world economic position and precludes reinvestment in more productive areas. Because of the way in which we have encouraged development, people who need jobs are frequently too poor to own the cars necessary to get to them. Programs are now being implemented to help the urban poor travel to the suburbs to where the jobs have now moved.<sup>8</sup> It can be argued further that we have overbuilt an inefficient highway infrastructure that we now cannot afford to maintain.

Enormous environmental externalities also result from our over-dependence upon cars, especially in air pollution and in the emission of greenhouse gases. The consequences of SO<sub>2</sub>, CO<sub>2</sub>, and ozone are no longer a matter of debate; they are scientific fact. Despite frequent headlines about replacing the internal combustion engine, all the realistic substitutes also ultimately rely upon fossil fuel power; solar powered cars are far in the future, if at all, and also fail to deal with any transition. Even further, there are the costs of highway crashes. Public pleas for people to drive safely are not likely to change the reality that people are fallible, and that every person driving his or her own car simply multiplies the probabilities of accidents. Just the costs of crashes—nothing else—represents a figure equal to 8 percent of the American Gross Domestic Product.<sup>9</sup> Finally, driving is no longer regarded as fun. There was a time when most people drove cars for pleasure; today people resent their having to drive so much and often see driving as a burden.<sup>10</sup>

### III

#### **Mechanisms of Interstate Highway Finance**

THE INTERSTATE HIGHWAY SYSTEM was from the beginning almost entirely financed by the imposition of an *ad valorem* tax on motor fuel. With



the passage of that act, the tax (on both gasoline and diesel fuel) was raised from 2¢ to 3¢ per gallon, and would continue at that rate until 1978 when it was raised to 4¢.<sup>11</sup> In addition, a tax was levied on tires, initially at 8¢ a pound, gradually increasing further over the years. No distinction was made in the funding mechanism with regard to capital cost debt service or operating costs, and charges for negative externalities were never even considered. Over the years, there have been instances when the Highway Trust Fund was overflowing with money; other times, it has failed to cover even basic costs. In recent years, there has been a general recognition that maintenance has not been addressed in a timely way and has led to a general deterioration of the roads and bridges that are part of the system. This can be interpreted in one of two ways: either that the public has chosen to address more pressing priorities, or that the initial capital construction has overextended the nation's capacity to maintain it.

The local and state share amounted to a token contribution, as most state and local highway revenues, regardless whether they were dedicated or not, were directed to the non-interstate network of roads. The result of having funding provided by a government source distant from its application site was that it provided an incentive to bias projects in favor of highway construction. Had the financial arrangements for the project insisted upon a greater share for local and state authorities, there would have been less inclination for highway interests to override other local considerations. As it was, highway transportation advocates easily prevailed over competing claimants when public policy decisions were called for. This is well illustrated by the controversies that arose in areas where competing concerns were manifest.<sup>12</sup> The interstate network was completed first in areas where land could quickly and easily be acquired and where construction could proceed without difficulty. Although the network was pronounced as completed in the early 1980s, certain extensions still continue to be carried out to this day. Yet roads continue to be congested, and all the problems associated with motor vehicle transportation—the sprawl development, the pollution, the evisceration of the urban cores, and the inordinate expense of this mode of travel—have failed as yet to foster a full national debate about the wisdom of this half-century-old decision.

## IV

**Capital Cost Recovery through Value Capture:  
An Alternative Approach**

VALUE CAPTURE, most simply defined, is the means by which capital infrastructure investment is financed through means of "capturing" either some or all of the added value of real property that results directly from that investment. Value capture in transportation investments works in two ways:

1. Insofar as infrastructure investments are capitalized in land values in the vicinity of stations or gates by improved accessibility, those values can be recaptured as "rents" put at the service of debt, even perhaps for operating expenses, in support of the services provided.
2. The higher rents on land values in the proximity of the services serve further as an incentive to development density. This occurs because landowners seek to recover their investments, pressed by the immediacy of the rents, rather than holding them for speculative gain.<sup>13</sup>

Value capture is an old idea, given this new name by the US Department of Transportation which is exploring innovative approaches to infrastructure finance.<sup>14</sup> It can be traced in the theories of public finance to the work of the 18th century French physiocrats.<sup>15</sup> In the past century this approach compares closely to the thinking of Henry George and his followers.<sup>16</sup> There are now enough cases where value capture has been employed to finance infrastructure that there is no longer doubt about its merit.<sup>17</sup> As conventional approaches to capital finance are found to be wanting and are exhausted or discarded, value capture represents a tried and true method of both public infrastructure finance and an incentive to further sound growth. In a word, value capture becomes an effective engine to its own further development.

Using a tax on land values that benefit from particular capital investments satisfies all the virtues of sound taxation theory.<sup>18</sup> Unlike finance methods that rely directly or indirectly on income, sales, or

franchise taxes, a levy on land correlates well with benefits received, and is likely to be stable, simple, administrable, progressive,<sup>19</sup> and, most of all, efficient. It is efficient because it is economically neutral; that is, it imposes no distortions on economic choices because land, particularly strategically located land, is limited in supply—in economic terms, inelastic. Whereas operating costs are frequently better financed from user fees that also employ the benefit approach, capital development costs are reflected in good part by location, and the resulting added value can be recaptured at the same rate that bond financing projects are amortized.

Experience in other nations shows that the extent to which land can sustain tax burdens is considerable, depending on the economic growth and development pressures of a region.<sup>20</sup> For example, within walking distance of commuter rail stations (typically about  $\frac{1}{4}$  mile), the land values may increase as much as 25 percent as a direct result of public investment in transit. Rather than permitting this windfall resulting from public investment to redound to the private landowners, land taxes in the form of value capture instruments can easily recoup the typical debt of projects.<sup>21</sup> Depending upon the planned density of the land use for commercial or residential purposes, the return can even be higher.

Much of the projected return on investment necessarily relates to the demand for development in a region. In regions where projections show substantial in-migration, the demand for housing is typically reflected in increased land values. But increased housing development does not need to mean commensurate increased land use. The attractive ambience of “walkable” communities may engender still higher growth levels, precisely because they accommodate human beings rather than motor vehicles. Fixed guideway systems, for example, financed through the value capture approach can channel development pressures to narrowly contained areas, in contrast to conventional sprawl patterns typically found in motor vehicle commuting communities.<sup>22</sup>

Development along these lines can occur in one of two ways: either as joint development (wherein significant capital finance is likely to be required concurrently “up front”) or by induced development through such mechanisms as incentive taxation and “value capture.” Creating a

heavier tax burden on landowners in a defined region exerts a downward pressure on price, inducing greater incentive for investment and opportunities for development. Many students of incentive taxation argue that the full limits to which such taxes can be imposed are unexplored and that they offer great promise for the economic enrichment of a region.<sup>23</sup>

Few studies if any outside the Georgist economic tradition have recognized the relationship between the automobile, land use, and taxation.<sup>24</sup> Had value capture been the approach by which to pay the capital costs of highway construction, it would have facilitated far more compact and efficient development at the nodes of highway access; there would have been fairer sharing of the burden of the capital costs; and there would have occurred development densities to facilitate the reliance upon a public transit system complementary to motor vehicle reliance. What follows is an examination of how much value might have been enjoyed to pay the capital costs of the Northway's construction had value capture been relied upon as the chosen approach to finance.

## V

### **Methodology**

THE MEANS BY WHICH to calculate the added increment of land value resulting from infrastructure investment is quite simple. It involves:

1. identifying the land parcels within service proximity of the infrastructure investment;
2. ascertaining the assessed and market value of those land parcels prior to the project's beginning;
3. obtaining the assessed and market value of those same land parcels when the bonds will be paid off;
4. converting both totals to constant dollars; and
5. establishing the debt service of the project, so that the proper level of value capture tax can be imposed.

Small costs should be apportioned to local service as opposed to thru-traffic, just as property taxes currently pay for local roads. These

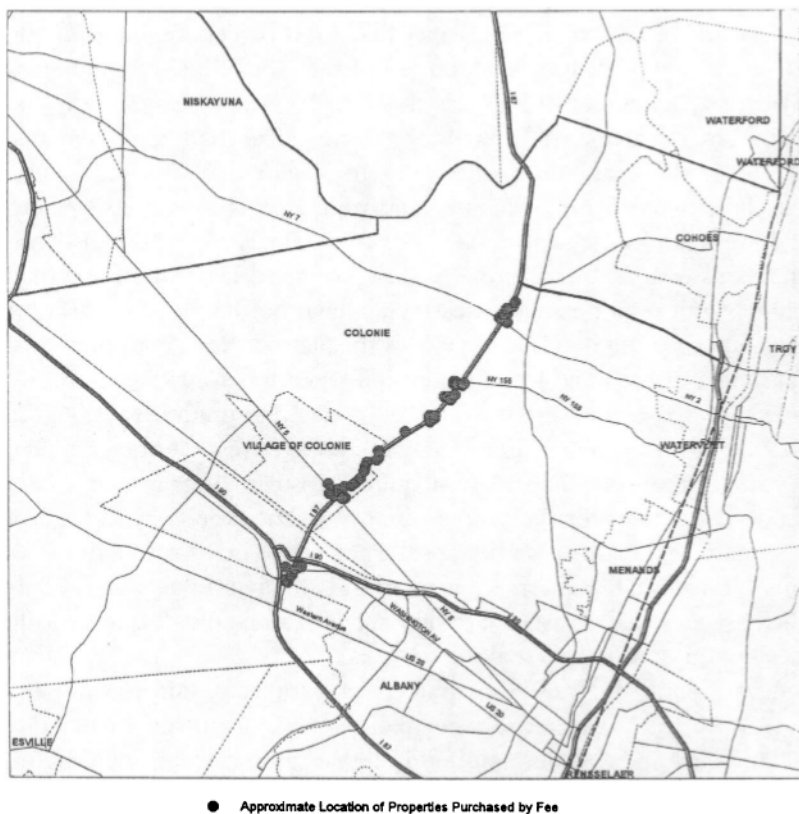
costs should be subtracted from the burden to be assigned to beneficiaries of the new investment. For this study the data for all this was available from the public records of New York State agencies.

Records of the purchase prices of the land parcels acquired by the State of New York for development of the Northway were acquired from old Department of Transportation files, noting particularly the parcel area in acres and whether or not the parcels had improvements. Since the State paid fair market value for each parcel, this provided a baseline for calculating what the land value was of all parcels—essentially farmland—in the area. New York State Real Property Tax Law requires assessment of all properties according to land value and total value,<sup>25</sup> but until recently assessments have not had a reputation for accuracy, so the sale price records of the State of New York provide a far more reliable indicator of land value. Therefore, only the total acreage and total purchase price of parcels that were unimproved (Figure 5) were used as an indicator of average value of market price per acre for 1958, the year they were acquired. Instead of computing land value differences for the whole distance of the Northway, a total of 178 miles to the Canadian border, the area close by its southern terminus (Route 20 at Western Avenue) to the Mohawk River was used as the basis of study, a distance of nine miles. It is the most commercially developed of any stretch along the road.

Establishing the values of parcels at various distances from the Northway was even easier, as the two major towns involved—Guilderland and Colonie—elected in 1995 to assess real property at full value. This data is available from both the towns and from the New York State Office of Real Property Services. The sliver of land running between the two parcels, less than a mile belonging to the City of Albany, has not had a comprehensive reassessment for over four decades, however. It is also probable that some of its transactions were not arm's length exchanges, and for both these reasons the few Albany parcels were excluded from the numbers used to establish current value per acre, although they are used later in the total calculation extrapolating from the data from the contiguous municipalities. Enough sample parcels from adjacent lands are available as data points that a reasonably accurate identification of their market value is possible.



Figure 5.



The next step was to average the current land values for all parcels at various distances from the present Northway. Reliance upon new geographic information system (GIS) computer technology makes such tasks simple, and averages were computed (Figure 6) for distances of up to ½ mile on either side, then from ½ mile to 1 mile away, and lastly for distances from 1 mile to 2 miles away. To be sure, the presence of the Northway and other components of the Interstate arterial system has influenced the value of land parcels at distances far

Figure 6.



greater than two miles—but the actual reach of this impact is ultimately a matter of speculation.<sup>26</sup> The principle of value capture is easily illustrated, however, by identifying values at distances within the two-mile margin.

The last step is to ascertain the actual cost of construction of the Northway in the area being serviced. Using only a section involves trade-offs. Highway construction costs are not equally spread along all sections of a project, nor are the costs of acquiring the right of way corridor the same. Therefore selecting a short intensively developed strip has both advantages and disadvantages for study. It should be understood that the southernmost nine miles of the Northway are the most intensively developed, have the most interchanges, and may be atypical in any number of other ways. The costs involved in the area under review are far beyond that of straight open construction in the more rural areas. But of course so are the returns in increased land value.

## VI

### **Findings**

CALCULATING THE INCREASE in land value in defined areas contiguous to the southernmost nine miles of the Northway is relatively simple. Its economic value relative to that in urban and suburban areas was low since it was essentially farmland. It also had relatively uniform value because location was not a significant factor in its use for truck farming. Records show that parcels identified for purchase by the State of New York for use by the Department of Transportation were purchased at the time for an average \$3,600 per acre, typical of the price of farmland generally at the time. A total of 307.4 acres of land were purchased in 1958 from the Route 20 (Western Avenue) southern terminus of the Northway to the point at which a bridge was to be built across the Mohawk River and Erie Canal. Figure 5 shows the centroid of several of the parcels that were then acquired by the State of New York.<sup>27</sup> Had there been no changes in land use, this land in 1995 dollars would be worth approximately \$16,568 per acre.<sup>28</sup> In fact the land is now worth many times that amount. That change in use is due directly to the advent of the Northway and its connecting Interstate network.

To be sure, the Northway alone cannot explain the increase in land values along its borders; it is all the highways taken together that make the area the attractive locus that it is for commerce and industry.

That is to say, there is no reason to believe that the Northway's construction had an impact on aggregate land values greater or lesser than the other highways of the region, except by noting the relative proximity of various links in the system. The I-87 Northway has likely contributed as much to the increased land values of the I-90 east-west corridor as the latter has contributed to those of I-87. The strategic value of the site must be understood as a whole, by the fact that interchange is one of the major transportation hubs of Northeast United States.

The influence of the interstate system on land values of course extends far beyond the delimited area of two miles on either side that this study identifies. As a network serving the nation, its value and its impact is national. But identifying just the adjacent areas demonstrates how much additional land value the highway's presence has brought about. The land values most proximate to the corridors themselves, more at the entry/exit points, and most of all at the junctures of different routes of course have the greatest value. Identifying just the increase in land values close by one of the major junctions is easily demonstrable.

The lands bordering on the Northway from the Western Avenue terminus to the Mohawk River have been separately identified for their land value on either side for the first  $\frac{1}{2}$  mile, for from  $\frac{1}{2}$  to one mile, and from one to two miles. Figure 6 is a map of the three land areas and Table 1 shows the number of acres involved in each. The data show that the land closest to the Northway has an average value almost twice that of the land between one and two miles distance, and over 40 percent higher than the land in areas just the next half to one mile away.

The most compelling number of all is that which shows that the 30,516 acres of remaining private land that lie within two miles on each side of the first nine miles of the Northway's corridor has an average value today of \$4.179 billion, representing an increase of \$3.734 billion (using 1995 constant dollars) over what the land would have been worth had the Northway not been built. This figure does not include the value of any improvements; only the land value. This simple study does not include the added value that arose on feeder roads beyond the two-mile distance to the Northway.<sup>29</sup>

The cost of construction of part of the Northway, represented in 1995 dollars, are calculated by NYS Transportation officials in straight-

Table 1

Added Increment of Land Value Due to Northway Construction in Albany County

Distance	Acres	50s \$acre adj to '95	95 \$/Acre	95 Total Value	% Increase	\$ Diff or \$ Gain
		\$3,603 to \$18,605				
½ mile	5,928	\$103,301,480	\$211,008	\$1,250,855,424	1274%	\$1,212,331,432
½-1 mile	7,206	\$119,389,008	\$148,050	\$1,066,848,300	894%	\$947,462,116
1-2 miles	17,382	\$287,984,976	\$107,132	\$1,862,168,424	647%	\$1,574,184,420
Total	30,516	\$510,675,464		\$4,179,872,148	831%	\$3,733,977,968



Table 2

Total Right-of-Way and Construction Costs (\$1995)

Right of Way	Road Construction	Bridge Construction	Total Costs
307.4 Acres	54 Lane-Miles	34 Bridges	
\$16,568 ea	\$1m each	\$175 / sq ft	
\$5,093,003	\$54,000,000	\$69,000,000	\$128,093,003

forward formulas. The acquisition of right-of-way are calculated separately, since they vary so widely. They then use a rough figure of \$1 million/lane-mile as the cost for the highway (including interchanges) and \$175 per square foot of deck for bridge structures.<sup>30</sup> The six-lane wide (three in each direction) Northway from Western Avenue (Route 20) to the Mohawk River is a distance of nine miles, a total of 54 lane-miles. This \$54 million cost is supplemented by the further cost of 34 bridge structures. The working projections used for these costs are \$175 per square foot of bridge deck.<sup>31</sup> The 34 bridges on, over, or servicing the Northway have a total of 394,470 square feet, representing a projected (1995) construction cost of slightly over \$69 million. The cost of the 307.4 acres purchased as the right-of-way in 1958 is \$5,093,003.<sup>32</sup> Together with the separate costs of the highway, the total projected cost is \$128 million.

The added increment of land value identified earlier reflects a figure over eleven times that of the cost of construction. That is, the added increment of value that resulted from the construction of the section of the Northway under discussion was left to the titleholders of the parcels to receive rather than to the society which was responsible for the creation of that wealth. This reveals how great the potential is for financing the cost of transportation infrastructure by recapturing that increase.

VII

Discussion

LAND VALUE IS a function of the social and economic traffic that the land generates. Excluding resources that a parcel of land may contain (lum-

ber, minerals, water, fish and game, etc.), it has economic value solely by virtue of its location. It is not what any lone individual does that makes a parcel of land valuable; rather it is through joint community effort that land acquires worth. This is the logic on which value capture rests. Traffic volume, whether by foot, bicycle, bus, rail, or car, all make for increases in land value, and that variable is social in nature. Because that value derives from social effort, society has a principled right to its claim. Yet what happens more often than not is that private individuals secure for themselves what should be rightfully a social gain. All the increases in land value that resulted from the social resources invested to build the Northway were left for private parties to enrich themselves, totaling at least \$3.734 billion just within the small area under study.

On the other hand, government acting in the name of society undertook to secure bonds to finance the development of this costly infrastructure without any recognition of the fact that financial means were already available to be tapped under the appropriate system of finance. Value capture raises the taxes on impacted lands, thereby doing two things: 1) removing the invitation of title holders to speculate, and 2) raising the holding costs high enough that there is immediate reason for titleholders to seek a return on their investments. This facilitates more robust economic activity in the very region where the public has placed its investment. It fosters more concentrated development in contrast to the sprawling and slow-developing ventures that typically characterize land configurations using conventional policies.<sup>33</sup> Most of all, it reduces the opportunity to engage in an egregious practice well captured by George Washington Plunkett almost a century ago:

There's an honest graft, and I'm an example of how it works. I might sum up the whole thing by sayin': "I seen my opportunities and I took 'em."

Just let me explain by examples. My party's in power in the city, and it's goin' to undertake a lot of public improvements. Well, I'm tipped off, say, that they're going to lay out a new park in a certain place.

I see my opportunity and I take it. I go to that place and I buy up all the land I can in the neighborhood. Then the board of this or that makes its plan public, and there is a rush to get my land, which nobody cared particularly for before.

Ain't it perfectly honest to charge a good price and make a profit on my investment and foresight? Of course, it is. Well, that's honest graft (Riordan 1963, p. 3).

## VIII

### Conclusion

URBAN ENVIRONMENTS have been largely taken away from people and become dominated by motorized traffic because urban and transportation planners have confused two core concepts: accessibility and mobility. These are explained particularly well in a recent text, *The Geography of Urban Transportation*:

*Accessibility* refers to the number of opportunities, also called activity sites, available within a certain distance or travel time. *Mobility* refers to the ability to move between different activity sites (e.g., from home to a grocery store). (Hanson 1995, p. 5.)

Transportation planners have confused mobility with access, expending enormous sums to move people efficiently while neglecting the matter of access. Planners by and large accept the premise that people should be free to make their own locational decisions and that these decisions are rational and should be accommodated when devising transportation services. To this extent they often respect the market. But they typically fail to realize that market decisions grow out of a context and are premised largely upon perception of economic costs. Since it is through public policies that land and transportation use are priced, people are not aware of how much those prices are distorted by economic factors. And it is through pricing incentives, or rather by removing disincentives, that it becomes possible to facilitate the access that makes for a congenial and livable urban environment.

Policy makers have two modes of leverage by which to implement public will: 1) so-called "command and control" approaches that are typically enforced by what state and federal constitutions group under "police powers" and 2) fiscal approaches that typically involve a variety of taxes, fees, fines, and other charges that derive constitutionally from either "police powers" or "tax powers." When governments ad-

minister either of these powers they are legitimate and authoritative. Fiscal measures available to governments can come from either ground and differ from charges that the private sector usually imposes, which are usually responsive to market forces. Prices which are established by government, however, are not responsive to market forces, nor are they intended to be. Rather they are set in order to accomplish certain public policy goals.<sup>34</sup> They can be no less efficient, however, when responsibly instituted.

Governments face the challenge of knowing which of the tools at their disposal—"command and control" approaches versus "pricing" approaches—will satisfactorily serve effective and efficient completion of public policies. Only in recent years, however, has there been a renewed interest in fiscal levers to achieve the goals which policy makers seek. There is particular interest among students of welfare economics in incorporating costs earlier regarded as externalities. Moreover, use of pricing approaches to recover costs of government services which have a high level of private good about them can bring about more attractive and achievable goals than can reliance upon conventional police power approaches. User fees, environmental fees, and other such fiscal tools have become more fascinating—at least to students of public policy—than conventional taxes.

Because public fiscal policy today involves much more than simply collecting revenue to support the purposes of government, it is important to evaluate various alternatives in the light of the principles of sound tax theory that were enumerated early on. At times it is important that a revenue source be totally neutral—that is, it should be designed to distort the economic behavior of parties as little as possible. In other cases, since it is the behavior itself that has a social cost to the larger society, as externalities, it is important that government impose a charge on such behavior that will recover its costs and/or correct the behavior. Transportation policy has evolved in ways that distorts our economic choices in a highly destructive and costly manner. So have the methods that we have chosen to pay for such services. Value capture is an approach consistent with sound economic and tax principles, provides a means by which the ill effects of past decisions can begin to be corrected, and uses relatively painless methods to support the next generation of transportation services.

## Notes

1. *Historical Statistics of the United States: Colonial Times to the Present, Bicentennial Edition, Vol. II*, U.S. Department of Commerce, Bureau of the Census, 1975, Table Series Q. As this century ends, the total passenger car sales in United States now approaches 20 million, and total travel is near three trillion vehicle miles annually. *Highway Statistics, 1998*, <http://www.fhwa.dot.gov/ohim/hs98/hs98page.htm>, Sections II and V. In one noteworthy article a mathematician, challenged by the dilemma of highway traffic growth, has shown that the construction of more roads leads inevitably to greater traffic problems. See Bass 1992.

2. Only much later was the New York State Department of Public Works given the much broader and more inclusive name of Department of Transportation, addressing multi-modal transportation services and not just roads.

3. Ellis 1967, p. 451.

4. Grondahl 1997.

5. See, for example: Munnell 1990, Munnell with Cook 1990, "Comment on Charles R Hulten and Robert M. Schwab, 'Is There Too Little Capital? Infrastructure and Economic Growth,'" *Infrastructure Needs and Policy Options for the 1990s*, Proceedings of the American Enterprise Institute Conference, Washington, D.C., February 4, 1991; and "Policy Watch: Infrastructure Investment and Economic Growth," *The Journal of Economic Perspectives*, Vol. 6, No. 4, Fall 1992.

6. A few of the more popular ones are worthy of note: Goddard 1994; McShane 1994; and Kay 1997. One particularly compelling article was written by Hank Dittmar, until recently a high level administrator with the U.S. Department of Transportation. His article, appearing in *Enough*, the magazine of the Center for a New American Dream, is titled "Road to Nowhere: The Automobile, Sprawl, and the Illusory Suburban Dream," at [www.newdream.org](http://www.newdream.org).

7. Miller and Moffet 1993, p. ii. Japan, by way of comparison, spends an estimated 10.4% to satisfy *all* its transportation requirements, although the figure might be somewhat low because not all externalities are included in the calculation. See Hook 1994, p. 28. See also The Conservation Law Foundation 1994; and MacKenzie et al. 1992.

8. President Clinton has recently taken actions to give low-income families better access to work opportunities by exempting ownership of automobile from eligibility requirements for food stamps. White House Press Release, February 23, 2000.

9. In 1988, a study by the Urban Institute calculated that \$71 billion were borne in out-of-pocket costs, another \$46 billion in lost wages and household production, and \$217 billion in pain, suffering and lost quality of life. Translated into vernacular, the total of \$334 billion in lost property, worktime, and injuries and deaths (Miller et al. 1991).

10. In a study done by the *Washington Post* in the early 1990s, 25 percent of



Americans are "road haters" who don't enjoy driving. Another 15 percent consider cars a necessary evil but take little interest in style, color or upkeep. Forty percent of drivers may be disenchanted, but except for those living in cities with good public transportation, driving remains the only reasonable way to get around. Cited in Nadis and McKenzie 1993, p. ix.

11. As this is written, the federal excise tax per gallon is 18.4¢ on gasoline and 24.4¢ on diesel fuel. *Highway Statistics, 1998*, Table FE-21E, at <http://www.fhwa.dot.gov/ohim/hs98/hs98page.htm>.

12. The best book recounting how highway interests were able to overwhelm competing forces in local communities is Robert Caro (1975), *The Power Broker: Robert Moses and the Fall of New York*, Vintage Books, , and this documented an era even before the Highway Trust Fund was established.

13. Under current practices the selling price of land balloons immediately after projects are announced because future rents are expected to increase. Rent is the present value of expected future net rents; the land value is now a function of expected rental value in the future. If half the rent is taxed, then half the future rents are taxed, and the present value of the land will be half the pre-tax value. So a tax on the land value is still equivalent to the tax on the rent. The relationship between the amount of rent taxed and the tax rate on the land value is:  $x = t/(i+t)$ , where  $t$  is the tax rate on the price of land,  $x$  is the percentage of the rent that is taxed, and  $i$  is the real interest rate after deducting inflation.

14. Walther, Hoel, Pignataro and Bladikas 1991.

15. Spengler, pp. 443–445.

16. Henry George (1839–1897) was most famous for his book *Progress and Poverty*, which argued that taxing land according to its value instead of labor or capital would be both more just and more economically efficient. For an overview of Georgist approaches to taxation, see Lindholm and Lynn 1982.

17. The most comprehensive study of the value capture approach in Hagman and Mischinski 1978. Among other significant studies on the merits of value capture as an approach to infrastructure finance are the following: Allen 1987; Allen, Chang, Marchetti, and Pokalsky 1986; Callies 1979; Cervero, Hall, and Landis 1993; Monograph 42; Cervero 1994; Johnson, and Hoel 1985; Rybeck, assisted by Wade and Josephs 1981; Sharpe 1977.

18. Adam Smith's *Wealth of Nations* (1776) remains even today a starting point for students of tax design, for he captured, even at that early time, not just the sum of learning to that date but his own acute insights. See, for example, "Principles of Taxation, in Light of Modern Developments," *Federal Tax Policy Memo*, The Tax Foundation, Washington, DC. For further discussion of what students of tax policy regard as the principles which should guide their design, see, for example, Musgrave and Musgrave 1989; Break 1993; *Tax Notes* 1988; Davies, 1986; and *Unleashing America's Potential: a Pro-Growth, Pro-Family Tax System for the 21st Century*. Washington: Report of the National Commission on Economic Growth and Tax Reform (Kemp Commission), 1996.

19. See, for example, the discussion in the current leading graduate text in graduate public finance courses: Rosen *Public Finance*, 5th Edition. Homewood, IL: Irwin Press, 1999, pp. 486–495. See also Gaffney [1971] 1972; Heilbrun 1983; Aaron 1975; Geisler 1995; Reschovsky 1998; Wolff 1998; and Earthright: The Economics of Freedom, at <http://www.geocities.com/RainForest/3046/>

20. Andelson 1998.

21. A feasibility study of the Washington Metro in 1980 showed that conservative interpolation of the findings to all completed stations, as well as an accounting of the increments in value that were being recorded along much of the 101-mile system in advance of construction, made it evident that the growth in the Metro-induced land values easily exceeded \$3.5 billion, compared with the \$2.7 billion of federal funds invested in Metro up until that time. See Rybeck 1981, pp. 23–27.

22. A study proposing just such a project, intended primarily to respond to projected population increases over the next few decades, has been done under contract with Orange County, New York: *2020 Vision: A Transportation Plan for Orange County, New York*. See also Shinbein and Adler 1995.

23. Cord 1986. See also Oates and Schwab 1995. A second and very recent study by Florenz Plassmann found that “on average, a one percentage point increase in the tax differential will yield an increase in the total value of construction of 17.8 percent” (Plassmann 1997, p. 122). This study can be found at <http://scholar.lib.vt.edu/theses/public/etd-61097-13834/edt-title.html>. Lists of publications on incentive taxation in its various forms are available from The Robert Schalkenbach Foundation in New York City, The Center for the Study of Economics in Columbia, Maryland, and The Lincoln Institute for Land Policy in Boston, Massachusetts.

24. Recognition of the relationship between land use policy and transportation policy is beginning, however, even though little attention is paid to tax policy. In 1995 a major conference was sponsored by The Brookings Institution and the Lincoln Institute of Land Policy, held in Washington, to explore alternatives to sprawl. See *Alternatives to Sprawl*, Conference Report published by the Lincoln Institute (Boston, 1995). A team of researchers at Rutgers has recently updated a 1974 study entitled *The Costs of Sprawl*, entitled *The Costs of Sprawl—Revisited*, TCRP Report 39 (1998), sponsored by the Federal Transit Administration, Transportation Research Board of the National Research Council.

25. NYS Real Property Tax Law § 502(3) states that “the assessment roll shall contain a column for the entry with respect to each separately assessed parcel of the assessed valuation of the land exclusive of any improvements, followed by a column for the entry of the total assessed valuation.”

26. For this reason, the ideal approach to value capture would be to employ a tax on land value not locally but comprehensively, even nationally.

27. In calculating the average land price per acre which was paid by the

state to property owners, not all parcels were included. This is because many parcels had structures on them, and it is impossible to know how much value should be attributed to structures and how much to land. The parcels that consisted of land only were distributed sufficiently widely that no distortion on that account is apparent. However, the price per acre which the state paid to titleholders varied a great deal according to the negotiating skills and other variables that typically go into such sales. Whereas the average price was just over \$3,600 per acre, they ranged far higher in a few cases. One landowner received \$3,260 for a parcel of only .009 acres, and another \$2,800 for .003 acres. This amounts to \$362,222 per acre in the first case and \$933,333 per acre in the second. It may just be that, in a few instances, some landowners really struck a bargain. In a few cases it may also be that the lands that they were left with after state purchase was so substantially lowered in value that the price had to reflect this factor as well.

28. The choice of which adjustment factor to employ to arrive at this figure is the result of a discussion with several land economists, and few indicators go back to 1958. Using a standard price deflator to calculate changes in land value raises problems, as no one factor is likely to apply in all regions of the country. The index employed here is the St. Louis Federal Reserve Board's Implicit Price Deflator at [www.stls.frb.org/fred/data/gdp/gnpdef](http://www.stls.frb.org/fred/data/gdp/gnpdef). Using 1996 as the base 100, the 1958 rate is roughly 21.50—it extends back only to the 1st Quarter of 1959. The 1995 (4th Quarter) is 98.85. If the GDP Price deflator is used, with the base year of 1982 as 100, the 1958 rate is 24.81, and for 1995 is 128.79. The latter index is a bit more generous, and was used in a prior draft of this paper. It leads to an adjusted 1995 value per acre of \$18,700. The precise increase in land value is beside the point however; it is certainly a small fraction of what prices obtain for the same parcels in current circumstances.

29. Value capture studies can sometimes be exceedingly sophisticated. Indeed one major study was so complex that it required a Cray computer to do the analysis. See *Transit Access and Land Value: Modeling the Relationship in the New York Metropolitan Area*, U.S. Department of Transportation, Federal Transit Administration, (FTA-NY-06-0152-93-1), September, 1993.

30. Of course these figures vary widely depending upon the design engineering complexity. Cutting through mountain terrain or wetlands will involve far higher costs than laying a highway over open flatland. When interchanges were expanded for the new Exit 8 of the Northway in 1995, the costs per lane mile came out to be as follows:

Date Const	Proj ID Number	#Lane-Mile	Proj Cost	Cost/Ln-Mi
2/23/1995	I-90 Exit 8	10.8	\$6,995,000	\$647,685
12/14/1995	I-90 Exit 8	10.8	\$8,848,752	\$819,328
Average			\$7,921,876	\$733,507

31. Interestingly, the cost per square foot is relatively invariant regardless of the size of the bridge.
32.  $307.4 \text{ acres} \times \$16,568 = \$5,093,003$ .
33. Nowhere is the ex-urban development resulting from automobile dependency better described than Joel Garreau's *Edge City: Life on the New Frontier*, New York: Doubleday, 1991.
34. One recent exploration of this is a chapter entitled "Catalytic Government: Steering Rather than Rowing," in David Osborne and Ted Gaebler, *Reinventing Government: How the Entrepreneurial Spirit is Transforming the Public Sector*, New York: Penguin Books, 1993.

### References

- Aaron, Henry J. (1975). *Who Pays the Property Tax: A New View*. Washington: The Brookings Institution.
- Allen, B. (1987). "Value Capture in Transit," *Journal of the Transportation Research Forum*, Washington DC, 28: 50–57.
- Allen, B., Chang, K., Marchetti, D., and J. Pokalsky (1986). *Value Capture in Transit: The Case of the Lindenwold High Speed Line*, Final Report # PA-11-0031-86-1, UMTA, US Department of Transportation and Philadelphia: University of Pennsylvania.
- Andelson, Robert V. (ed.) (1998). *Land-Value Taxation Around the World: Reports on Current and Historical Efforts to Apply the Principle of Collecting the Community-Created Value of Land for Community Benefit*, New York: Robert Schalkenbach Foundation.
- Anonymous, "Principles of a High Quality Revenue System," *Tax Notes*, March 21, 1988.
- Bass, Thomas (1992). "Road to Ruin," *Discover*: May 1992.
- Break, George (1993). "Taxation," *Encarta Encyclopedia* by Microsoft.
- Callies, D. (1979). "A Hypothetical Case: Value Capture / Joint Development Techniques to Reduce the Public Costs of Public Improvements." In *Urban Law Annual*. St. Louis, Washington University School of Law. 16: 155–192.
- Cervero, R. (1994). Rail Transit and Joint Development: Land Market Impacts in Washington, DC and Atlanta. *Journal of the American Planning Association*, 60, 1:83–94.
- Cervero, R., Hall, P., and J. Landis. (1993). *Transit and Joint Development in the United States*, University of Calif. Berkeley, Institute of Urban and Regional Development.
- Cord, Steven (1986). "How Much Revenue Would a Full Land Value Tax Yield?" *American Journal of Economics and Sociology*, 44, 3 (July): 279–294.
- Davies, David G. (1986). *United States Taxes and Tax Policy*. New York: Cambridge University Press.
- Dittmar, Hank (1999). "Road to Nowhere: The Automobile, Sprawl, and the Il-



- lusory Suburban Dream," *Enough*, The Center for a New American Dream, [www.newdream.org](http://www.newdream.org).
- Ellis, David (1967). *A History of New York State*, Rev. Edition, Ithaca: Cornell University Press.
- Gaffney, Mason (1971). "The Property Tax is a Progressive Tax," *Proceedings*, National Tax Association, 64th Annual Conference, Kansas City. [Republished (1972) in *The Congressional Record*, March 16: E 2675–79. Resources for the Future, Inc., The Property Tax is a Progressive Tax, Reprint No. 104, October, 1972].
- Geisler, Charles C. (1995). "Land and Poverty in the United States: Insights and Oversights," *Land Economics*, 71, 1 (February): 16–34.
- Goddard, Stephen B. (1994). *Getting There: The Epic Struggle between Road and Rail in the American Century*, Chicago: University of Chicago Press.
- Grondahl, Paul (1997). *Mayor Erastus Corning: Albany Icon, Albany Enigma*, Albany: Washington Park Press.
- Hagman, Donald G. and Dean J. Mischinski (editors) (1978). *Windfalls for Wipeouts: Land Value Capture and Compensation*, Chicago: American Society of Planning Officials.
- Hanson, Susan (Ed.) (1995). *The Geography of Urban Transportation*, Second Edition, New York: Guilford Press.
- Heilbrun, James (1983). "Who Bears the Burden of the Property Tax?" in C. Lowell Harriss (ed.), *The Property Tax and Local Finance*. Proceedings of the American Academy of Political Science, 35, 1 New York.
- Hook, Walter (1994). *Counting on Cars, Counting out People*, New York: Institute for Transportation Development Policy Paper, Winter.
- Johnson, G. and L. A. Hoel (1985). *An Inventory of Value Capture Techniques for Transportation*. University of Virginia, Charlottesville, VA.
- Kay, Jane Holtz (1997). *Asphalt Nation: How the Automobile Took Over America and How We Can Take It Back*, New York: Crown Publishers.
- Lindholm Richard W. and Arthur D. Lynn, Jr. (eds.) (1982). *Land Value Taxation: The Progress and Poverty Centenary*, Madison: University of Wisconsin Press.
- MacKenzie, James J. et al. (1992). *The Going Rate: What it Really Costs to Drive*, Washington: World Resources Institute.
- McShane, Clay (1994). *Down the Asphalt Path: The Automobile and the American City*, New York: Columbia University Press.
- Miller, Peter and John Moffet (1993). *The Price of Mobility: Uncovering the Hidden Costs of Transportation*, New York: Natural Resources Defense Council, October.
- Miller, T. et al (1991). *The Costs of Highway Crashes*, The Urban Institute, Washington, D.C., October.
- Munnell, Alicia H. (Ed.) (1990). *Is There a Shortfall in Public Capital Investment?* proceedings of a conference sponsored by Federal Reserve Bank of Boston.



- Munnell, Alicia H. with Leah H. Cook (1990). "How Does Public Infrastructure Affect Regional Economic Performance?" *New England Economic Review* (Federal Reserve Bank of Boston), September/October.
- Munnell, Alicia H. and Leah H. Cook, "Comment on Charles R Hulten and Robert M. Schwab, 'Is There Too Little Capital? Infrastructure and Economic Growth,'" *Infrastructure Needs and Policy Options for the 1990s*, Proceedings of the American Enterprise Institute Conference, Washington, D.C., February 4, 1991.
- Munnell, Alicia H., "Policy Watch: Infrastructure Investment and Economic Growth," *The Journal of Economic Perspectives*, Vol. 6, No. 4, Fall 1992.
- Musgrave, Richard and Peggy Musgrave (1989). *Public Finance: Theory and Practice*, Fifth Edition. New York: McGraw Hill, pp. 210–314.
- Nadis, Steve and James J. McKenzie, (1993). *Car Trouble*, Boston: Beacon Press.
- Oates, Wallace and Robert Schwab (1995). "The Impact of Urban Land Taxation: The Pittsburgh Experience." Cambridge, MA: Lincoln Institute of Land Policy, WP92W01.
- Plassmann, Florenz (1997). "The Impact of Two-Rate Taxes on Construction in Pennsylvania." Doctoral Dissertation, Virginia Polytechnic Institute.
- Reschovsky, Andrew (1998). "The Progressivity of State Tax Systems," *The Future of State Taxation*, David Brunori, (Editor), Washington: Urban Institute Press.
- Riordan, William L. (1963). *Plunkett of Tammany Hall*. New York: Dutton.
- Road Kill: How Solo Driving Runs Down the Economy*, Boston: The Conservation Law Foundation (May, 1994).
- Rosen, Harvey S. (1999). *Public Finance*, 5th Edition. Homewood, IL: Irwin Press.
- Rybeck, W., assisted by Wade J., and R. Josephs (1981). *Metrorail Impacts on Washington Area Land Values*. Subcommittee on the City Committee on Banking, Finance and Urban Affairs US House of Representatives.
- Rybeck, Walter (1981). "Transit-Induced Land Values: Development and Revenue Implications," *Economic Development Commentary* (National Council for Urban Economic Development), 5, 1 (October): 23–27.
- Sharpe, C. (1977). *Value Capture and Joint Development Applications: Chicago/ Louisville/ Los Angeles*. Rice Center for Community Design and Research. Report No. DOT-TST-77-72, US Department of Transportation. Houston, TX.
- Shinbein, Phillip J. and Jeffrey L. Adler (1995). "Land Use and Rail Transit," *Transportation Quarterly*, 49, 3 (Summer): 83–92.
- Spengler, Joseph, "Physiocratic Thought," *International Encyclopedia of Social Sciences*, 4: 443–445.
- Unleashing America's Potential: a Pro-Growth, Pro-Family Tax System for the 21st Century*. Washington: Report of the National Commission on Economic Growth and Tax Reform (Kemp Commission), 1996.
- Walther, E, Hoel, L. A, Pignataro, L. J., A. Bladikas (1991). *Value Capture Tech-*

*niques in Transportation: Final Report, Phase One.* No. DOT-T-90-11, Washington DC: US Dept. of Transportation Program of University Research.

- Wolff, Edward N. (1998). "Distributional Consequences of a National Land Value Tax on Real Property," in Dick Netzer (ed.) *Land Value Taxation: Can it Work Today?*, Cambridge: Lincoln Institute of Land Policy.