Why do Households without Children Support Local Public Schools?

Linking House Price Capitalization to School Spending

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House Prices and Schools

Why do households without children support school spending?

- Only about 33% of households have children in public schools (1990 Census)
- Yet the median homebuyer outside of central cities has school-aged children (AHS)

→ If voters consider own house prices, models predict they should support school spending if that spending increases house prices (ex. Bradbury, Mayer & Case 2001)

Motivation

Observation 1:

Several studies argue that (full) house price capitalization provides a mechanism to induce

- local governments to behave efficiently
- present generations to internalize the well-being of future generations

→ Conclusions depend on whether (full) capitalization occurs and whether voters consider house prices when voting on public spending

Do Voters Consider Capitalization?

- Capitalization induces local governments to behave efficiently ("Homevoter-hypothesis")
  - Edelson (1976)
  - Sonstelie & Portney (1978)
  - Fischel (2001)
- Capitalization provides a mechanism to internalize the well-being of future generations
  - Oates & Schwab (1988 & 1996)
  - Glaeser (1996)
  - Conley & Rangel (2001)

Do Voters Consider Capitalization?

Will the elderly vote to support school spending?

- Poterba (1997) suggests that increase in percentage elderly by 2030 may lead to 12.2% drop in real school spending
- Hoxby (1997) and Goldin & Katz (1997) find similar (-) correlations between elderly & school spending at the end of the 20th century

→ But…elderly have a relatively short horizon in their property; If elderly voters consider own house prices, theory predicts they might support school spending

Motivation—*continued*

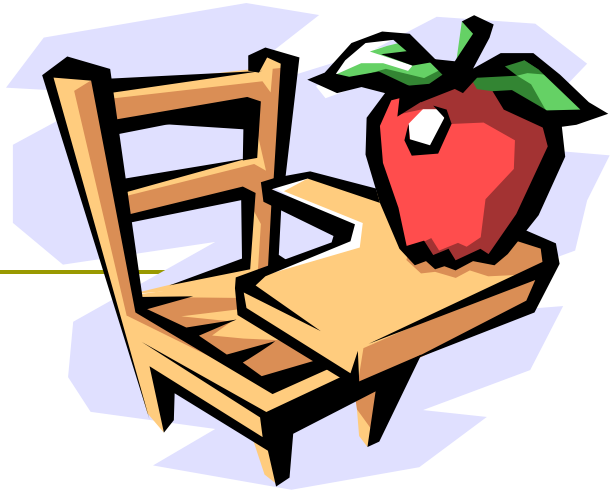
Observation 2:

Numerous studies infer from house price capitalization

- the willingness-to-pay for amenities and public spending
- distribution effects of public policies

→ Studies typically neglect the supply side, that is, the availability of land in a jurisdiction

Contents

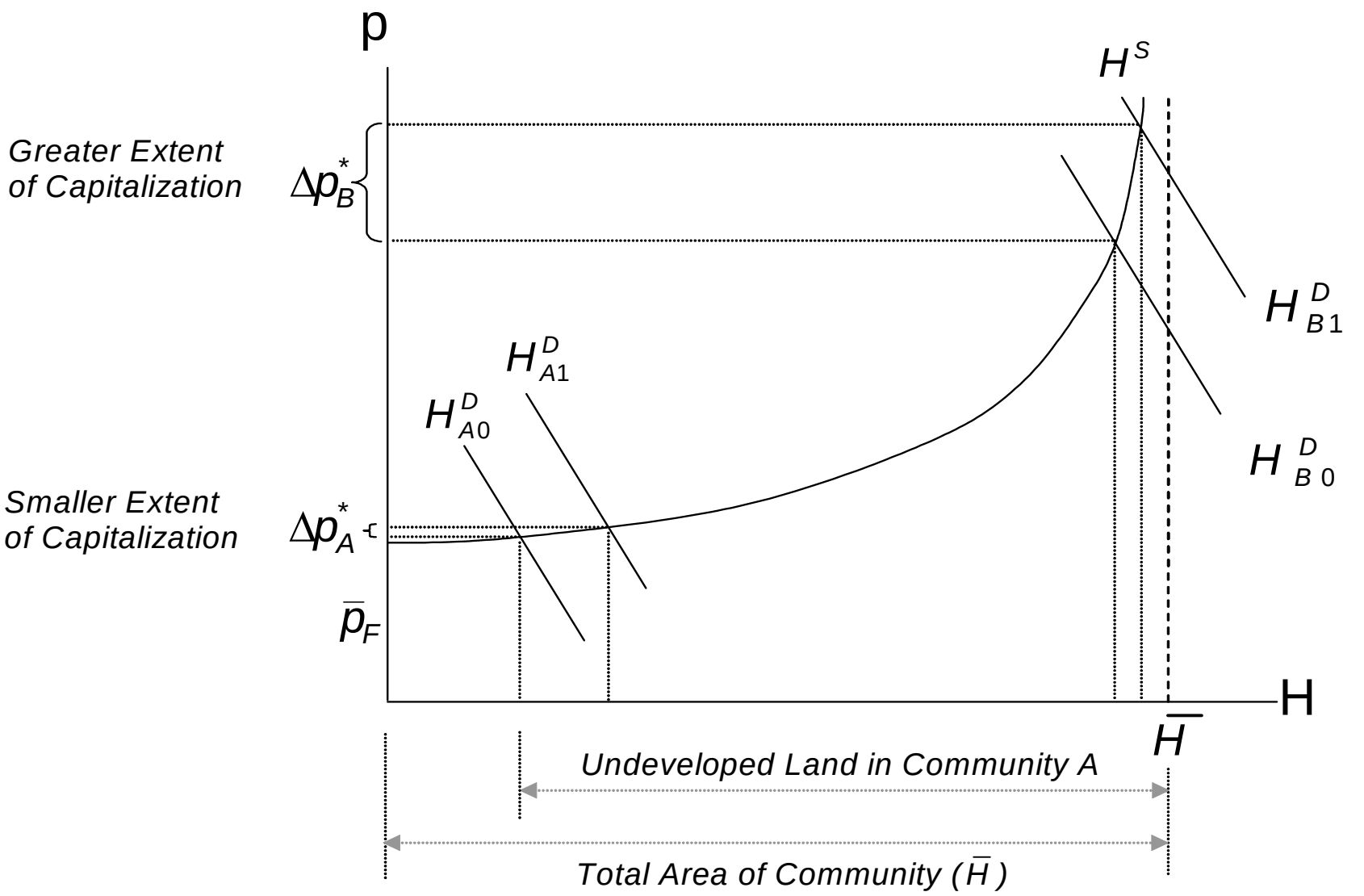


1. Motivation and Intuition
2. Theoretical Predictions
3. Specification and Results
   - House Price and School Spending Regressions (MA)
   - School Spending Regressions (US)
4. General Conclusions and Policy Implications

Theoretical Predictions

- The extent of capitalization is decreasing in the land supply elasticity (measured as land availability or density)
- The extent of capitalization (land supply elasticity) affects local public spending
- Capitalization matters most when considering impact of homeownership and the elderly on school spending

Land Supply and Capitalization

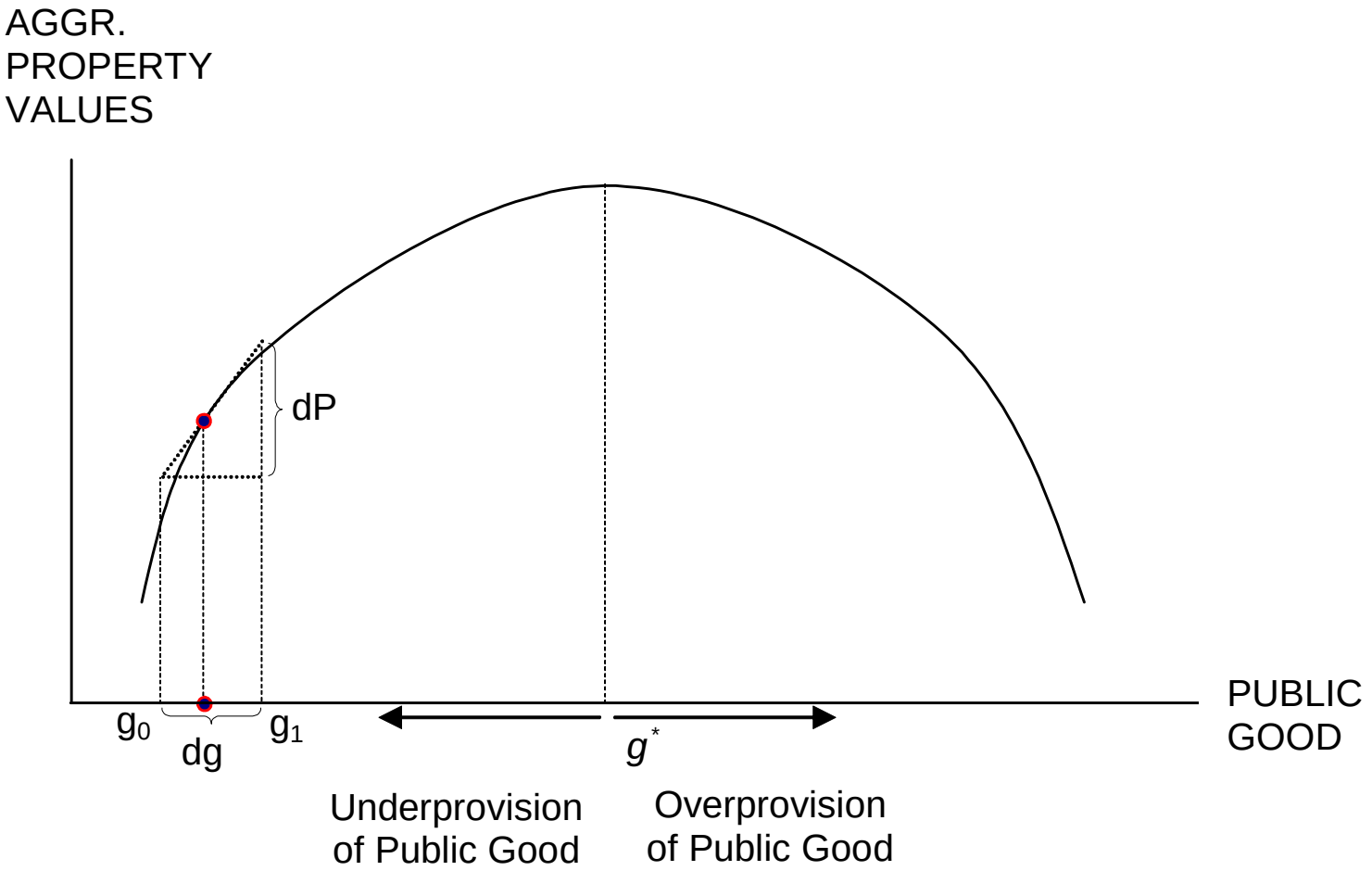


Theoretical Predictions—Continued

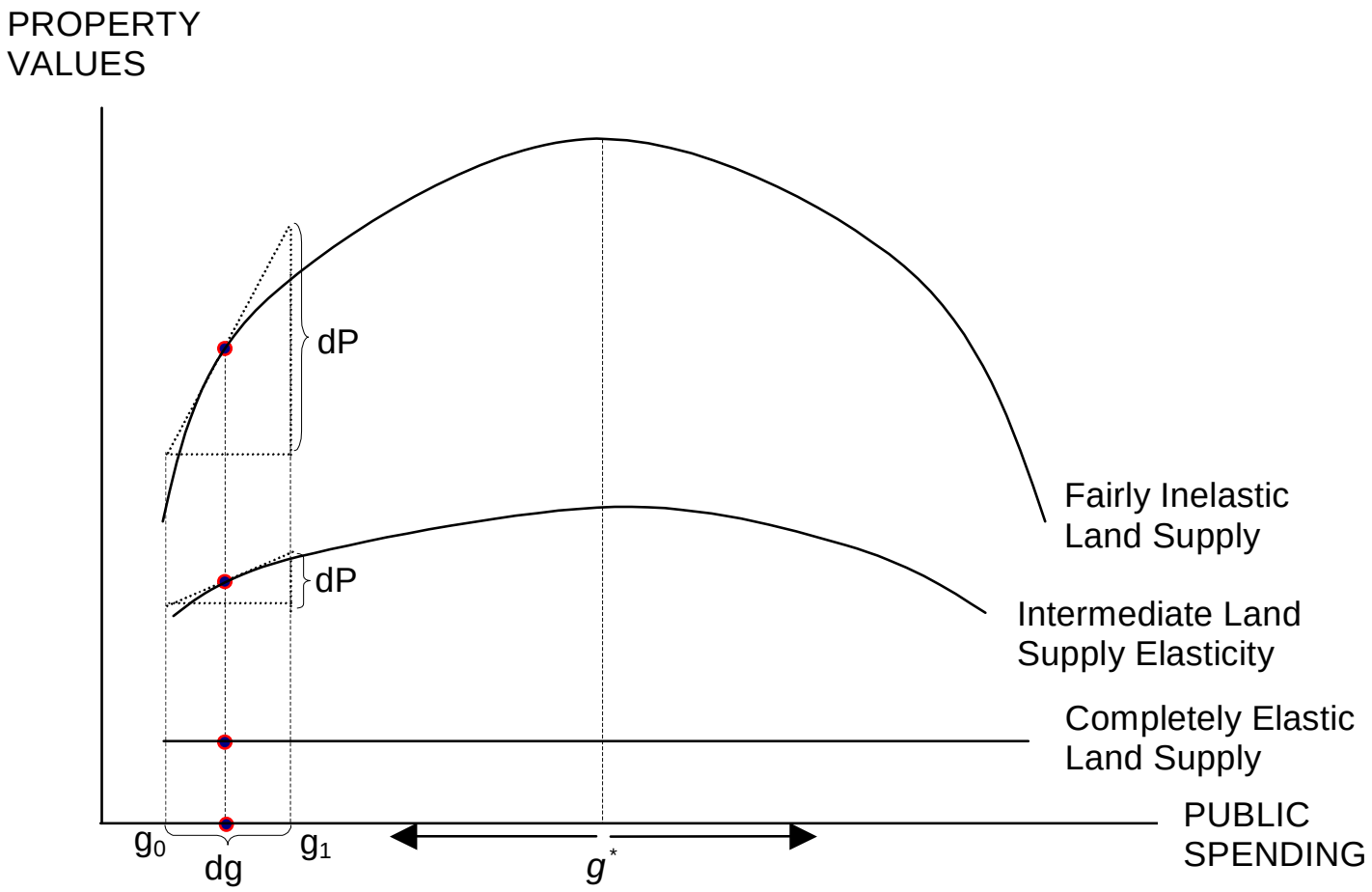
- Use evidence from property tax limit "Proposition 2½" in Massachusetts
- Previous Findings (Bradbury, Mayer, & Case, J. of Pub. Econ 2001)
  - Proposition 2½ significantly constrained local spending
  - Property values rose in communities that increased school spending
  - Changes in non-school spending had little impact on property values

Theoretical Predictions

Property Tax Limit as Fiscal Shock



Theoretical Predictions—Continued



Econometric Specification

$$(1)\ \Delta\,\textbf{price} = \alpha_0 + \alpha_1(\Delta\,\textbf{supply}) + \alpha_2(\Delta\,\textbf{spending}) + \alpha_3(\text{demand shifters}) + \varepsilon_p$$

$$(2)\ \Delta\,\textbf{supply} = \beta_0 + \beta_1(\Delta\,\textbf{price}) + \beta_2(\text{supply shifters}) + \varepsilon_s$$

$$(3)\ \Delta\,\textbf{spending} = \gamma_0 + \gamma_1(\Delta\,\textbf{pupils}) + \gamma_2(\%\text{ developed land}) + \gamma_3(\text{spending shifters}) + \varepsilon_{sp}$$

$$(4)\ \Delta\,\textbf{pupils} = \delta_0 + \delta_1(\text{supply shifters}) + \delta_2(\text{demand shifters}) + \delta_3(\text{pupil shifters}) + \varepsilon_{pu}$$

Econometric Specification, ctd.

- Demand shifters:
  - School test scores
  - Proximity to Boston
- Supply shifters:
  - Lagged housing permits
- Spending shifters:
  - Prop 2½ rules
  - Predetermined cost and revenue variables
- Pupil shifters
  - Percent of population<5 yrs old in 1990

Model Predictions

- Prediction 3A: The coefficients on changes in spending (α_2) and the demand shifters (α_3) in equation (1) will be larger in absolute value in communities with less available land (Figures 1 & 3)
  - Divide the sample by percentage of undeveloped land
  - Compare coefficients in the two regressions

Model Predictions

- Prediction 3B: The price elasticity of supply (β1) in equation (2) will be smaller in places with less available land (Fig. 1)

- Prediction 3C: Communities with less available land will increase spending more in response to constraints under Proposition 2½, which often require communities to cut their spending below the level that would maximize house prices.

House Price Regression Results

Dependent Variable: % Change in House Prices, 90-94

Sample divided by % developed land (104/104 Communities)

Explanatory Variable	Less Land Available	More Land Available
Percent change in school spending, 90-94	**.33 ** (.12)**	**.099 (.11)**
Percent change in non-school spending, 90-94	**.075 (.086)**	**.017 (.061)**
Math and reading MEAP test score, 90 (x 10^3)	.14 ** (.029)	.11 ** (.031)
Dummy variable, in Boston metro area	.097 ** (.012)	.074 ** (.011)
Dummy variable, in Boston suburban ring	.11 ** (.022)	.036 ** (.0091)
Single family permits, 90-94, per 90 housing units	**-.70 ** (.22)**	**-.11 (.17)**

Supply Regression Results

Dependent Variable: Single Family Permits/Total Housing Units, 90-94

Sample divided by % developed land (104/104 Communities)

Explanatory Variable	Less Land Available	More Land Available
Percent change in house prices, 90-94	**.014 (.055)**	**.16** ** **(.079)**
Constant	.043 ** (.0056)	.064 ** (.0086)

Spending Regression Results

Dependent Variable: Percent Change in School or Non-school Spending, Fiscal Years 1990-1994

Explanatory Variable	Δ School Spending	Δ Non-school Spending	Δ School Spending	Δ Non-school Spending
Percentage of developed land in 1984	**.24 ** (.12)**	**.24 (.18)**	**.25 ** (.12)**	**.29 (.20)**
Dummy, required one year of initial levy reductions, 82	-.013 (.014)	.022 (.030)	-.021 (.014)	.012 (.031)
Dummy, required 2 years of initial levy reductions, 82-83	-.088 ** (.028)	-.015 (.048)	-.094 ** (.030)	-.013 (.046)
Dummy, required 3 year of initial levy reductions, 82-84	-.16 ** (.051)	.051 (.072)	-.17 ** (.049)	.042 (.073)
Percent change in number of students, 90-94	.74 ** (.17)		.77 ** (.16)	
Percent change in population, 90-94		1.2 * (.61)		1.1 * (.63)
Other control variables	Yes (broader set)		Yes (base set)	

Override (Voting) Regression Results

Dependent Variable: Cumulative Amount of Overrides Passed Per Resident, Fiscal Years 1990-1994

Explanatory Variable	Base Equation	Plus Early 1980s Prop 2.5 Variables	Plus Late 1980s Prop 2.5 Variables	Endogenous Population Change
Percentage of developed land in 1984	**106.1 ** (47.6)**	**117.5 ** (52.0)**	**118.0 ** (52.8)**	**75.2 * (46.5)**
Ratio, school enrollment to population (1990)	192.1* (114.4)	167.9 (117.9)	126.6 (112.9)	261.2** (120.2)
Nonresidential Share of Property Value	-72.7 * (42.3)	-59.3 (43.2)	-46.1 (44.6)	-107.1 ** (42.8)
Percent of Adults with a College Education	168.2 ** (67.9)	166.7 ** (68.2)	156.5 ** (71.2)	95.0 (68.8)
Percent change in population, 90-94				-296.3 * (144.0)
Other control variables	Yes (broad set)			

Summary, so far…

- Communities with less available land:
  - Greater extent of capitalization
  - Lower elasticity of supply
  - Spend more on schools (& vote more overrides) when facing a demand shock
- Empirical problems:
  - Is land supply correlated with unobserved factors?
  - Do these results generalize beyond Massachusetts?
  - Policy implications?

Strategy 2: Examine National Data

- Examine school spending for a single year (1989/90) in most US school districts
- Advantages:
  - Get variation across communities to examine more precise predictions
  - Help answer policy questions such as elderly and school spending
- Complications:
  - No cleanly identified demand shock as Prop 2.5
  - Cross sectional regression: unobserved tastes

Land Supply, School Spending, and Heterogenous Voters

- Does a community make an investment in (durable) school services
  - Gross benefit B_t for households with children
    - No direct benefit for households without children
    - Benefit is durable
  - Property owners finance the benefit through property taxes τ_t, payable each period
  - Voters choose how to vote based on
    - value of investment to each voter
    - house price change (if voter is a homeowner)
    - taxes required to finance the investment

Land Supply, School Spending, and Heterogenous Voters

- Renters: Rents increase; valued only if median renter has children (unlikely)

- Homeowners: House price change depends on:
  - WTP of the marginal homebuyer
    - Marginal buyer has children: $b_t = B_t - \tau_t$
    - Marginal buyer has no children: $b_t = -\tau_t$
  - Extent of capitalization (supply elasticity)

Land Supply, School Spending, and Heterogenous Voters

- Consider an investment in schools:
  - Prediction 4A: Amount of school investment increases with greater extent of capitalization (measured by percentage of land already developed)
  - Prediction 4B: Effect of percentage developed land should persist primarily in communities where the median voter is a homeowner

Land Supply, School Spending, and Heterogenous Voters

- Prediction 4C: Owners without children should be more willing to support an investment in schools if the extent of capitalization is high & owners have a relatively short horizon in the property
  - C1: Interaction of Percent developed land and percent elderly should be positive
  - C2: Positive relationship between percent developed land and percent elderly should increase for older elderly who have a shorter expected horizon in their property
- All predictions will hold when controlling for many community and district attributes, incl. income, demographics, density, & MSA size

National School Spending Data

- Spending by school district in 1989/90
  - Source: School District Data Book (SDDB), US Dept of Education
  - 49 states, 13,141 school districts
  - Merge with detailed Census data
  - Demographic data (age, race, education,…)
  - Cost factors (poverty, “at-risk” children, “children who speak English not well”)
  - Type of district (central city or suburbs of large MSA, medium MSA or suburbs, small MSA or suburbs, and non-MSA)

Specification of National Spending Regressions

$$\text{spending per pupil} = \beta_0 + \beta_1(\text{pct developed land}) + \beta_2(\text{local characteristics}) + \beta_3(\text{school characteristics}) + \beta_4(\text{state and federal revenue}) + \beta_5(\text{state}) + \varepsilon.$$

- Use national data on land classifications from 1991-93 (NCLD 92)
  - Results are equally strong when controlling for MSA size and community type (center city, suburbs, rural)
- Compare with measures of location of district

TABLE 8
Dependent Variable: Total School Expenditures per Pupil S/Y 1989/90

	(1)	(2)	(3)	(4)	(5)
Percentage developed land (1992)	.14** (.02)	-.01 (.06)	-.11 (.07)	-.07 (.07)	-.07 (.07)
(Homeownership rate>50%), 1990	-.03 (.02)	-.09** (.03)	-.09** (.03)	-.07** (.03)	-.07* (.03)
Percent developed land x (Homeownership rate>50%)		.15** (.05)	.14* (.05)	.14* (.06)	.14* (.06)
Percentage age 65 or older, 1990	.14 (.09)	.15 (.09)	-.08 (.09)		
Population density x Percentage age 65 or older			.68** (.24)		
Percentage age 75 or older, 1990				-.31* (.14)	
Population density x Percentage age 75 or older				1.1* (0.5)	
Percentage age 85 or older, 1990					-1.9** (0.3)
Population density x Percentage age 85 or older					5.0** (1.5)

TABLE 9
Quantitative Effects

Δ Change		Little developed school district (75th percentile: 6.6% developed)	Highly developed school district (95th percentile: 68.1% developed)	Highly developed versus little developed school district
		Percentage change in spending per pupil (1)	*Percentage change in spending per pupil* (2)	*Additional spending per pupil in highly developed district due to change** (3) = (2) – (1)
Effect of percentage developed residential land on school expenditures per pupil (little versus highly developed district)	T 8 (1)	Baseline	9.2%	9.2%
Majority tenure changes from owner-occupied to renter-occupied	T 8 (2)	8.3%	-1.6%	-10.0%
Elderly population (over 65) increases by 1 standard deviation	T 8 (3)	0.8%	2.1%	+1.4%
Elderly population (over 75) increases by 1 standard deviation	T 8 (4)	-0.5%	1.7%	+2.2%
Elderly population (over 85) increases by 1 standard deviation	T 8 (5)	-2.2%	1.4%	+3.5%

National Spending Regressions

- Is land supply correlated with unobserved cost factors or community characteristics?
  - Divide into 3 groups of states (Hoxby 2001)
    - State govt. mandates local spending levels (3 states)
    - State govt. distorts local spending decisions (13 states)
    - State govt. places few restrictions on local decisions (34 states)
  - Spending results are strongest in places with fewest restrictions and do not hold in places with state mandated school spending (CA, NM)

National Spending Regressions

- Could land supply be serving as a proxy for crime?
  - Match crime rates to school districts
    - Missing local crime data for many rural cities
    - Sample falls to 7.979 school districts
  - When the murder rate and its interactions with homeownership and pct. elderly are included:
    - Murder rate is positively related to school spending
    - No impact on land supply coefficient and its interactions with homeownership and pct. elderly

Conclusions

- Communities with little available land:
  - Have a greater extent of capitalization
  - Lower elasticity of supply
  - Greater increase in school spending
- School spending is higher:
  - Locations with more developable land
  - Interaction of percent elderly*(%developable land)
  - Interaction of homeowner*(% developable land)
  - Results are quite stable when controlling for a wide variety of community characteristics
  - Results only hold in states with few restrictions on local control of school spending and when controlling for crime

Policy Issues

- Can only infer WTP from spending levels where land supply is inelastic
- Housing market can provide incentives for efficient provision of local services
- Local control of spending works best in states where land supply is relatively inelastic
- What will happen when percentage elderly increases?
  - More homeowners with short horizon
  - BUT…marginal homebuyer may no longer have children in schools