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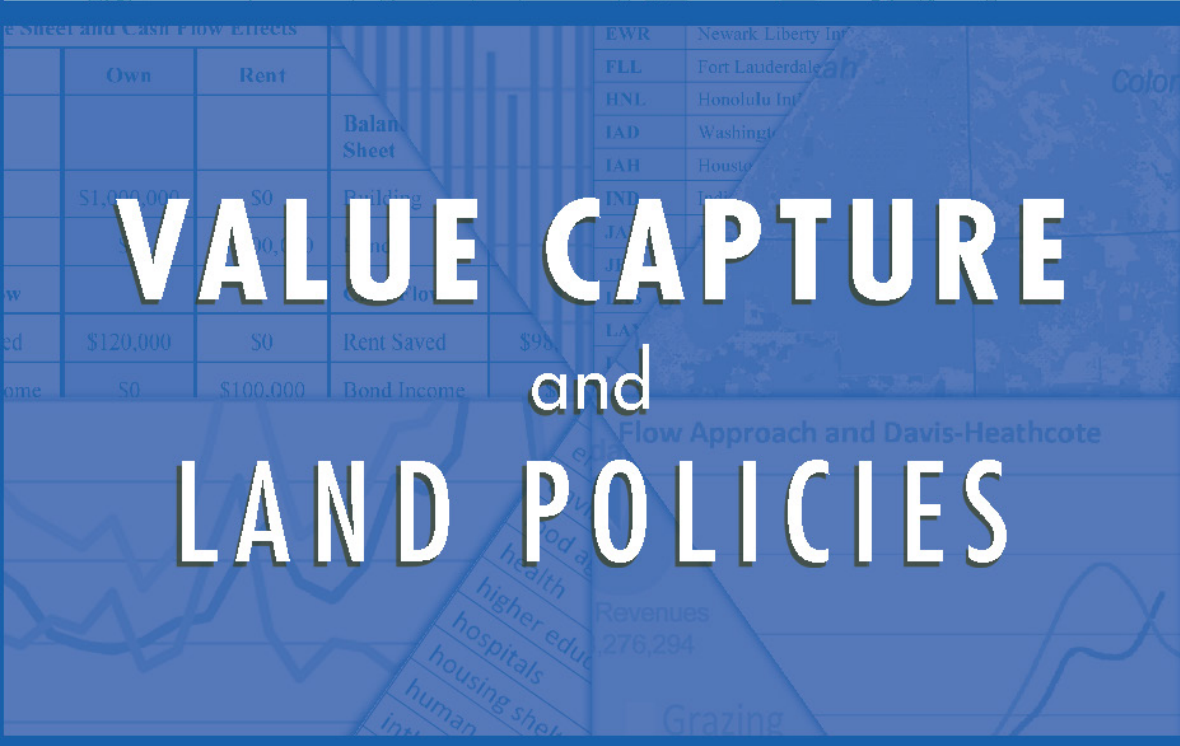
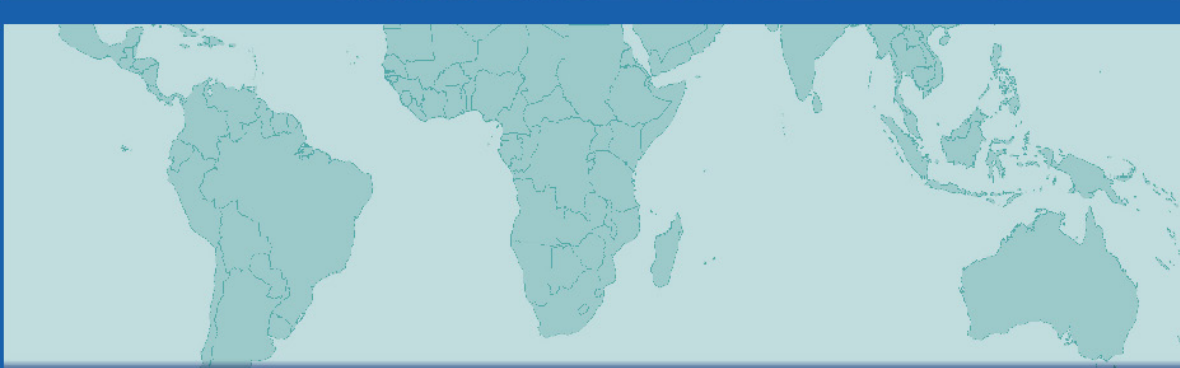
VALUE CAPTURE and LAND POLICIES





Edited by Gregory K. Ingram and Yu-Hung Hong

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CONTENTS

8

Are Property-Related Taxes Effective Value Capture Instruments?

Lawrence C. Walters

In the fields of urban public finance and international development the concept of land value capture (LVC) has become a standard argument for implementing or reforming taxes based on land. Often the value of privately held land increases as a result of public investments in infrastructure, publicly approved changes in land use, or broader changes in the community such as population growth. LVC is one way governments use taxes and fees to collect some share of this increase in land value in order to fund infrastructure and service improvements. The literature on the use of LVC tools reflects a substantial consensus that the "unearned increment" can and should be captured by the community. Most writers agree with the Vancouver Action Plan, the founding document for the United Nations Human Settlements Programme, UN-HABITAT, that "the unearned increment resulting from the rise in land values resulting from change in use of land, from public investment or decision, or due to the general growth of the community must be subject to appropriate recapture by public bodies (the community)" (UN 1976, recommendation D.3).

Likewise, most writers agree with the conclusions of Brown and Smolka (1997) regarding land-based taxes. In theory, they state the following: (1) publicly created value should be captured; (2) substituting land-based taxes for other taxes to pay for investments is economically efficient; (3) land-based taxes tend to lower prices and reduce speculation; and (4) land-based taxes could cover a major part of public infrastructure improvements.

This chapter explores some of the practical aspects of LVC. The approach is a mix of literature review, both U.S. and international, and preliminary empirical work based in the United States. The LVC argument contends that demographic trends and public actions often result in increased private land values. There are

multiple ways local authorities can capture some share of these increased values. Some are one-time taxes or fees, but such fees are often politically contentious. Another approach is through an annual property tax. But for LVC to have practical policy relevance through the property tax, the following conditions must hold:

1. Population growth, public investment in infrastructure, and/or improved services must result in increased private land values.
2. The increased values must be identified by the property tax valuation process and incorporated into taxable property values.
3. Entities levying a property tax must maintain an effective tax rate sufficient to result in a higher tax bill on the affected land.
4. The resulting increase in revenue must be adequate to pay for the required share of the infrastructure investment.

Public Investment and Private Land Values

There is by now a rather large literature examining the impact of public investment and public land use management decisions on private property values. Much of the empirical literature examines the influence that investment in transportation infrastructure has on adjacent private land. For a recent review of more than 85 studies exploring that relationship, see Smith and Gihring (2006), which also provides the foundation for the PricewaterhouseCoopers report to the Property Council of New South Wales, Australia (PricewaterhouseCoopers 2008). Others who have argued that public capital investment enhances private property values include Ayougu (2007); Bhatta and Drennan (2003); Canning and Pedroni (2008); Carroll (2008); Haughwout (2002); Mikelbank (2004); Moreno and Lopez-Bazo (2007); Siethoff and Kockelman (2002); Taylor and Brown (2006); and Weber, Bhatta, and Merriman (2003). At least one study has found that public-private partnerships in developing toll roads positively impacts adjacent property values (Vadali 2008).

Given this preponderance of evidence, we accept that the first condition articulated in the previous section, that public infrastructure investment, public service levels, and land use management decisions impact private property values, has been adequately demonstrated. We also accept that general population increases lead to higher property values. We turn now to some of the mechanisms that have been used to capture all or part of this increased value for public purposes.

Value Capture Mechanisms

A wide range of techniques have been used over the centuries in an attempt to capture the unearned increment in land value that results from public and community actions. These approaches can be broadly divided into two groups: fees and taxes on one hand, and nontax value capture tools on the other. Fees

Table 8.1
Taxes and Fees on Land and Improvements

	What Is Taxable?	What Is the Basis for Determining the Tax or Fee?	When Is the Tax or Fee Collected?
Development fees	Market value of new private investment in development	Cost of overseeing new development or mitigating impact of development on public infrastructure	Once, when permission to proceed with development is granted
Estate tax	Generally all land and property included in estates above a defined threshold of total value	Value of land and property transferred as part of an inheritance	Once, following death of estate owner
Capital gains tax	Sale of real property	Value of real property sold minus original purchase price and any subsequent improvement costs	Once, as part of income tax system
Transfer tax and stamp tax	Transfer of registered land title or other land rights to another party	Market value of real property transferred	Once, when registered land title or rights are formally transferred
Betterment tax	Increment in real property value due to public investment or approved change in land use	Land and improvement value after change minus land and improvement value before change	Once, at time of investment or when permission to change land use is granted
Land rent or lease (see chapter 6 in this volume)	Right to occupy and use publicly owned land	Varies widely	Annually, but can be more frequent
Annual property tax	Privately owned or controlled land and immovable improvements	(1) Market value of land and property; or (2) physical characteristics of land and property	Due annually; payable either annually, monthly, or quarterly

and taxes also can be divided into two groups: one-time assessments and annual property taxes. The more common fees and taxes are summarized in table 8.1.

TAXES AND FEES

Development Fees Development fees, impact fees, planning fees, and the like are among the one-time fees that local governments charge. These fees are generally levied to offset the costs of managing the development process or to mitigate

the impact on the existing public infrastructure. Development and impact fees have been applied to a wide range of impacts. The most obvious are roads and water, sewer, and electric utilities. New growth often requires the expansion of existing public infrastructure systems. That infrastructure can also include services. For example, in cases where new development is expected to increase the burden on public education, education impact fees are sometimes levied.

Because these fees are intended to offset the costs of new development experienced by communities, a number of local judicial systems have held that the fees assessed should approximate the actual costs incurred (Been 2005). Most fee structures have been challenged in court, to the point that courts have developed a standard to evaluate development and impact fees. This "rational nexus" standard requires a logical link between the fees charged and the infrastructure provided. This link makes the assessment of fees problematic: capital needs usually extend for longer periods than capital improvement plans, so determining the fees needed to cover costs over the life of a project can be very subjective. Using a deductive method to assess the fees by comparing the project with existing projects also can be problematic, because it may not account for the specific needs of the community (Clarke and Evans 1999). Under such limitations, it is difficult to realize a substantial increase in local revenues from development fees, although they may be an important source of funds to address the pressures of new growth.

Most studies have found that impact fees result in higher housing prices. See Been (2005) for a solid review of this topic and Evans-Cowley et al. (2009) for a more recent contribution. Others have argued that impact fees actually expand the supply of housing (Burge and Ihlanfeldt 2006). From an LVC perspective, the question is whether such fees reduce land values. If so, impact and other development-related fees can serve as an LVC mechanism by sharing at least partially in land value increases due to development. Ihlanfeldt and Shaughnessy (2004) found that impact fees did lower land prices in Florida, although Been (2005) is somewhat critical of their study. Evans-Cowley, Forgey, and Rutherford (2005) found that at least a portion of the impact fees in the Dallas area were absorbed by landowners. In both cases, the overall effect of development fees on land prices, and therefore their effectiveness as a mechanism for LVC, was modest.

Estate Tax The estate, or inheritance, tax is assessed when wealth (including real estate) is transferred as part of an estate or inheritance.[1] The tax as it applies to real estate is based on the market value of the property. Often an exemption is granted for estates below a specified value. Since this tax is nearly

1. In some instances, a distinction is made between an estate tax, which is levied on the total value of a person's estate, and an inheritance tax, which applies only to property that is passed on to an heir.

always applied at the state and/or federal levels and is imposed only when an estate is transferred, its effectiveness as an LVC mechanism in the current U.S. system is very limited. In addition, unless the initial exemption happens to correspond to the pre–public action value of the property, there is no reason to expect the estate tax to be a tax on the unearned increment attributable to the public action.

Capital Gains Tax The capital gains tax is assessed on the profits resulting from the sale of property. It may appear that this tax can be used for LVC purposes. However, since it is most commonly part of the income tax system, it may serve as an LVC mechanism for the state or federal government, but it offers little potential to local governments without some revenue-sharing mechanism. Even in countries where local governments have limited taxing authority, because the sale of a given property may not take place for years or even decades, the capital gains tax represents a very uncertain LVC mechanism for funding infrastructure and service improvements (Bahl and Wallace 2008).

Transfer Tax The transfer tax is assessed when the statutory title to land is transferred from one party to another. It differs from the capital gains tax in that the latter is a tax on income (the value of the sale minus the adjusted original investment), whereas the transfer tax is generally applied to the total value of a transaction and must be paid in order to complete the transfer of title. It is often charged even if the transfer is not the result of a sale. Transfer taxes are common, and rates vary widely around the world and within the United States. Since the tax is generally based on the full market value of the property being transferred, there is a clear disconnect with the LVC concept, which is intended to tax only the unearned increment.

Betterment Tax The betterment tax is intended to allow the community to capture part of the increased value that often results when infrastructure is improved or permission is granted to change land use. The betterment tax differs from development or impact fees in that it is an explicit attempt to share in a private value gain resulting from a public action. It differs from an annual property tax in that it is a one-time assessment and generally applies only to the increment in value resulting from a public investment or a change in land use. For a more complete discussion of betterment taxes, see chapter 4 in this volume.

Property Tax The property tax has been designed and implemented in a variety of ways around the world and has existed in some places for centuries. A property tax based on regularly updated and accurate market values meets one criterion (accurate property values) for an effective LVC tool. However, if the property tax is based on nonmarket factors such as land area or building attributes, or if market value estimates are not regularly updated, the potential of the property tax for LVC is impaired.

Labels change and implementation nuances are many, but the basic concepts of land-based taxes are fairly straightforward. Land and property can be taxed effectively when something about it changes, whether that is ownership or use. While some of these instruments can serve as LVC tools for specific public investments, their irregularity makes them an uncertain source of funding for ongoing services. An annual property tax on land and/or improvements can be a more stable source of LVC revenues if it is accurately tied to the capital market value of property.

In addition to taxes and fees intended to capture some share of increases in land value, governments use other mechanisms that effectively serve as LVC tools.

NONTAX LAND VALUE CAPTURE TOOLS

Nontax LVC tools have been used all over the world in many different ways. The abundant literature reflects the many approaches, tools, successes, and failures in efforts by governments to put LVC into practice. Each study comes with recommendations for further research, implementation with different conditions, or more specifications. This section describes some of these approaches and tools.

Developer Land Sale This tool shifts the investment in infrastructure improvements to private developers and requires them to recover their costs through the sale of the improved land. Whole new portions of cities have been built using this approach. In Denmark, the central government and the City of Copenhagen entered into a partnership to build a new district of the city called Ørestad. They combined land they each owned and developed a plan for the new district, which included an automatic metro rail connecting it to the city center. Sales of gross floor space to private developers, property taxes on new construction, and borrowing were used to finance the €175 million project (Peterson 2009). As an LVC tool, this approach obviously provides no new resources to fund ongoing services, but it does implicitly capture a portion of increased land values for new infrastructure while at the same time reducing risks for local governments.

Project-Related Land Sale For publicly owned land, the government can recover infrastructure costs by selling (or increasing the rent on) parcels of land that have increased in value due to infrastructure improvements or zoning changes. If land is privately owned, the government must first acquire the land, which can be a politically contentious action. By acquiring excess land beyond that required for infrastructure construction, the government can potentially capture land value gains. The major redesign of Paris by Georges-Eugène Haussmann during the nineteenth century was financed by grants, borrowing, and land sales following expropriations permitted by a change in the law just before the start of the project (Peterson 2009).

Tax Increment Financing In a tax increment financing (TIF) scheme, the government designates an area as a TIF district and determines the base taxable

value of property within the district. Subsequently, as developments are planned or improvements made, property values, and consequently assessed property taxes, increase. The difference between the base value and the increased value is the tax increment assigned to fund infrastructure improvements. Most fundamentally, TIF is a financing mechanism rather than a method to raise additional tax revenue. The incremental funds raised are dedicated to specific infrastructure, services, and debts. This earmarking of property taxes has been reviewed as having varying effects on property values, and there is far from unanimity on the impact of TIF schemes.

Property located within industrial TIF districts does not appear to increase in value, whereas property in mixed-use (residential and industrial) districts may or may not increase in value (Man and Rosentraub 1998; Weber, Bhatta, and Merriman 2003). Carroll (2008) found that public services provided with TIF are capitalized in property values over time, which would appear to support TIF as an LVC mechanism. This position is also supported by Byrne (2006) and Zhao, Das, and Larson (2011). As Youngman (2011) notes, the major challenge facing empirical attempts to assess the impact of TIF on property values is the difficulty of identifying what would have happened to values without it.

There is some empirical evidence that growth in a TIF area may be at the expense of growth for the whole city (Dye and Merriman 2000; Merriman, Skidmore, and Kashian 2011). Further, Dye and Merriman (2000) argue that although TIF provides a mechanism for earmarking property tax revenues for a specific purpose, it does not constitute LVC per se. Youngman (2011, 323) observes that "a plethora of economic studies have reached no consensus as to the effect of TIF on economic growth." It seems clear that at best, only a portion of the tax increment might qualify as LVC. Taxes generated by private investment in structures and improvements cannot be considered LVC. Taxes generated by incremental increases in land value as a result of being in a TIF zone might qualify as LVC, but only if the increased value does not come at the expense of other areas within the city.

Land Value Capture and Current Property Tax Limitation Efforts

There seems to be little doubt that public investment increases property values. The question considered in this section is whether the combination of administrative practices and tax limitation policies allows property tax systems to identify and tax the increase. The discussion focuses primarily on the annual property tax, but several of the arguments apply equally to other LVC mechanisms. As noted earlier, for LVC to have practical relevance, the property tax system must correctly identify property value increases due to factors external to the property, such as population increases or off-site infrastructure investments. Further, the local authorities levying the property tax must maintain a tax rate that is

sufficient to result in a higher tax bill for affected land, and the overall revenue increase must be sufficient to fund the designated share of improvement costs.

But the property tax environment in the United States has focused heavily in recent years on limiting the ability of local governments to raise property taxes. These limitation efforts vary by state and are certainly more intense in some states than in others. Efforts have been made to limit increases in

- assessed taxable value;
- property tax rates;
- property tax revenue collected;
- property taxes levied; and
- broader revenues and expenditures.

Limiting property tax rates is unlikely to affect the potential of using the property tax for LVC, although such limits may impair the ability of local governments to raise sufficient revenue to fund infrastructure improvements at the desired level. Assessment limits, levy limits, or revenue and expenditure limits could pose a more severe challenge for LVC. Only four states place no limits on the property tax system, and only eight others either limit just the tax rate or require full disclosure and widely advertised public hearings prior to adoption of a tax increase. All other states have placed limits on assessment increases, revenue raised, or amount of tax that can be levied (Lincoln Institute of Land Policy 2009).

Such limitations might pose a challenge for LVC: even if public investment results in higher land values, if the tax assessor is legally prohibited from identifying and incorporating that higher value into the taxable value, capturing part of the increase could be problematic. Likewise, if the assessor is permitted to identify the higher value, but the local government is legally prohibited from collecting more revenue than in previous years, it is difficult to see how LVC could be effective.

Another difficulty that may impair the practical potential of LVC is the time between revaluations by the assessment officer. For LVC to be effective, values must be identified and incorporated into the property tax system in a timely manner. In many jurisdictions, however, revaluations do not happen regularly. Table 8.2 summarizes the revaluation cycles mandated by states. It should be noted that actual practice may differ significantly from the mandates. The table shows, however, that more than half the states either revalue property at intervals greater than every three years or have no fixed schedule for revaluation.

If properties are not revalued regularly, and if market value increases either cannot be incorporated into taxable values or cannot be taxed at levels sufficient to raise additional revenue, it is reasonable to ask whether the property tax system as it exists in the United States can effectively serve as an LVC mechanism. To explore this question further, we devised a new metric of aggregate property value.

Table 8.2
State-Mandated Real Property Revaluation Cycles

Cycle Period	Number of States
No fixed schedule	3
Every year	22
Every 2 years	3
Every 3–5 years	18
More than 5 years	5

Source: Significant Features of the Property Tax, Lincoln Institute of Land Policy and George Washington Institute of Public Policy, http://www.lincolninst.edu/subcenters/significant-features-property-tax/Report_TaxLimitationMeasures.aspx.

Measuring Aggregate Property Value

Objectively measuring the property value in a given area is a daunting task. Tax assessors in most jurisdictions are charged with this task, but they are not equally prompt in their assessments, nor are their methods such that their valuation results are sufficiently comparable. Efforts have been made to generate estimates of land values and land price indexes, including the S&P/Case-Shiller Home Price Indices; the Davis-Heathcote/Lincoln Institute index (Davis and Heathcote 2007); and the Sirmans-Slade index (Sirmans and Slade 2011). However, these indexes often focus just on residential property and thus understate the total value of the property tax base. We propose a somewhat different approach to the problem of measuring aggregate property value.

Estimating the value of a given property generally involves applying at least one of three different approaches to value (Appraisal Institute 2008): the cost approach, the comparable sales approach, or the income approach. The *cost approach* estimates value as the cost of replacing the land and improvements minus any relevant estimates of obsolescence and depreciation. The *comparable sales approach* estimates value by comparing a property to other similar properties that have sold in the recent past. This approach is the foundation for the Case-Shiller indices, the Davis-Heathcote/Lincoln Institute index, and the Sirmans-Slade index. These are well-thought-out and carefully constructed indexes, but they focus largely on residential properties in places where there are rich databases of comparable sales.[2]

The third approach to value, the *income approach*, has not been as carefully explored. In this approach, market value is defined as the discounted present value of the free cash flow (CF) that is generated by a property. Free cash flow is

2. The Sirmans-Slade data also include indexes for nonresidential property.

an accounting concept representing the cash flow available for distribution to all securities holders, including both equity and debt. It is defined as follows:

$$(1) \qquad CF = EBIT(1-r) + Dep - \Delta WC - CE,$$

where $EBIT$ = earnings before interest deductions and taxes;
r = income tax rate;
Dep = depreciation;
WC = working capital; and
CE = capital expenditures.

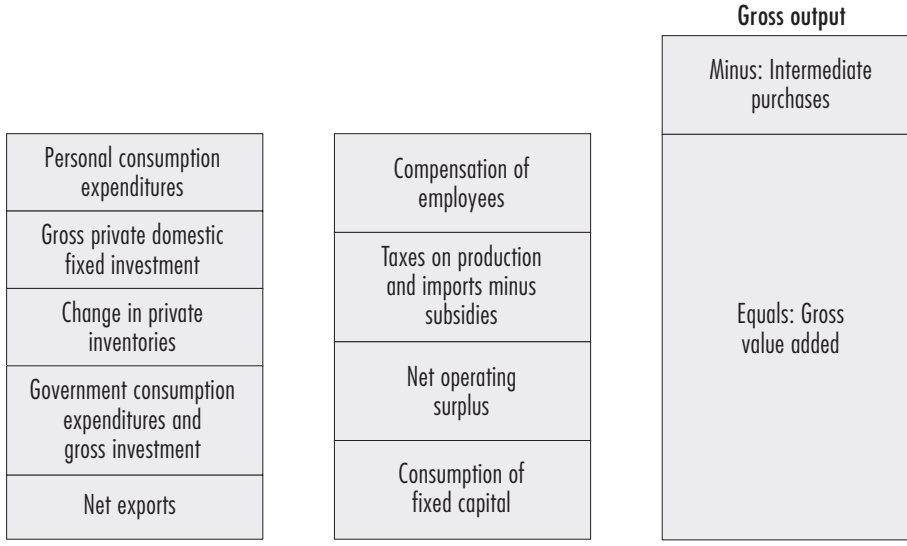
The national income and product accounts (NIPAs) employ a very similar concept known as the gross operating surplus (GOS). The Bureau of Economic Analysis defines GOS as follows:

> Net operating surplus . . . is a profits-like measure that shows the incomes earned by private enterprises from current production. It is calculated by deducting the costs of compensation of employees, taxes on production and imports less subsidies, and consumption of fixed capital from value added, but before taking account of financing costs (such as net interest) and other payments (such as business current transfer payments). Net operating surplus plus consumption of fixed capital is equal to gross operating surplus. (BEA 2009, 2–9)

Thus, GOS differs from free cash flow in the treatment of income taxes (included in free cash flow, but not in GOS), changes in working capital, and capital expenditures and depreciation. Figure 8.1 provides a graphic definition of net and gross operating surplus and compares the GOS concept to other terms used in the NIPAs.

Table 8.3 demonstrates the logic used here for deriving an approximation of free cash flow from the NIPA tables. Clearly, there are several important assumptions made as part of the calculations. First, the accounting calculations for working capital normally include all current assets and liabilities, of which inventory levels are only a part. The approach taken here assumes that in the aggregate, other current assets will offset current liabilities. Second, the capital consumption estimates included in GOS do not adjust for residential equipment and software, neither of which are subject to the property tax in most cases. Finally, there may be other intangible contributions to GOS that would normally be excluded from the income approach to value. This is an important consideration and is often the subject of litigation. Unfortunately, there is no widely accepted approach for extracting such intangibles from the income approach. For purposes of this preliminary presentation of the new metric, we acknowledge the limitation but make the assumption that the result of the calculation described in table 8.3 is a reasonable approximation of the free cash flow generated by the economy of a given area.

Figure 8.1
Three Ways to Measure Gross Domestic Product (GDP)



[a]Gross domestic product.
[b]Gross domestic income. Gross operating surplus is net operating surplus plus consumption of fixed capital.
[c]Gross value added.

Source: BEA (2011), chart 2.1, pp. 2–8.

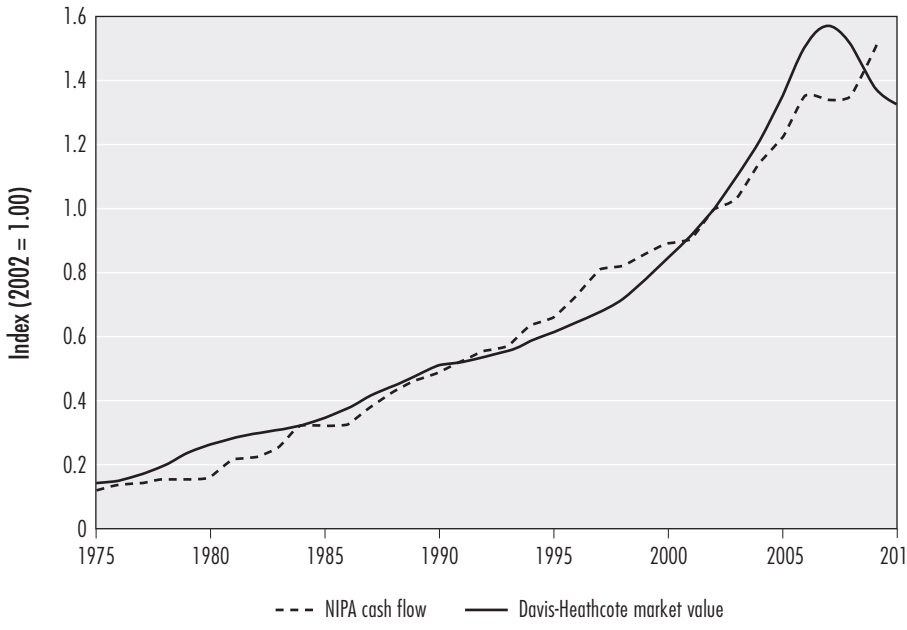
Table 8.3
Deriving Free Cash Flow from National Income and Products Accounts (NIPAs)

Action	Accounting Concept	NIPA Approximation
Start with	*EBIT* + *Dep*[a]	Gross operating surplus (GOS; private sector)
Subtract	Income taxes	Taxes on corporate income
Subtract	Change in working capital	Change in private inventories
Subtract	Capital expenditures	Gross fixed private investment minus software and residential equipment

[a]*EBIT* = earnings before interest deductions and taxes; *Dep* = depreciation.

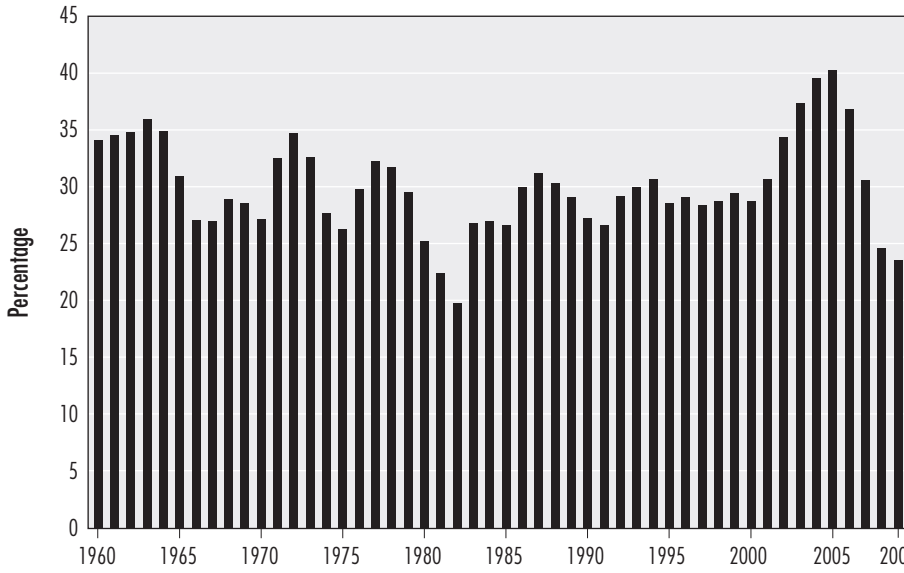
It is useful to compare the results of this analysis with other attempts to assess aggregate market value. The analysis by Davis and Heathcote (2007) has received a good deal of attention in recent years. These authors created an aggregate estimate of residential market value, along with price indexes for a number of metropolitan statistical areas (MSAs) in the United States. Figure 8.2 compares the most recent Davis-Heathcote aggregate (indexed) market value to the NIPA cash flow approach proposed here. To facilitate comparisons, both data series have been indexed to 2002. In general, the cash flow approach is more volatile than the Davis-Heathcote aggregate value. The Davis-Heathcote data also emphasize the recent real estate bubble far more than the cash flow approach does. This is expected, because the Davis-Heathcote series represents only residential property, whereas the cash flow approach attempts to capture all real estate value. As shown in figure 8.3, residential investment generally represents between 25 and 30 percent of total gross investment, with a few notable exceptions, such as the recent housing bubble. Thus, while some divergence should be expected, the general patterns in the two data series appear quite similar.

Figure 8.2
Comparison of NIPA Cash Flow Approach and Davis-Heathcote Aggregate (Indexed) Market Value



Source: Davis-Heathcote (2007) and calculations by the author.

Figure 8.3
Gross Residential Fixed Investment as a Percentage of Total Gross Fixed Investment (excluding software and residential equipment)



Source: BEA (2011), table 5.9. Changes in net stock of produced assets (fixed assets and inventories) and calculations by the author.

To pursue the value capture question further, it is helpful to disaggregate the data series to a smaller geographic area than the entire United States. Unfortunately, this requires some additional assumptions, because the Bureau of Economic Analysis does not report all of the necessary time series below the national level. The approach taken here is based on the observation that GOS, the key starting point for the cash flow approach, is highly correlated with earnings by place of work (EPW). Indeed, the correlation at the state level between share of EPW and share of GOS is above 0.99 for all years 1997–2008. Given this high degree of correspondence, we make two assumptions. First, we assume that a similar relationship exists between EPW and GOS at the MSA level. Second, we assume that a similar relationship holds for free cash flow (CF) and EPW. With these two assumptions, we can estimate CF for each MSA in a given year as

$$(2) \qquad CF_{MSA} = \left(\frac{EPW_{MSA}}{EPW_{National}} \right) \times CF_{National}.$$

In addition, we use the following assumptions to evaluate the value capture relationships:

1. Changes in cash flow in an MSA are immediately capitalized in real estate market prices.
2. Changes in real estate prices affect assessed values with a one- to three-year lag.
3. Changes in assessed values affect property tax revenues with a one- to two-year lag.

Armed with the cash flow metric and these assumptions, we can now consider the relationship between property value and property tax revenue.

Property Value and Property Tax Revenue

We relied on the U.S. Census Bureau's state and local government finance survey data for 1992–2006. Starting with the complete individual unit file for each year, we selected only those units that reported property tax revenue. From this set, we selected the government entities that were included in the sample in all years. This step yielded a consistent panel of entities with property tax revenue for the years 1994–2006.

We next selected those government entities located in an MSA (using the county location identifier). The result was a set of entities for each MSA. According to the 2007 Census of Governments, the total number of government units in the nation's 366 MSAs was just over 41,500. The number of entities in each MSA varied from just 1 in the Danville, Virginia, and Harrisonburg, Virginia, MSAs to 1,726 units in the Chicago-Joliet-Naperville, Illinois-Indiana-Wisconsin MSA. The average number of units was just over 113, including counties, cities, towns, special districts, and school districts.

Of the total government units, just over 18 percent (7,531 units) were included in the state and local government finance survey in all relevant years and reported property tax revenue in those years. The selection strategy resulted in 10 MSAs with no government units in the sample. The largest of them in terms of the number of units in the MSA was Norwich–New London, Connecticut, with 88 units. Of the 356 remaining MSAs, the number of units in each varied from 1 to 583, with an average of 21.

It would seem problematic to attempt to draw inferences on large, complex MSAs based on a very small sample of government units. For example, the Denver-Aurora-Broomfield, Colorado, MSA had 813 units in total, but only 35 were included in the state and local government finance survey and reported property tax revenue for each year. A 4.3 percent "response rate" was deemed too low to

be reliable. In contrast, some MSAs had very few government entities. Fairbanks, Alaska, for example, had just 4 units, and only 1 of those was included in the finance survey data, representing a 25 percent response rate. In the end, the judgment was made to include all MSAs with a response rate of at least 20 percent or a minimum of 45 government entities included in the finance survey data. This standard resulted in a sample of 156 MSAs, including 5,611 government units in total and an average response rate of 27.2 percent (36 units). See the appendix for the list of MSAs included in the final analysis. Based on these units, the property tax collections within each MSA were estimated by simply summing across the units within the MSA.

We do not claim that this calculation results in an accurate estimate of total property taxes collected within the MSA. Since the census data represent a survey, our contention is simply that this consistent panel of government units is representative of the entire MSA. The collection experience of these entities likely reflects the broader experience of local governments within the MSA.

The variable to measure change in cash flow (CF) value was calculated using the following formula:

$$(3) \qquad \textit{Change in value} = \frac{CF_t}{CF_{t-1}},$$

where t is the time period.

To capture the potential lagged effects, we measured the change in property tax (PT) revenue (taxes collected) using this formula:

$$(4) \qquad \textit{Change in PT revenue} = \textit{Mean}\left(\frac{PT_{t+2}}{PT_t}, \frac{PT_{t+3}}{PT_t}, \frac{PT_{t+4}}{PT_t}\right).$$

The descriptive statistics for the two variables are reported in table 8.4. The Pearson correlation between them is positive but fairly low (r = 0.03).

Table 8.4
Descriptive Statistics for Changes in Cash Flow Value and Property Tax Revenue

Variable	Number of Entities	Mean	Std. Dev.
Change in cash flow value	1,850	1.057	0.048
Change in property tax revenue	1,850	1.277	0.737

Table 8.5
Fixed-Effects Model Results [DV = (Change in PT revenue)$^{-2.5}$]

Variable	Parameter Estimate	Standard Error	T Value
Change in value	–0.460	0.133	–3.45[a]
Intercept	1.180	0.157	7.53[a]
Model R^2	0.58		

[a]Significant at 0.001 level.

Analysis of the PT revenue variable indicates that modeling $PT^{-2.5}$ was most appropriate. The results of a fixed-effects, 12-year[3] time-series analysis, with change in PT revenue as the dependent variable (DV), are summarized in table 8.5 (the MSA and year effects are omitted for ease of reporting). Reversing the transformation of the dependent variable, the model results indicate that a 1 percent increase in CF in the base year (2004) resulted in a 0.27 percent increase in PT revenue three to five years later. Given widespread efforts to restrain property tax assessments and levy increases, this is a somewhat surprising finding.

Local Capital Outlays and Changes in Cash Flow

The U.S. Census Bureau's state and local government finance survey also reports data on capital outlays by governments. These data are not as complete as the tax revenue data, and the subsample selected for this study focused only on jurisdictions that reported property tax revenue. However, it is possible to examine the relationship between reported capital outlays by these jurisdictions and subsequent changes in cash flow. Again, no particular effort was made to capture all of the reported capital outlays for each MSA. Government entities were selected because they reported property tax revenue, and then capital outlays were aggregated for those entities. Similarly, no effort was made to capture state or federal expenditures for capital outlays in the 156 MSAs. Such expenditures may be included if the funds were first transferred to local governments, but there is no doubt significant undercounting of total capital expenditures.

Likewise, we did not consider all capital outlay categories, but rather focused on two that have received attention in previous value capture studies: transportation and utilities. We hypothesized that a capital outlay in either transportation or utilities would result in increased economic activity and therefore in increased cash flow (CF). Because we are not certain how much time must elapse before public investment shows up in the private economy, we considered one-, two-, and three-year lead times. Thus, if the investment was made in year *t*, we looked

3. The years 1994–2006, with 1997 omitted because of data limitations.

for a change in CF in years $t + 1$, $t + 2$, and $t + 3$, after controlling for time and MSA.

We found that transportation investments in year t had a significant positive impact on CF in year $t + 1$, but no systematic effect on CF beyond that. After all the transformations and standardizations were accounted for, we found that an investment of $822,000[4] in the median MSA with an annual CF of just over $2 billion would result in a $10.3 million increase in CF the following year. If the property tax rate was about the national average of 13 percent of CF, the cost of the investment would easily be recouped within a year.

Local utility expenditures tended to be much higher than local transportation expenditures, and they appeared to have a more extended impact on the local economy. Whereas the impact of transportation expenditures was felt the following year, with little or no additional impact in subsequent years, utility expenditures had a positive impact over at least three years. Thus, local utility expenditures in year t were positively associated with changes in CF in years $t + 1$, $t + 2$, and $t + 3$. But the impact of utilities was somewhat smaller than that of transportation, and therefore the payback period would be somewhat longer. Again using our example of a median MSA with an annual CF of about $2 billion, the average annual utility investment was just over $56 million. If this were increased by 10 percent ($5.6 million), the resulting increase in CF would be on the order of $2.3 million spread over three years. At the national average property tax rate, the payback period would approach 20 years, which may be reasonable if the original investment was financed appropriately.

Based on the cash flow approach to aggregate value, it appears that there is reason to be optimistic that average property tax rates can generate sufficient incremental revenue to repay the cost of public investment in transportation and public utilities. Substantiating this claim will clearly require a more detailed analysis.

Conclusions

Value capture has been widely advocated as good public policy. In this chapter, we considered the practical potential of LVC. We noted that LVC can take place only if certain conditions are met:

1. Population growth, public investment in infrastructure, and/or improved services must result in increased private land values.
2. The increased values must be identified by the property tax valuation process and incorporated into taxable property values.

4. About a 10 percent increase in transportation spending on average.

3. Entities levying a property tax must maintain an effective tax rate sufficient to result in a higher tax bill on the affected land.
4. The resulting increase in revenue must be adequate to pay for the required share of the infrastructure investment.

The extensive literature on LVC largely considers the first point and clearly establishes that public investment often results in increased private land values. It is less clear that the other conditions are routinely met even in advanced economies such as that of the United States.

The mechanisms often used to attempt LVC can be divided into two broad categories: taxes and fees, and nontax value capture tools. Taxes and fees also can be divided into two groups: one-time assessments and annual property taxes. One-time assessments can be effective, but there are often difficulties in the implementation. Studies have shown that development fees are only modestly effective in LVC. Betterment taxes require sustained political will, but they can be effective for direct public investment projects. The challenges in their implementation should not be minimized, and as with most other one-time charges resulting from some change in either ownership or use of land, betterment taxes fail to capture broader socioeconomic trends in the community. Annual property taxes can be effective in LVC, but only if values are updated regularly and rates are designed to capture the increased value. Nontax approaches to LVC have generally proved to be less effective.

Efforts to restrain property taxes in the United States can potentially compromise the potential for LVC through that mechanism. Limiting assessment increases, levy increases, and total revenue collected may make LVC difficult. Rate limits seem less problematic. At the same time, administrative practices may impair LVC if they result in out-of-date values or systematically undervalued property.

To explore some of the empirical issues raised here, we introduced a new metric based on the income approach to value and the NIPA tables. Unlike several other approaches to measuring aggregate value that focus on residential value, this cash flow approach attempts to capture the aggregate value of all real estate. Our analysis of 156 MSAs in the United States over a 12-year period indicates that despite the potential challenges created by property tax limitation efforts, annual property taxes appear to be effective at capturing increased real estate values. It also appears that there is reason to be optimistic that property taxes can generate sufficient incremental revenue to repay public investments at least for transportation expenditures.

The empirical study of LVC poses several important challenges, as demonstrated by the fact that much of the literature has focused on only the first requirement for LVC: values must go up as a result of public investment. While the current study attempted to explore other requirements, much of the work presented here is more suggestive than definitive. The cash flow metric holds promise, but ques-

tions remain. For example, the increased property tax revenue observed could be due to assessments on new private investments rather than an increase in land values resulting from public investments and overall increased demand.

An important question suggested by Dye and Merriman (2000) also requires further study. Local governments are often criticized for what is termed "zoning for dollars," meaning the aggressive pursuit of sales tax revenue through favorable land use policies and incentives (Tannenwald 2001). There is a convincing argument that such policies move retail sales from one location to another without increasing overall economic activity (with the possible exception of construction). It is possible to make a similar argument about public investment in infrastructure. Dye and Merriman (2000) suggest that this may be the case with TIF. Such mechanisms may be effective at increasing land values within the TIF zone, but they may do so by shifting economic activity from other areas, thereby reducing land values in those areas. Similarly, it may be that infrastructure investment that does not result in a net gain in employment, population, or productivity may simply be moving land value from one location to another without creating value to be captured.

These observations suggest at least three potential directions for further research on land value capture. The first is focused on refining the cash flow approach to aggregate land value estimation. These refinements will require that total property tax revenue be disaggregated into revenue from taxing land and revenue from taxing improvements. This will likely be most feasible in states that already require this distinction in their record keeping. Similarly, refining the cash flow approach will require that changes in land values be distinguished from changes in the overall stock of improved land. The justification for LVC is that public actions increase private land values. Thus, to test the effectiveness of LVC mechanisms, it will be important to focus on changes in land values.

The focus on land values also points to the second potential direction for further research. There seems little doubt that infrastructure investments can materially improve communities by making them more attractive places to live. But it also seems likely that not all infrastructure investments are created equal in this regard. Some are likely to add greater value to a community than others, and some may simply move land value from one location to another without a net increase. Understanding which investments result in net increases in value and which simply move value around represents a potentially valuable contribution to urban management as well as tax policy.

Finally, there is the important question of whether the cash flow approach can have any relevance in less developed countries. The national income accounts in Organisation for Economic Co-operation and Development (OECD) countries may provide sufficient detail at a disaggregated level to permit estimates of tax capacity and effort using a cash flow approach. It is less clear that such information is available outside these industrialized countries. But it is in precisely such

contexts that the measure is most needed. In most instances, the property tax is underutilized in developing countries, but international interest in land-based taxes is growing. Estimating revenue capacity and effort in such settings has potential interest beyond LVC and thus supports the relevance of further research in this area.

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APPENDIX: METROPOLITAN STATISTICAL AREAS INCLUDED IN THE ANALYSIS

MSA Name (FIPS: federal information processing standards code)	Number of Government Units, 2007 Census	Number of Units Selected from State and Local Government Finance Survey	Percentage of Units Selected
Abilene, TX (10180)	51	16	31.4
Akron, OH (10420)	114	34	29.8
Albany, GA (10500)	35	7	20.0
Albany–Schenectady–Troy, NY (10580)	272	56	20.6
Allentown–Bethlehem–Easton, PA–NJ (10900)	233	50	21.5
Amarillo, TX (11100)	37	12	32.4
Ames, IA (11180)	26	8	30.8
Anchorage, AK (11260)	8	2	25.0
Ann Arbor, MI (11460)	54	13	24.1
Anniston–Oxford, AL (11500)	22	6	27.3
Atlanta–Sandy Springs–Marietta, GA (12060)	379	45	11.9
Atlantic City–Hammonton, NJ (12100)	49	19	38.8
Bakersfield–Delano, CA (12540)	157	50	31.8
Baton Rouge, LA (12940)	63	13	20.6
Battle Creek, MI (12980)	44	12	27.3
Bay City, MI (13020)	30	7	23.3
Beaumont–Port Arthur, TX (13140)	79	19	24.1
Billings, MT (13740)	96	26	27.1
Binghamton, NY (13780)	78	21	26.9
Bismarck, ND (13900)	94	19	20.2
Boston–Cambridge–Quincy, MA–NH (14460)	480	80	16.7
Bowling Green, KY (14540)	18	4	22.2
Brunswick, GA (15260)	14	4	28.6
Buffalo–Niagara Falls, NY (15380)	139	44	31.7

(continued)

APPENDIX
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MSA Name (FIPS: federal information processing standards code)	Number of Government Units, 2007 Census	Number of Units Selected from State and Local Government Finance Survey	Percentage of Units Selected
Canton–Massillon, OH (15940)	93	22	23.7
Carson City, NV (16180)	3	1	33.3
Cedar Rapids, IA (16300)	84	22	26.2
Chicago–Joliet–Naperville, IL–IN–WI (16980)	1,726	401	23.2
Chico, CA (17020)	69	14	20.3
Cincinnati–Middletown, OH–KY–IN (17140)	472	90	19.1
Cleveland–Elyria–Mentor, OH (17460)	289	87	30.1
College Station–Bryan, TX (17780)	45	13	28.9
Columbus, GA–AL (17980)	32	7	21.9
Columbus, OH (18140)	352	62	17.6
Corpus Christi, TX (18580)	75	23	30.7
Dallas–Fort Worth–Arlington, TX (19100)	484	133	27.5
Dalton, GA (19140)	20	4	20.0
Dayton, OH (19380)	182	47	25.8
Des Moines–West Des Moines, IA (19780)	142	32	22.5
Detroit–Warren–Livonia, MI (19820)	388	121	31.2
Durham–Chapel Hill, NC (20500)	21	6	28.6
El Centro, CA (20940)	51	18	35.3
El Paso, TX (21340)	44	12	27.3
Elizabethtown, KY (21060)	21	6	28.6
Eugene–Springfield, OR (21660)	87	20	23.0
Fairbanks, AK (21820)	4	1	25.0
Flagstaff, AZ (22380)	37	9	24.3
Flint, MI (22420)	63	24	38.1

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APPENDIX
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MSA Name (FIPS: federal information processing standards code)	Number of Government Units, 2007 Census	Number of Units Selected from State and Local Government Finance Survey	Percentage of Units Selected
Fort Smith, AR–OK (22900)	152	45	29.6
Fresno, CA (23420)	161	38	23.6
Gainesville, GA (23580)	16	4	25.0
Glens Falls, NY (24020)	75	21	28.0
Grand Rapids–Wyoming, MI (24340)	182	41	22.5
Great Falls, MT (24500)	45	9	20.0
Gulfport–Biloxi, MS (25060)	49	10	20.4
Hanford–Corcoran, CA (25260)	65	15	23.1
Hattiesburg, MS (25620)	37	10	27.0
Hinesville–Fort Stewart, GA (25980)	15	3	20.0
Holland–Grand Haven, MI (26100)	42	10	23.8
Honolulu, HI (26180)	5	1	20.0
Hot Springs, AR (26300)	34	8	23.5
Houma–Bayou Cane–Thibodaux, LA (26380)	13	5	38.5
Houston–Sugar Land–Baytown, TX (26420)	936	81	8.7
Indianapolis–Carmel, IN (26900)	450	55	12.2
Iowa City, IA (26980)	36	8	22.2
Ithaca, NY (27060)	30	7	23.3
Jackson, MI (27100)	44	14	31.8
Jackson, MS (27140)	80	17	21.3
Janesville, WI (27500)	47	11	23.4
Kalamazoo–Portage, MI (28020)	97	25	25.8
Kansas City, MO–KS (28140)	704	107	15.2
Killeen–Temple–Fort Hood, TX (28660)	69	20	29.0

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APPENDIX
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MSA Name (FIPS: federal information processing standards code)	Number of Government Units, 2007 Census	Number of Units Selected from State and Local Government Finance Survey	Percentage of Units Selected
Lafayette, LA (29180)	15	3	20.0
Lake Charles, LA (29340)	16	4	25.0
Lake Havasu City–Kingman, AZ (29420)	43	15	34.9
Lansing–East Lansing, MI (29620)	128	32	25.0
Laredo, TX (29700)	11	6	54.5
Las Vegas–Paradise, NV (29820)	22	6	27.3
Lawton, OK (30020)	32	13	40.6
Lewiston, ID–WA (30300)	33	8	24.2
Lexington–Fayette, KY (30460)	46	10	21.7
Lima, OH (30620)	44	11	25.0
Longview, TX (30980)	64	24	37.5
Los Angeles–Long Beach–Santa Ana, CA (31100)	453	159	35.1
Lubbock, TX (31180)	38	12	31.6
Macon, GA (31420)	29	7	24.1
Manchester–Nashua, NH (31700)	63	26	41.3
Mansfield, OH (31900)	44	11	25.0
McAllen–Edinburg–Mission, TX (32580)	78	18	23.1
Medford, OR (32780)	49	13	26.5
Merced, CA (32900)	81	23	28.4
Midland, TX (33260)	10	6	60.0
Milwaukee–Waukesha–West Allis, WI (33340)	208	64	30.8
Minneapolis–St. Paul–Bloomington, MN–WI (33460)	532	98	18.4
Missoula, MT (33540)	42	15	35.7

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APPENDIX
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MSA Name (FIPS: federal information processing standards code)	Number of Government Units, 2007 Census	Number of Units Selected from State and Local Government Finance Survey	Percentage of Units Selected
Modesto, CA (33700)	100	22	22.0
Monroe, LA (33740)	19	4	21.1
Monroe, MI (33780)	37	11	29.7
Muncie, IN (34620)	42	9	21.4
Muskegon–Norton Shores, MI (34740)	49	15	30.6
Napa, CA (34900)	26	7	26.9
New Orleans–Metairie–Kenner, LA (35380)	43	13	30.2
New York–Northern New Jersey–Long Island, NY–NJ–PA (35620)	1,520	583	38.4
Niles–Benton Harbor, MI (35660)	72	19	26.4
Ocean City, NJ (36140)	50	16	32.0
Odessa, TX (36220)	10	4	40.0
Oklahoma City, OK (36420)	203	74	36.5
Omaha–Council Bluffs, NE–IA (36540)	606	51	8.4
Owensboro, KY (36980)	25	6	24.0
Oxnard–Thousand Oaks–Ventura, CA (37100)	77	28	36.4
Pascagoula, MS (37700)	24	6	25.0
Peoria, IL (37900)	330	53	16.1
Philadelphia–Camden–Wilmington, PA–NJ–DE–MD (37980)	857	205	23.9
Phoenix–Mesa–Glendale, AZ (38060)	216	85	39.4
Pittsburgh, PA (38300)	885	112	12.7
Portland–Vancouver–Hillsboro, OR–WA (38900)	293	66	22.5
Prescott, AZ (39140)	59	24	40.7
Racine, WI (39540)	52	14	26.9

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APPENDIX
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MSA Name (FIPS: federal information processing standards code)	Number of Government Units, 2007 Census	Number of Units Selected from State and Local Government Finance Survey	Percentage of Units Selected
Redding, CA (39820)	71	27	38.0
Riverside–San Bernardino–Ontario, CA (40140)	298	79	26.5
Rochester, NY (40380)	240	55	22.9
Sacramento–Arden–Arcade–Roseville, CA (40900)	339	60	17.7
St. Louis, MO–IL (41180)	1,019	142	13.9
Salinas, CA (41500)	101	27	26.7
San Angelo, TX (41660)	25	9	36.0
San Antonio–New Braunfels, TX (41700)	155	40	25.8
San Diego–Carlsbad–San Marcos, CA (41740)	163	57	35.0
San Francisco–Oakland–Fremont, CA (41860)	374	101	27.0
San Jose–Sunnyvale–Santa Clara, CA (41940)	109	54	49.5
Sandusky, OH (41780)	33	8	24.2
Santa Barbara–Santa Maria–Goleta, CA (42060)	74	26	35.1
Santa Rosa–Petaluma, CA (42220)	106	38	35.8
Seattle–Tacoma–Bellevue, WA (42660)	322	64	19.9
Sherman–Denison, TX (43300)	49	13	26.5
Spokane, WA (44060)	73	16	21.9
Springfield, MO (44180)	129	29	22.5
Springfield, OH (44220)	34	9	26.5
Sumter, SC (44940)	11	3	27.3
Syracuse, NY (45060)	176	40	22.7
Texarkana, TX–Texarkana, AR (45500)	54	17	31.5
Toledo, OH (45780)	177	38	21.5

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APPENDIX
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MSA Name (FIPS: federal information processing standards code)	Number of Government Units, 2007 Census	Number of Units Selected from State and Local Government Finance Survey	Percentage of Units Selected
Trenton–Ewing, NJ (45940)	39	11	28.2
Tucson, AZ (46060)	46	17	37.0
Tulsa, OK (46140)	244	74	30.3
Tyler, TX (46340)	27	10	37.0
Valdosta, GA (46660)	32	7	21.9
Vineland–Millville–Bridgeton, NJ (47220)	42	17	40.5
Virginia Beach–Norfolk–Newport News, VA–NC (47260)	34	8	23.5
Visalia–Porterville, CA (47300)	162	47	29.0
Waco, TX (47380)	52	21	40.4
Waterloo–Cedar Falls, IA (47940)	55	16	29.1
Wichita Falls, TX (48660)	51	15	29.4
Youngstown–Warren–Boardman, OH–PA (49660)	198	54	27.3
Yuba City, CA (49700)	85	18	21.2
Yuma, AZ (49740)	32	12	37.5