

Property  
Taxes

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# Property Taxes

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# Lecture Overview

## Topics covered

- Definition and administrative steps
- Property value determination and assessment
- Tax rate setting
- Various measures related to equity and policy
- Evaluation regarding equity, efficiency, etc.

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# Property Taxation

## Definition

- Tax on the market value of privately owned property
- Theoretically a wealth tax (e.g., real estate, personal property)

Inclusion of all property: Administratively and politically unfeasible

- Including agricultural land, commercial and industrial property, and residential homes
- Exemptions for public property, cemeteries, churches, colleges, nonprofit hospitals, etc. as long as used for intended purpose

Most important tax used by U.S. local governments (Source: [U.S. Census 2021 State & Local Government Finance Historical Datasets and Tables](#))

- 72.5% of local tax revenue
- Economic basis for local autonomy

# Key Administrative Steps

## Registration

- Identification of properties to be taxed as ownership

## Assessment

- Quantification of property value (tax base) and tax rate
- Key difficulty with respect to property taxes
- Key difference to other taxes: Setting of tax base and tax rate by the government
- Trade-off between setting tax base and rate

## Collection

- Mailing of bills and processing of tax receipts

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# Property Value Determination

## Goal of property value assessment

- Accurate and up-to-date estimate of market value for each property
- Accuracy of assessment affects fairness of property tax

## Assessment cost versus accuracy

- Higher accuracy requires more frequent, regular, and ideally annual assessment

## Various values for properties

- Market value
- Appraised value
- Assessed value

# Types of Property Values

## Market value

- Assumption of full information and functioning markets

## Appraised value

- Determination by professional appraiser during sale process of property
- Relevance for mortgage lending purposes

## Assessed value

- Relevance for property tax purposes
- Likely very different from market or appraised value, e.g., setting of assessed value as a fraction (below 1) of market value by policy
- Assessment conducted at local level and seldom at state level

Market and appraised values easily defensible since based on actual transactions available for comparison



# Property Value Assessment Methods

Three methods to assess property values

- ① Comparable sales approach
- ② Cost approach
- ③ Income approach

# Comparable Sales and Cost Approach

## Comparable sales approach

- Residential properties
- Using large amounts of market transaction data

## Cost approach for industrial and utility properties

- Reproduction cost: Cost of constructing an replica at current prices
- Replacements cost: Cost of constructing a similar unit using current technology

## Income Approach

Example: 10 unit apartment complex that rents for \$1,500 per month

- Expense rate: 54% (as percent of gross income)
- Vacancy rate: 6%
- Discount rate: 5% (important factor determining value)

### Calculations

- Gross income:  $\$1,500 \cdot 10 \cdot 12 \cdot (1 - 0.06) = \$169,200$
- Expenses:  $\$169,200 \cdot 0.54 = \$91,368$
- Net income per year:  $\$169,200 - \$91,368 = \$71,832$
- Present value:  $\$71,832 / 0.05 = \$1,436,640$

Assumption: Reception of revenue in perpetuity

## Assessment Ratio Rule

Assessment ratio: Assessed value as percentage of market value

- Set by state finance laws to differentiate classes of property, i.e., residential, agricultural, commercial, and industrial
- Lower rates for residential as opposed to commercial and industrial property

Assessed value equals assessment ratio ( $AR$ ) times market value ( $MV$ ), i.e.,

$$AV = AR \cdot MV$$

Rationales for property classifications

- Perception of fairness
- Slow urban sprawl by taxing farm property at lower rates

# Assessment Cycle I

## Cyclical assessment

- All properties assessed in assessment year
- Value remains fixed until next schedule assessment but may change if significant changes made to property

## Segmental assessment

- Fraction of all properties reassessed each year
- Example: Assessment of one-third of all properties every three years

## Annual assessment

- Possible with improvements in technology
- Assigns value to each characteristic of property
- Adjusts for these values and market trends for the jurisdiction

## Assessment on sale

- Reassessment takes place when property is sold
- Leads to significant (horizontal and vertical) inequities due to properties remaining off the market for multiple years

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# Property Tax Rates

## Setting of Tax Rate

Set as part of annual budget process

$$r = \frac{E - NPR}{AV}$$

where

- $r$  is the rate
- $E$  is budget expenditure
- $NPR$  is non-property tax revenue
- $AV$  is the assessed value

Setting property tax rates as part of budgeting process

- Helps officials balance budget and avoid borrowing
- Fluctuations in rates might contribute to political unpopularity of the tax



Mill rate: Quotation of property tax rate in mills

- \$1 for every \$1000 of assessed value

Relationship between mill rate ( $m$ ) and tax rate ( $r$ ):

$$r = \frac{m}{1000}$$

Example

- Mill rate:  $m = 7$
- Tax rate:  $r = 0.007 = 0.7\%$

## Notation

- $TR$ : Tax revenue
- $AV$ : Assessed values

Tax revenue based on tax rate ( $r$ )

$$TR = AV \cdot r$$

Tax revenue based on tax rate ( $m$ )

$$TR = \frac{AV}{1000} \cdot m$$

## Illustration

- Taxable real property: \$220 million with an assessment ratio of 0.5
- Exemptions reduce assessed value by 3 million
- Total budget: 3.5 million
- Non-property tax revenue: 0.75 million

What is the statutory tax rate?

- Gross assessed value:  $\$220 \text{ million} \times 50\% = \$110 \text{ million}$
- Net assessed value:  $\$110 \text{ million} - \$3 \text{ million} = \$107 \text{ million}$
- Statutory tax rate:  $r = (3.5 - 0.75) / 107 = 0.0257$  or  $m = 25.7$

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# Public Services and Rate Setting

## Expenditures

ID	Public Service	Parcels	Expenditure	Tax Base	Millage
1	School District 1	A+B+C	20	350	0.0571
2	School District 2	D+E+F	10	450	0.0222
3	Waste Water District 1	A+D	5	250	0.0200
4	Waste Water District 2	B+E	5	250	0.0200
5	Waste Water District 3	C+F	5	300	0.0167
6	Fire District 1	A+B+D+E	40	500	0.0800
7	Fire District 2	C+F	20	300	0.0667
8	Library 1	B+D+E+F	60	500	0.1200
9	Library 2	A	10	100	0.1000
10	Library 3	C	10	200	0.0500

## Rate by Parcel

Parcel	Value	School	Waste	Fire	Library	Millage	Tax Bill
A	100	1	1	1	2	0.2571	25.71
B	50	1	2	1	1	0.2771	13.86
C	200	1	3	2	3	0.1905	38.10
D	150	2	1	1	1	0.2422	36.33
E	200	2	2	1	1	0.2422	48.44
F	100	2	3	2	1	0.2256	22.56

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# Technical Aspects of Property Taxes

# Equity Related Measures and Policies

Measures of dispersion of assessed values and progressiveness

- Coefficient of dispersion (COD)
- Price related differential (PRD)

Property tax relief for equity purposes

- Homestead exemption
- Circuit breaker



# Coefficient of Dispersion (COD): Overview

## Overview

- Measure of assessed value dispersion and horizontal equity
- Average deviation around the median assessment ratio as a percentage of the median
- Indication of assessed values being clustered around median (i.e., little variation in the assessed values)

## Interpretation of magnitude

- Small size as a positive measure
- Acceptable COD range: 10%-15% for residential and 15%-20% for commercial

## Coefficient of Dispersion (COD): Example

Property	A	B	C
Market value	\$40,000	\$60,000	\$100,000
Assessed value	\$25,000	\$30,000	\$40,000
Assessment ratio	0.625	0.5	0.4
Difference from median	0.125	0	0.1

## Calculations

- Median assessment ratio: 0.5 (median of 0.4, 0.5, and 0.625)
- Average difference from median:  $(0.125 + 0 + 0.1)/3 = 0.075$
- COD:  $0.075/0.5 = 0.15$
- Average of assessment ratios are 15% from the median

# Price Related Differential (PRD): Overview

## Measurement of progressiveness

- $PRD = 1$ : Proportional tax
- $PRD > 1$ : Regressive tax (i.e., under-assessment of high value parcels relative to low value parcels)
- $PRD < 1$ : Progressive tax (i.e., over-assessment of high value parcels relative to low value parcels)

## Equation

$$PRD = \frac{1/N \cdot \sum_i A_i / M_i}{\sum_i A_i / \sum_i M_i}$$

where

- $A_i$ : Assessed value of property  $i$
- $M_i$ : Market value of property  $i$

# Price Related Differential (PRD): Example

Example with five properties

Market Value	Assessment	
	Progressive	Regressive
\$50,000	\$35,000 (0.70)	\$47,500 (0.95)
\$75,000	\$60,000 (0.80)	\$67,500 (0.90)
\$100,000	\$85,000 (0.85)	\$85,000 (0.85)
\$150,000	\$135,000 (0.90)	\$120,000 (0.80)
\$250,000	\$237,500 (0.95)	\$175,000 (0.70)
PRD	0.95	1.061

# Homestead Exemption: Overview

Homestead exemption: Absolute reduction in taxable property values (e.g., \$30,000).

- Subtraction of exemption from assessed value to calculate tax
- Lower home value  $\Rightarrow$  Higher percent reduction in taxes
- Application to owner-occupied housing only (not renters)

## Advantages

- Provision of tax relief and improved vertical equity for lower to middle income homeowners

## Disadvantages

- Not helpful to renters who are often lower income households
- Not helpful to cities with large portion of renters

## Homestead Exemption: Example

	Property A	Property B
Market value	\$100,000	\$500,000
Assessment ratio	70%	70%
Assessed value	\$70,000	\$350,000
Exemption	\$30,000	\$30,000
Taxed value	\$40,000	\$320,000
Tax rate	4%	4%
Tax without exemption	\$2,800	\$14,000
Tax with exemption	\$1,600	\$12,800
Real rate without exemption	2.80%	2.80%
Real rate with exemption	1.60%	2.60%

# Circuit Breaker: Overview

## Characteristics

- Provides rebate/credit on state income tax for high property taxes.
- Neither lowers property tax bill nor directly affects local tax revenue.
- Can be applied to both, homeowners and renters, and is usually means-tested.

## Circuit breaker structure

$$R = p \cdot (PT - k \cdot I)$$

where

- $R$ : Tax credit
- $p$ : Percentage specified by law and usually declining with income after a threshold
- $PT$ : Property tax paid (estimate for renters)
- $k \cdot I$ : Excessive tax burden specified as percent ( $k$ ) of income ( $I$ )

## Circuit Breaker: Examples

Simple example: Tax credit of 50% on excess burden if property taxes larger than 5% of income

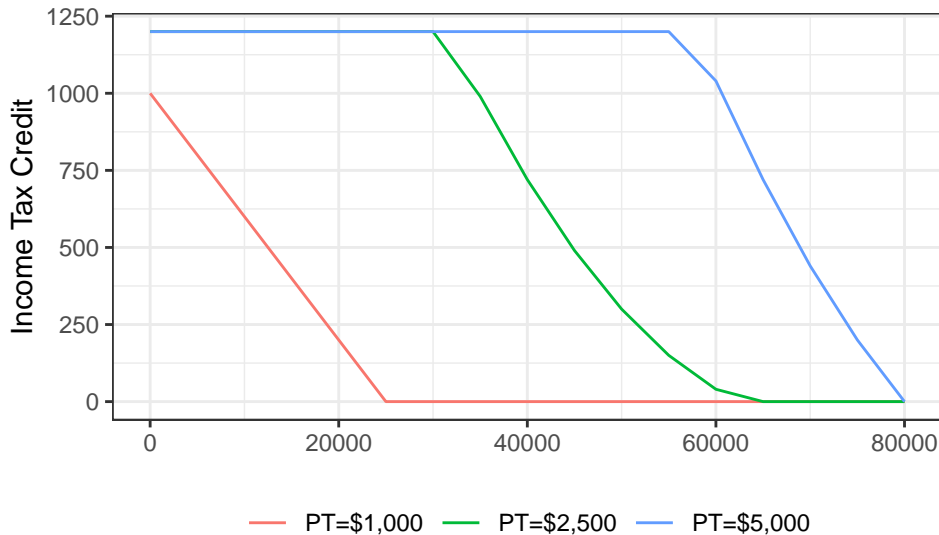
- Income: \$30,000
- Property tax: \$2,000
- Income tax credit:  $R = 50\% \cdot (\$2,000 - 5\% \cdot \$30,000) = \$250$

More complex example

- Tax credit limit: \$1,200
- Credit reduction (i.e., reduction in  $p$ ): 10 percentage points for every \$5,000 over \$30,000 of income
- $k = 4$



## Circuit Breaker: More Complex EXample



# Circuit Breaker: Advantages and Disadvantages

## Advantages

- Property tax relief can be targeted to lower and middle income homeowners and renters
- Benefit can decline with income

## Disadvantage

- Households can only benefit if they file income tax returns

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# Evaluation Criteria

Effective tax rates (i.e., tax burden relative to ability to pay)

- Two possible measures: Taxes divided by (1) income and (2) market value

Horizontal equity (i.e., same taxes given same ability-to-pay)

- Horizontal inequities given inaccurate assessment value
- Horizontal inequities even with accurate assessments if measurement based on income

Vertical equity

- Residential properties: Tax burden on homeowner
- Rental and business properties: Tax burden on landlord, tenants, owners, employees, or customers depending on market conditions

## Equity Illustration

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	Family		
	A	B	C
Household size	8	2	2
Income	80,000	30,000	80,000
Adjustment factor	1.32	0.80	0.80
Adjusted income	60,606	37,500	100,000
Assessed value	250,000	100,000	250,000
Tax rate	2%	2%	2%
Taxes liability	5,000	2,000	5,000
ETR (Adjusted income)	8.25%	5.33%	5.00%

Source: [Adjustment factors](#)

## Key questions

- Distortion of economic decisions due to the tax
- Magnitude of distortions

## Distortion of economic decisions

- Consumption decisions between housing and other goods
- Investment decisions
- Business production decisions
- Location decisions of individuals and firms

## Variations in revenue raising capacity across jurisdictions

- Differences in wealth
- Increase in revenue raising capacity due to large industry
- Undermining of revenue raising capacity via exemptions

Elasticity (i.e., increase in tax revenue through income growth without changes in tax base and/or rate)

- Matter of the relationship between income growth, market value of homes, and assessment method

# Feasibility and Stability

## Feasibility

- Assessment as the most difficult part with trade-off between horizontal equity and administrative costs
- Politically feasible but very visible tax due to its payment as a lump sum (e.g., annual, semi-annual)
- Hesitation to increase commercial rates by elected officials for concern of driving out businesses

## Stability

- Broad tax base with little fluctuation over time
- Fluctuations as assessment dependent