The Economic Value of Land Lease Communities: Models and Data Gaps in Manufactured Housing Research

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Manufactured Housing Institute
2015 NCC Fall Leadership Forum
Chicago, IL November 2015

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Research issues

- Manufactured Housing Communities: theoretical basis
- MHC empirical issues:
  - What aspects of parks do tenants value most?
  - What sort of housing is the competition?
  - What sort of park buyers and sellers get the best deals?
- MHC and affordable housing supply policy issues
  - Social value of healthy communities
  - Potential value of new parks
  - Mechanisms to strengthen unit owner property rights that enhance park value as well – is there a role for local government intermediation?
  - Zoning policy: should it be moved to higher levels of government?
  - Community aging and retirement

Policy concerns…or *Why MHCs and the MHI are really important*

- A high proportion of communities – especially “mom-n-pops” – will close in the coming two decades, creating a housing crisis for as many as 1-2 million people
- Local communities in growing areas will resist the construction of new parks and may impose additional restrictions on remodeled ones (and more generally will discourage the construction of low-income housing).
- The MH Park industry as a whole would gain political clout by expansion, but in practice may not oppose park shrinkage:
  - Large corporate owners will have no interest in competition
  - Small owners would like expansion elsewhere but not locally, as this also would drive down competitive rents and hence park values

Policy concerns…or *Why MHCs and the MHI are really important*

- Tenants are politically weak; advocating for more than token amounts of affordable housing in central city areas is politically unattractive.
- These points suggest that it is desirable to push for local government initiatives that support park repairs and possibly underwrite unit rents in declining areas to forestall closure. They also imply that state governments should restrict anti-park zoning ordinances and support new park initiatives that would be opposed at local levels for NIMBY reasons.
- Concurrently, improved access to financing of MH unit purchases by individuals is critically important, ideally at the federal or at least state levels. Underwriting rent-to-own arrangements that have become increasingly common may be an intermediate step that appeals to many parties.

Empirical findings from modeling park sales value and site rents (Becker & Yea, 2015)

- Local rents are a key determinant of park sales values
- There are differences in sales and profitability between corporate and small owners
- Park value depends on location quality and distance from schools
- Assessed and actual sales values values of parks are very highly correlated.
- Park value declines at about 1% per annum.

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Data

Table 1: Complete Descriptive Statistics

Variable	N	Mean	St. Dev.	Min	Max
Dependent Variables					
Transaction Price (*1000's*)	491	5600	7900	0	61000
Rent Income (*1000's*)	483	430	700	0	5400
Parameters					
Density	485	11.09	79.28	.7	1750
Occupancy (%)	381	85.82	20.61	0	100
Vacancy (%)	483	.05	.09	0	.73
Features					
Appeal	487	2.23	.90	0	6
Cemeteries (*ln distance*)	499	.033	.037	0	.283
Condition	487	2.23	.94	0	6
Double Section	491	54.42	106.05	0	814
Hospitals (*ln distance*)	499	.082	.136	0	1.489
Location Quality	492	2.24	.83	0	6
Number of Units	486	160.11	179.1	7	1814
Parking	417	1.47	.99	0	5
Project Amenities	248	.37	.48	0	1

Data, 2

Quality	487	2.13	.95	0	6
Resident Type	477	.16	.37	0	1
Major Roads (*ln distance*)	499	.002	.004	0	.0334
Schools (*ln distance*)	499	.014	.016	0	.177
Security Features	200	1.21	1.39	0	4
Single Section	491	94.78	130.94	0	1266
Size (*acres*)	491	35.51	123.14	.02	2631
Triple Section	491	1.20	20.19	0	441
Year Built	499	1972	16.14	1910	2014
Income and Education					
High School or *less* (*ln value*)	466	7.043	.630	3.989	8.470
4-Year College Degree (*ln value*)	465	5.977	.977	2.890	8.540
Unemployed (*ln value*)	465	5.001	.708	2.485	6.648
Median Household Income (*ln value*)	466	10.637	.445	8.794	11.833
Persons in Poverty (*ln value*)	464	6.260	.833	3.135	8.360
Housing Values					
Median Monthly Contract Rent (*ln value per county*)	462	6.372	.495	4.883	7.601
Median Home Value (*ln value per county*)	463	11.853	.742	9.622	13.816

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Data, 3

Table 2: Complete Descriptive Statistics-*continued*

Variable	N	Mean	St. Dev.	Min	Max
Geographical Factors					
Region dummies					
Northeast	499	.1122	.3160	0	1
Midwest	499	.2665	.4426	0	1
South	499	.2244	.4176	0	1
West	499	.3968	.4897	0	1
Topography					
Level	442	.8801	.3252	0	1
Sloping	442	.0656	.2479	0	1
Rolling	442	.0317	.1753	0	1
Hilly	442	.0204	.1414	0	1
Steep	442	.0023	.0476	0	1
Features					
Rights Transferred					
Fee Simple	425	.9412	.2356	0	1
Leased Fee	425	.0518	.2218	0	1
Leasehold	425	.0071	.0838	0	1
Transaction Status					
Expired Listing	492	.0081	.0899	0	1
Fell Out of Escrow	492	.0703	.4211	0	1
In Contract	492	.0142	.1185	0	1
Listing	492	.1646	.3712	0	1
Offer/Pending	492	.0427	.2023	0	1

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Data, 4

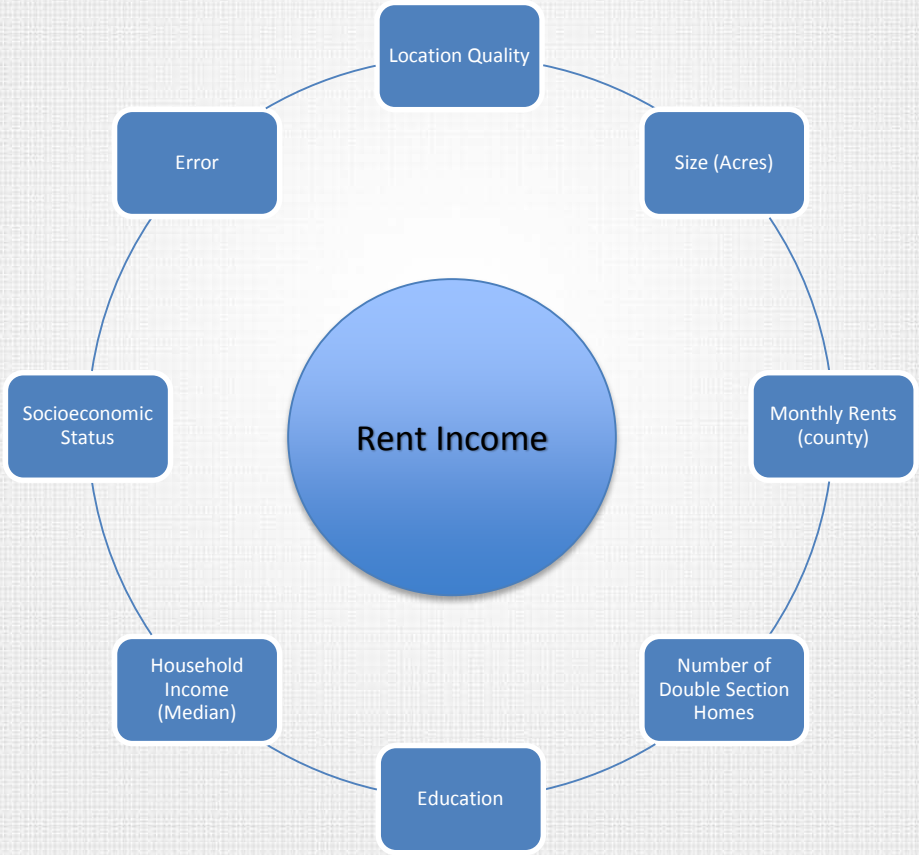
Utilities					
Water	194	.0103	.1013	0	1
Sewer	194	.0361	.1870	0	1
Trash	194	.2165	.4130	0	1
Cable	194	.0103	.1013	0	1
Combination of two of cable, sewer, trash, or water	194	.2113	.4093	0	1
Water, Sewer, Trash	194	.4845	.5011	0	1
Water, Sewer, Trash, Cable	194	.0309	.1736	0	1

Estimation details (Becker & Yea, 2015)

- There are two main equations estimated
  - Rent Income
  - Transaction Price
- In principle, Occupancy also should be determined simultaneously. In fact, though, it was not explained by readily observable characteristics.
- Data are provided by Colliers International. The sample size is small but the quality of information on the parks is exceptionally high. Other datasets are larger but lacking in detail.

So what determines the value of site rent?

Total Park Rent Income Equation



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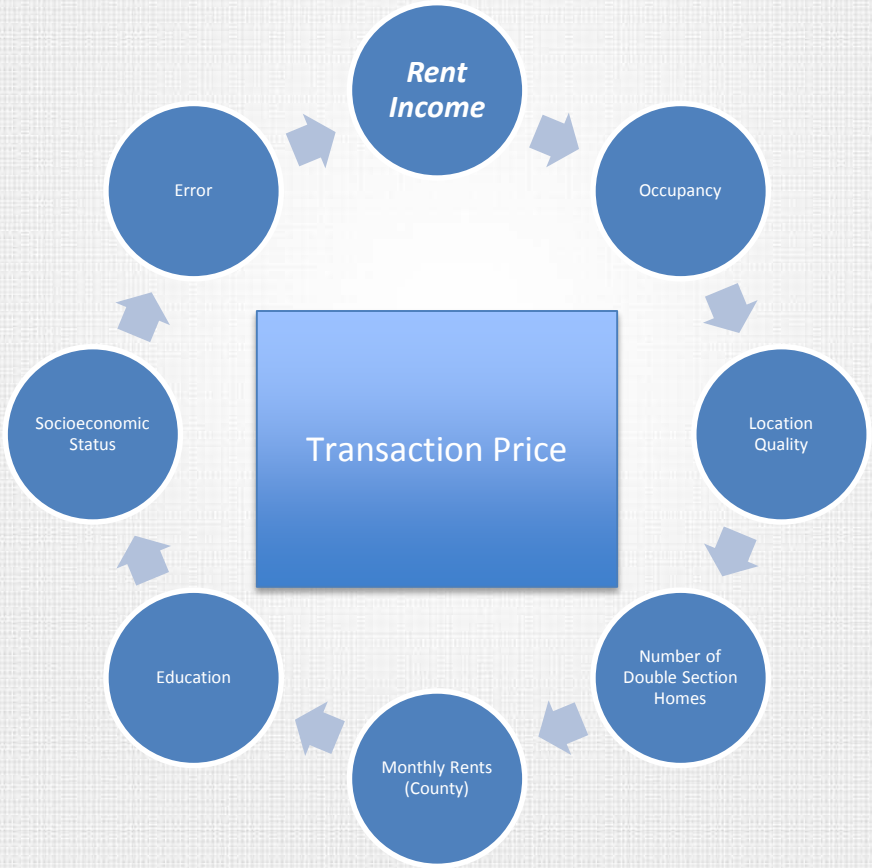
Park Transaction Price Equation



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Empirical Analysis (Becker & Yea, 2015)

- 3SLS Method
- Allows us to estimate Rental Income and Park Value equations simultaneously
- Error terms are correlated

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Results (Becker & Yea, 2015)

Table 3: 3SLS Regression Results for Transaction Price and Rent Income as a Dependent Variables (*Multiple imputed log price*)

	(1)	(2)	(3)
Transaction Price			
Rent Income	0.914***	0.918***	0.920***
	(18.89)	(18.09)	(18.14)
Occupancy	0.394	0.389	0.391
	(1.75)	(1.86)	(1.85)
Location Quality	0.119***	0.109***	0.109***
	(4.12)	(3.87)	(3.93)
Double Section	0.0682***	0.0660***	0.0656***
	(5.87)	(5.45)	(5.44)
Size (Acres)	0.0126	0.00832	0.00674
	(0.38)	(0.25)	(0.20)
Median Monthly Contract Rent (*county*)		0.221***	0.221**
		(3.43)	(3.10)
Median Home Value (*county*)		-0.0845*	-0.0839
		(-2.14)	(-1.93)
High School or *less*			0.00659
			(0.17)
4-Year College Degree			0.00536
			(0.14)
Unemployed			0.0107
			(0.31)
Median Household Income			-0.0343
			(-0.35)
Persons in Poverty			-0.0269
			(-0.71)
Constant	2.222**	1.800*	2.175
	(3.75)	(2.65)	(1.83)

Results (Becker & Yea, 2015)

Rent Income			
Location Quality	0.170***	0.153***	0.153***
	(6.77)	(6.22)	(6.21)
Number of Units	0.974***	0.995***	0.995***
	(30.93)	(31.48)	(31.65)
Residence Type × Security Features	-0.0668	-0.0831	-0.0835
	(-1.64)	(-1.91)	(-1.92)
Single Section	-0.0283	-0.0359*	-0.0360*
	(-1.62)	(-2.10)	(-2.11)
Double Section	0.0517***	0.0477***	0.0477***
	(3.60)	(3.55)	(3.53)
Year Built		-0.00517***	-0.00517***
		(-3.89)	(-3.88)
Security Features		0.0280	0.0282
		(1.12)	(1.11)
Project Amenities		0.00176	0.00101
		(0.03)	(0.02)
Median Monthly Contract Rent (*county*)		0.134*	0.134*
		(2.46)	(2.46)
Median Home Value (*county*)		0.0128	0.0129
		(0.32)	(0.32)
Constant	8.052***	17.20***	17.19***
	(72.05)	(6.55)	(6.52)
N	499	499	499
R^2	0.8826	0.8875	0.8882
Adjusted R^2	0.8435	0.8757	0.8758

Things That Do Matter (Becker & Yea, 2015)

- Local rents (rents for apartments and houses)
- Location quality
- Number of double section homes
- Rent income generated (for park sales value)

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Things That Do Not Matter for Park Value (Becker & Yea, 2015)

- Star Ratings
- Community demographics
- Community education or income measures
- Rights transferred through a sale

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Things That Do Not Matter for Rental Income

(Becker & Yea, 2015)

- Security Features
- Amenities in a Community
- Topography
- Utilities
- Distance to major roads
- Distance to nearest hospital
- Distance to nearest cemetery (remoteness indicator)

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Things That Do Not Matter for Rent or Park Value

(Becker & Yea, 2015)

- Quality Measures
- Condition
- Appeal

Caveat: much of the variation is lost because we control for region. Nonetheless, location is clearly key, in large part because alternative housing in good locations is also expensive.

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Corporate vs. Small Owners

(Becker & Yea, 2015)

Table 10: 3SLS Regression Results for Transaction Price and Rent Income with Corporate Dummy Variables in the Transaction Price Equation(*Multiple imputed log price*)

	(1)	(2)	
Corporate (*buyers*)	-0.0440	-0.101*	-0.0479
	(-1.12)	(-2.06)	(-1.20)
Corporate (*seller*)	0.128**	0.0469	0.127**
	(2.94)	(0.83)	(2.93)
Corporate buyers to sellers (*v.v.*)		0.154*	
		(2.06)	
Small & Local Owners		0.0563	0.0529
		(0.86)	(0.80)

- Corporate sellers make more money
- Corporate buyers receive a small discount on purchase pricing

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Corporate vs. Small Owners (Becker & Yea, 2015)

Table 10: 3SLS Regression Results for Transaction Price and Rent Income with Corporate Dummy Variables in the Transaction Price Equation(*Multiple imputed log price*)

	(1)	(2)	
Transaction Price			
Rent Income	0.914***	0.924***	0.919***
	(14.81)	(15.28)	(15.19)
Occupancy	0.192	0.192	0.198
	(0.74)	(0.75)	(0.77)
Location Quality	0.115***	0.115***	0.116***
	(4.26)	(4.24)	(4.27)
Double Section	0.0673***	0.0660***	0.0669***
	(5.53)	(5.52)	(5.56)
Size (Acres)	0.00592	0.0189	0.0197
	(0.15)	(0.40)	(0.42)
Median Monthly Contract Rent (*county*)	0.228***	0.224**	0.223**
	(3.45)	(3.43)	(3.41)
Median Home Value (*county*)	-0.0908*	-0.0855*	-0.0863*
	(-2.44)	(-2.27)	(-2.30)
Corporate (*buyers*)	-0.0440	-0.101*	-0.0479
	(-1.12)	(-2.06)	(-1.20)
Corporate (*seller*)	0.128**	0.0469	0.127**
	(2.94)	(0.83)	(2.93)
Corporate buyers to sellers (*v.v.*)		0.154*	
		(2.06)	
Small & Local Owners		0.0563	0.0529
		(0.86)	(0.80)
Constant	2.023*	1.802*	1.863*
	(2.71)	(2.42)	(2.51)

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Corporate vs. Small Owners (Becker & Yea, 2015)

Rent Income			
Location Quality	0.144***	0.144***	0.144***
	(6.06)	(6.07)	(6.06)
Number of Units	0.983***	0.983***	0.983***
	(25.86)	(25.86)	(25.91)
Resident Type × Security Features	-0.0822*	-0.0824*	-0.0818*
	(-2.60)	(-2.60)	(-2.58)
Single Section	-0.0288	-0.0289	-0.0288
	(-1.88)	(-1.89)	(-1.88)
Double Section	0.0505***	0.0504***	0.0505***
	(4.01)	(4.00)	(4.01)
Year Built	-0.00482*	-0.00482**	-0.00484**
	(-2.81)	(-2.83)	(-2.83)
Security Features	0.0500	0.0504	0.0500
	(1.56)	(1.57)	(1.56)
Project Amenities	0.00224	0.00387	0.00254
	(0.03)	(0.05)	(0.03)
Median Monthly Contract Rent (*county*)	0.125	0.125	0.125
	(1.76)	(1.76)	(1.76)
Median Home Value (*county*)	0.0218	0.0219	0.0219
	(0.48)	(0.48)	(0.48)
Constant	16.46***	16.47***	16.51***
	(4.88)	(4.91)	(4.92)
N	499	499	499
R^2	0.9112	0.9127	0.9117

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Corporate vs. Small Owners (Becker & Yea, 2015)

- Corporate only (corporate-to-corporate) transactions are more expensive (likely that parks are better maintained)
- Corporate sellers make more money when there are small mom-n-pop sellers in the market

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Theoretical Framework: 6 non-competing models

- Demand for limited amount of housing
- Bad friends and relatives
- Bad Tenants (voluntary dictator model)
- Capital Constraints
- Risk-Sharing and Uncertain Growth (Boom-Bust problem)
- Short Run vs. Long Run Growth

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Limited housing demand

- Very simple model: for a significant fraction of people, housing demand, conditional on income, prices of land and housing attributes, and prices of other goods, will be modest – in the $5,000 - $75,000 range.
- In most parts of the USA and Canada, stick built housing options for this “quantity” of housing are extremely limited, and tend to be associated with remoteness, crime, and poor amenities.
- The joint product of living in a MHC makes it possible to consume small to modest but non-zero quantities of housing

Limited housing demand

- A real life example will suffice. Consider my wife's cousin DF. He and his wife sell their stick-built home for $185,000 (numbers approximate). In addition to giving up their house, they also turn over a property tax liability that is worth $25,000 (in perpetuity).
- They use the housing proceeds to buy a used double-wide for $25,000 and put in another $5,000 of upgrades.
- They face annual park fees of $3400 which they (in principle) offset by buying an annuity for $67,000. The park fees cover 2/3 of property tax liabilities, an annuity of $8,000 covers the rest.

Limited housing demand

- Before, they were consuming $185,000+25,000=$210,000 in housing and local public goods (valued as assets rather than flows).
- Now, by living in a MHP they are consuming $25,000+5,000+67,000+8,000 = $105,000 in housing and local public goods.
- There is virtually no risk of the park closing; even if it does, they have less than 1/3 of their housing at risk.
- In practice – especially for empty nesters – the desired amount of housing is well below $210,000 even for middle class households.
- They now have $105,000 to use for travel and Cougars' tailgates.

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Bad friends and worse relatives

- The stereotype is that buying a manufactured home and placing it in a park is a bad investment.
- This is true in the sense that housing appreciation accrues to land rather than the structure in normal cases (rent-controlled areas of California are the obvious exception).
- However, it does not reflect the opportunity cost of holding assets in other forms.

Bad friends and worse relatives

- Consider a person who has $10,000 in net assets, of which half is invested in a (used) vehicle.
- The remaining $5,000 can be invested in
  - A liquid financial asset held in a financial institution
  - As cash
  - Invested in a small business
  - A used manufactured home
- Claims from needy friends and sick relatives may make the net return on nominally higher return assets become negative:
- The return on holding a used MH may be the least negative option.

Bad Tenants/shared risk: model 1

- From Owner's Perspective
  - Pure Rental System
    - Owns large tract of land upon which rental structures are placed
    - Goal: maximize his profits, π
    - Cannot observe whether renter is "good" or "bad"
    - Revenues: flat rental rate
    - Costs: sunk costs, renovation, park upkeep, eviction

Bad Tenants – owner's perspective cont.

- Cost function:
  - probability of the renter being bad multiplied by the cost of a bad renter, added to the probability of a good renter multiplied by the cost of a good renter, and then finally, the cost of upkeep is added
- Revenues: $r(m^g+m^b)$, where m^i is renter I, i$\in$[g,b], with g for "good renter" and b for "bad renter"
- Profit Maximization function:

$$\max_{m^b, m^g} \pi = r\left(m^b + m^g\right) - \left[\mathrm{P}(m^g)c^g + \left(1 - \mathrm{P}(m^g)\right)\left(c^b + C^e\right)\right] - G$$

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Bad Tenants – owner's perspective cont.

- Discussion of profit maximization in pure rental scenario:
  - Maximized when there is no "bad renter"
  - Owner tries to "homogenize" renters
    - How? → lessens owner's responsibility for maintenance, and
    - Results on C^e and r
      - » Removal of negative externality, and sharing of responsibility

Bad Tenants

- From Occupant's Perspective
  - Pure Ownership system – tenant owns own land and own units
  - Bad tenant creates negative externalities
    - Examples?
    - Results?
  - Problem: maximize utility subject to a budget constraint (which includes cost of evicting unruly occupant)
    - Eviction cost clearly lower in case with rented land
    - Third party role

Bad Tenants – tenant's perspective cont.

- No longer use asymmetric information, must use a game → two player collective action game
  - Two tenants
  - Joint project (maintaining neighborhood with high property value)
  - Efforts, utilities of "good" and "bad" tenants

Bad Tenants – tenant's perspective cont.

- The Game without 3rd party actor

Player 1,2	**Good Tenant**	**Bad Tenant**
Good Tenant	$U^1 - e^1$, $U^2 - e^2$	$U^1 - e^1 - ne^1$, U^2
Bad Tenant	U^1, $U^2 - e^2 - ne^2$	$U^1 - ne^1$, $U^2 - ne^2$

- Nash Equilibrium: prisoner's dilemma – (Bad Tenant, Bad Tenant)

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Bad Tenants – tenant's perspective cont.

- The Game with 3rd party actor
  - Role of 3rd party actor? Benevolent Dictator
  - Introduction of eviction costs borne by bad tenants, $C^e > e^i$

Player 1,2 Tenant	**Good Tenant**	**Bad**
Good Tenant	$U^1 - e^1$, $U^2 - e^2$	$U^1 - e^1 - ne^1$, $U^2 - C^e$
Bad Tenant	$U^1 - C^e$, $U^2 - e^2 - ne^2$	$U^1 - ne^1 - C^e$, $U^2 - ne^2 - C^e$

- Nash Equilibrium: (Good Tenant, Good Tenant)

Bad Tenants – tenant's perspective cont.

- Next step: generalize game to allow N tenants, with n participants (those who exert effort)
- Good tenant payoff: $G(n) = b(n) - c(n)$
  - Payoff is the difference between the benefits and the costs, dependent on participation, n.
- Bad tenant payoff: $B(n) = b(n)$
  - Payoffs equal to the benefits the nonparticipant gains from the group doing the work
- Participation: in order for the n+1 person to participate, G(n+1)>B(n)

Bad Tenants – tenant's perspective cont.

- Now move to total societal payoff from being a good or bad tenant:

$$T(n) = nG(n) + (N-n)B(n) = NB(n) - n\left[B(n) - G(n)\right]$$

- Assume both forms of payoff are increasing with respect to n, or that payoffs increase the more people participate in the project
- Further, notice that [B(n) – G(n)]=c(n), or the cost of participation.
- Large v. small gaps in B(.), G(.)
  - Large gap – cost is very high, game becomes Prisoner's Dilemma
  - Small gap – Multi-Person Assurance Game

Bad Tenants – tenant's perspective cont.

- Total societal payoff with and without 3rd party regulator:
  - Without: $T(n) = NU^n - n\left[U^n - (U^n - e)\right] = NU^n - n(e)$
  - With: $T(n) = N(U^n - C^e) - n\left[\left(U^n - C^e\right) - \left(U^n - e\right)\right] = N\left(U^n - C^e\right) - n\left(e - C^e\right)$

- By maximizing both cases with respect to n, we can find optimal number of participants.
- Let $U^n = n^\alpha h^{1-\alpha}$, where h stands for housing value and alpha is between 0 and 1. Decreasing marginal returns to housing value.
- Resulting optimal participants:
  - Without: $n^* = \left(\frac{\alpha N h^{1-\alpha}}{e}\right)^{\frac{1}{1-\alpha}}$ with: $n^* = \left(\frac{\alpha N h^{1-\alpha}}{e - C^e}\right)^{\frac{1}{1-\alpha}}$
  - When $\left|e - C^e\right| < e$, we find that *n** is larger with a third party regulator. Additionally, C^e is bounded, otherwise the owner evicts everyone.

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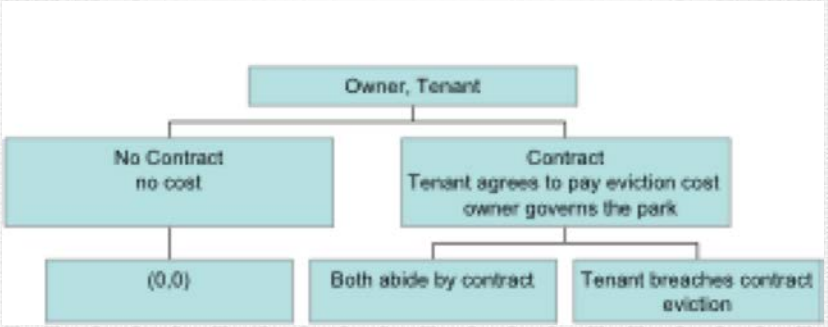
Bad Tenants – tenant's perspective cont.

- At certain values of eviction cost, it is optimal to hire a 3rd party regulator to kick out bad tenants.
  - What does this mean for trailer parks?
- Neighborhood thought experiment
  - How do you minimize your neighbors negative externalities?

Bad Tenants

- Mixed Rental and Ownership System
  - Land owners prefer to rent only land, and tenants prefer to own only structure, but how does the system come into existence?
- Contracting Game and backwards induction
  - Both abide by contract: $\left(U(r_l l), U^i - e\right)$
  - Tenant breaches contract: $\left(P(U(r_l l - r_{l^i} l^i), P(U^i - C^e\right)$



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Bad Tenant – Summary/Empirical Methods

- Land owner's best interest to require tenants to purchase own housing unit, and in tenants best interest to push the burden of eviction costs onto the owner, incentivizing a land-rental system
- Data collection:
  - Need to compare 2 types of MHC
    - Mixed vs. full rental or full ownership
  - Neighborhood complaints, selection bias, crime, homogeneity

Capital Constraints: model 2

- Pure Rental Case – owner purchased both housing and land, renting packages (unit + land)
  - Number of packages less than number of land parcels alone he could have rented
  - Revenues: rent for a housing unit, r^k, rent for a parcel of land is r^l
  - Costs: maintenance costs on unit, c^k, and on the land, c^l, initial purchase of manufactured housing units, M_0, initial land purchase, L_0.

Capital Constraints – Pure Rental Case cont.

- Model (owner's side of rental case):

$$\max \pi = r^k k + r^l l - c^k k - c^l l - L_0 - M_0$$

subject to: $L_0 + M_0 + c^k k + c^l l \le k_0$ and

- We can maximize profit by plugging $k = l$ in constraints to the objective:

$$\max \pi = l\left[\left(r^k + r^l\right) - \left(c^k + c^l\right)\right] - L_0 - M_0 \quad \text{s.t.} \quad l \le \left(\frac{k_0 - L_0 - M_0}{c^k + c^l}\right)$$

- Profit is then maximized when:

$$\pi = (k_0 - L_0 - M_0)\left(\frac{r^k + r^l}{c^k + c^l}\right) - k_0$$

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Capital Constraints – Pure Rental Case cont.

- Model (renter's side in pure rental): $\max U\left(h(k,l)\right) = l^{\alpha}k^{1-\alpha}$

  s.t. $r^{l}l + r^{k}k \le k_0$

- Utility is maximized when: $k^* = \frac{k_0(1-\alpha)}{r^k}$ and $l^* = \frac{\alpha k_0}{r^l}$

Capital Constraints – Pure Ownership Case

- Owner buys large tract of land, then sells parcels of land to tenants. Future rents must be capitalized into selling price. Land not sold in period 1 can be rented out.
- owner's objective: $\max \pi = p^l l + (r^l - c^l)(l_0 - l)$

s.t. $c^l(l_0 - l) + l_0 \le k_0$ $\quad l_0 \le p^l l$

where $p^l = \sum_1^{\infty} \left(\frac{1}{1+r}\right)^i r^l$

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Capital Constraints – Pure Ownership Case

- Tenant's Objective: $\max U\left(h(k,l)\right) = l^{\alpha}k^{1-\alpha}$

  s.t. $p^{l}l + p^{k}k \le k_0 + \frac{1}{1+r(d)}\mathrm{E}\left(k^{l} + l^{l}\right)$

  where $k^{1} \in [0\ , k^{1})$ and $l^{l} \in (-\infty, \infty)$

- Utility is maximized when

$$l^{*} = \frac{\alpha\left[k_0 + \left(\frac{1}{1+r}\right)\mathrm{E}(k^{1})\right]}{r^{l}} \qquad k^{*} = \frac{(1-\alpha)\left[k_0 + \left(\frac{1}{1+r}\right)\mathrm{E}(k^{1})\right]}{p^{k}}$$

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Capital Constraints – Mixed Case

- Owner rents land to tenants and tenants provide own housing
- Owner's objective: $\max \pi = r^l l - c^l - l_0$

  s.t. $l_0 + c^l l \le k_0$

  maximized when: $\pi^* = \frac{(r^l - c^l)\left(k_0 + (1 - c^l) l_0\right)}{c^l}$

- Tenant's objective: $\max U\left(h(k,l)\right) = l^{\alpha} k^{1-\alpha}$

  s.t. $r^l l + p^k k \le k_0 + \mathrm{E}(k^1)$

Capital Constraints – Summary/Empirical Methods

- Best interest of landowners to only rent land, and allow tenants to be responsible for securing own homes.
- Why is this realistic?
  - Low income areas
  - Not attractive to rich developers
  - Lack of existing structures for low-income housing
  - Lack of many low-income housing options
  - Urban vs. rural
- Empirical methods
  - Data on income level of owners and tenants are desirable
  - Prices for manufactured homes, startup costs for MHCs compared to other low income housing startups
  - Credit ratings, savings behavior

Risk Sharing and Uncertain Growth in boom/bust economics: model 3

- Assume landowner is risk averse and gets less utility from profits than he does disutility from losses
- Faces uncertain future, and will hope to minimize future costs. Cannot minimize costs by scaling back entire venture, as boom/bust cycles ensure high profits or high losses no matter park size.
  - Best option: share burden of risk with tenants, whom he views to be flight risks.
  - NTS risk is minimized when owner rents only the land to the tenants

Risk Sharing and Uncertain growth cont.

- Relation to factory towns, oil towns, and boom/bust cycles
  - High demand for immediate housing when new factories/mines/drilling spring up
  - Manufactured housing is cheap and expedient way to provide housing to blue-collar workers
  - Developer worries factory will close or price of oil will fall, leaving new housing developments empty
    - Decides to invest in land, but not (or less) in housing units

Risk Sharing and Uncertain growth cont.

- Owner's objective:
  - Cobb-Douglas preferences over profit
  - Simplify to 2 period model
  - Owner will maximize expected utility over profits over the two periods; only knows growth pattern on period 1, not period 2

$$\max U(\pi) = \sqrt{(r^k - c^k)k_0 + (r^l - c^l)l_0} + \beta\sqrt{\mathrm{P}(r^k k_1 + r^l l_1) - (c^k k_1 + c^l l_1)}$$

  - Owner maximizes profit with respect to both k and l → cannot cut out l, only k.

Risk Sharing and Uncertain growth – Summary and Empirical Methods

- Empirical Methods
  - Currently looking at growth in low-educated population, industry, and manufactured homes in NC
  - Preliminary results: very high correlation between growth in industry and growth in manufactured homes

Short Run vs. Long Run Growth

- Hypothesis: in areas with fast expected growth, MHCs will spring up instead of stick-built housing
  - MH park/stick built depreciation vs. rents

Short Run vs. Long Run Growth cont.

- Owner's objective:
  - Costs: initial cost, loss of value due to capital depreciation, and tear down costs
    - Each dependent on stick built or trailer park
  - Revenues: driven by selling price of land, appreciation of property value (land and capital), and rents
    - Excepting selling price, all variables are dependent on type of capital (stick built vs. MHC)

Short Run vs. Long Run Growth cont.

- Objective: $\max_k \pi = \left(S_t + (l_i + k_i)(1+R)^t + r_i(k)\right) - \left(I_i(k) + T_i(k) + \frac{k_i}{(1+R)^t}\right)$
- First order conditions

$$\frac{\partial \pi}{\partial k} = \left((1+R)^t + r_k(k)\right) - \left(I_k(k) + T_k(k) + \frac{1}{(1+R)^t}\right)$$

- It should be noted that I_i, T_i, and r_i are increasing in *k*.
- Additional assumptions are needed on rental rate
  - MH parks offer chance to achieve increasing returns to scale
  - Stick built offer at best constant returns to scale

Short Run vs. Long Run Growth – Summary and Empirical methods

- Summary
- Empirical Methods
  - Observe relation between urban growth rates and trailer park growth rates
  - Ideally, work in property value changes

THEORETICAL CONCLUSIONS

- Realistic housing scenarios, very few assumptions have been made, models are general
- 1st model: possibility of good and bad tenants
- 2nd model: capital constraints all around
- 3rd model: boom/bust cycles, risk sharing
- 4th model: investment timing and returns

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Next project: more closely linking unit rents to local housing costs and zoning policies (Becker, Garcia, & Gorback, 2015)

- Detailed information on MHC site rents is available from DataComp (which I believe incorporates MHVillage.com and MHPark.com data) and CoStar
- Data on local (county) low to moderate income rental housing is available from HUD http://www.huduser.gov/portal/datasets/fmr.html
- Wharton has its own detailed rental database
- As parks are geocoded, we will collect at least some data on nearest neighbor apartment rents to compare with values obtained from other sources.

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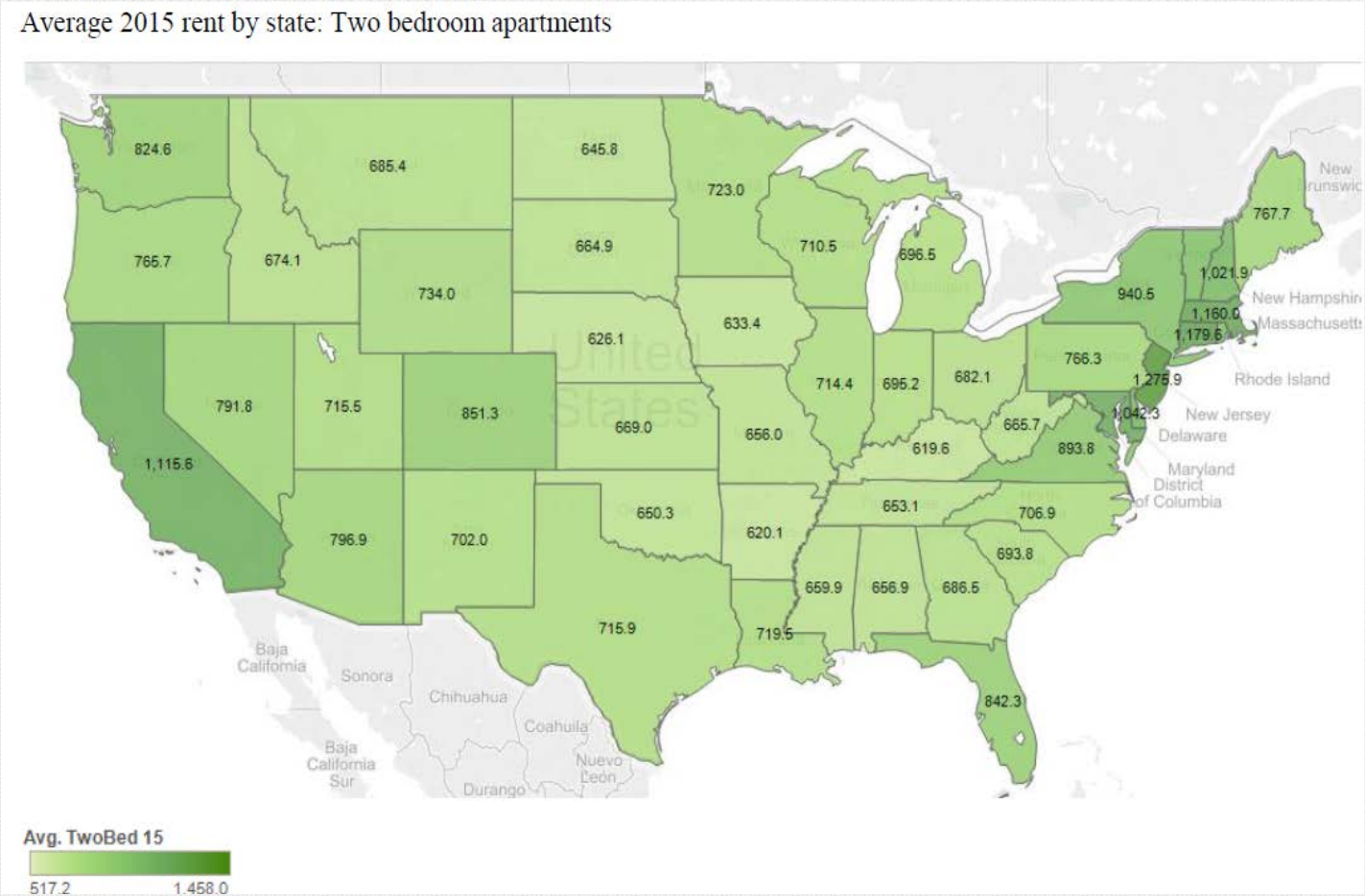
Next project: more closely linking unit rents to local housing costs (Becker, Garcia, & Gorback, 2015)



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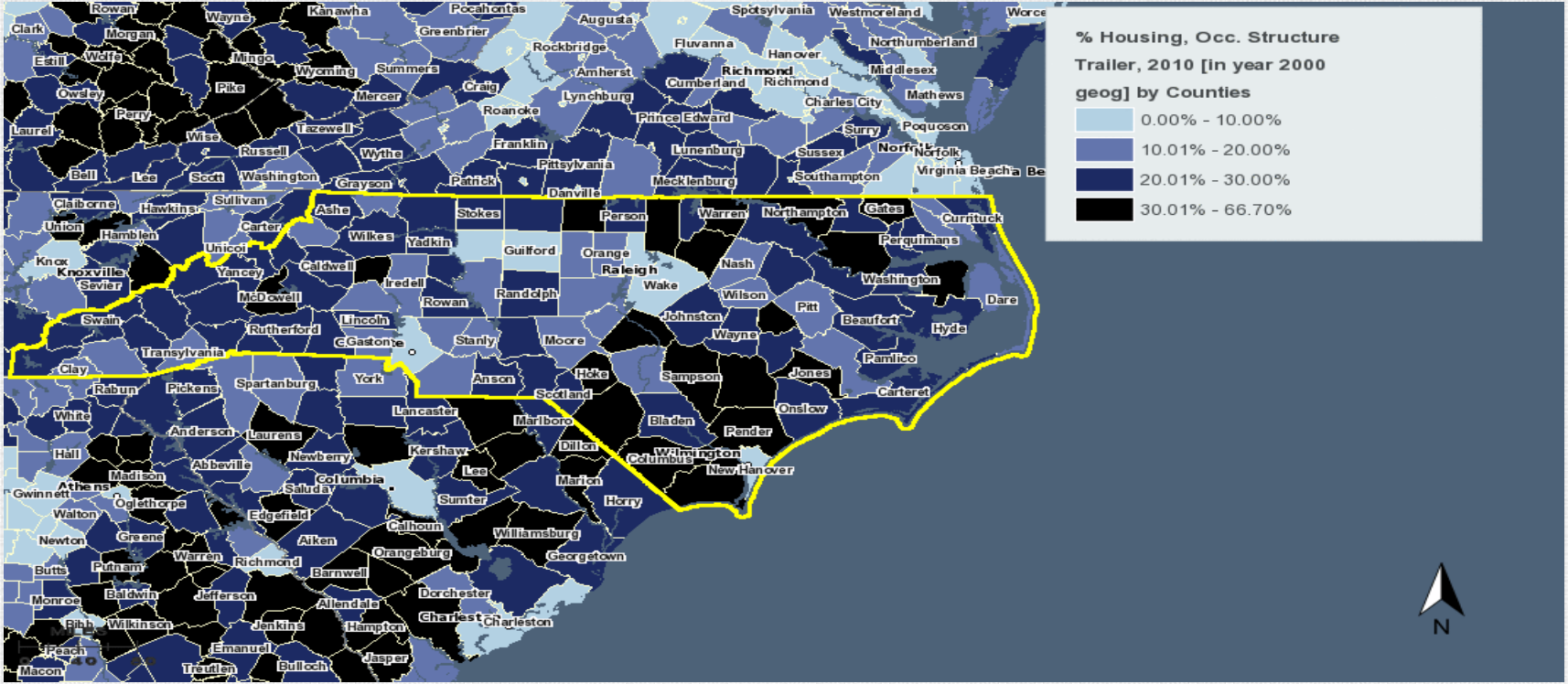
Next project: more closely linking unit rents to local housing costs (Becker, Garcia, & Gorback, 2015)



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Next project: more closely linking unit rents to local housing costs (Becker, Garcia, & Gorback, 2015)

Zoning Districts	Category	
Agricultural/Agricultural-Residential	AR	districts in which the principal use of land is either residential or agricultural (to provide low density residential living while encouraging farming activity and preserving rural ch
Residential	R-1	districts in which the principal use of land is residential and the minimum lot size is between 0-9,999 sqft
	R-2	districts in which the principal use of land is residential and the minimum lot size is between 10,000-19,999 sqft
	R-3	districts in which the principal use of land is residential and the minimum lot size is between 20,000-29,999 sqft
	R-4	districts in which the principal use of land is residential and the minimum lot size is between 30,000-39,999 sqft
	R-5	districts in which the principal use of land is residential and the minimum lot size is between ≥40,000 sqft
Business/Commercial	C	
Industrial	I	districts in which the principal use of land is industrial uses such as assembly, packaging, fabrication, wholesale retail, conversion of raw materials into products for subsequent
Mobile Home Parks	RMH-1	districts in which the principal use of land is residential specifically in mobile homes and/or mobile home parks and the minimum lot size is <20,000 sqft
	RMH-2	districts in which the principal use of land is residential specifically in mobile homes and/or mobile home parks and the minimum lot size is ≥20,000 sqft
Other	O	districts in which the principal use of land is not listed above (including mixed use, planned development, environmental conservation, etc.)

Mobile Home Park Allowed Use		
	0	mobile home parks are allowed by right in districts that fall into the category (as defined above)
	1	mobile home parks are allowed by special permit in districts that fall into the category (as define above)
	2	mobile home parks are not allowed in any district that falls into the category(as defined above)
	-	no districts fall into this category (as defined above)
	*-E	existing mobile home parks only
	*-N	new mobile home parks only

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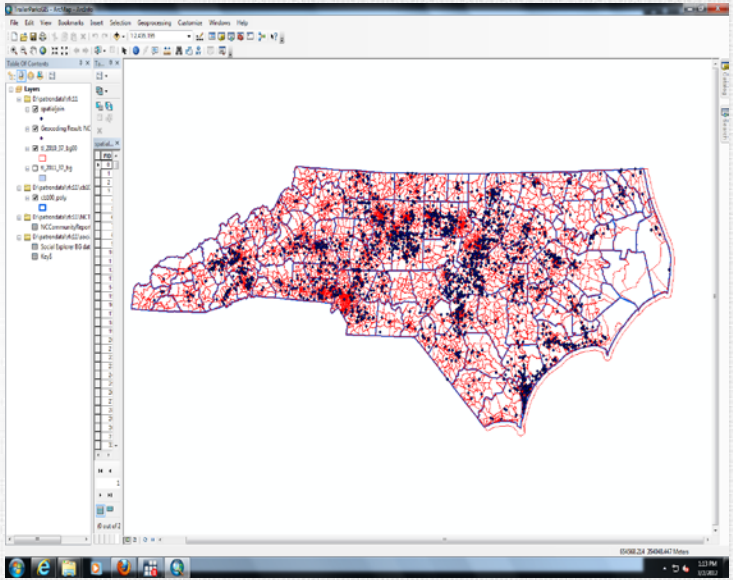
Next project: more closely linking unit rents to local housing costs and zoning policies (Becker, Garcia, & Gorback, 2015)

- We have constructed our own estimates of zoning severity for North Carolina regions and also have CoStar estimates
- Intention is to explore impact of zoning and local housing costs on site rents and park values
- Locations and local characteristics are available at the census block group level.



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Appraisal Excellence

Table A3: Binary OLS Regression Results for Collier's Appraisal Price as a Dependent Variable

	(Appraisal Price)
Transaction Price	0.990***
	(81.86)
Constant	0.137
	(0.76)
N	485
R^2	0.9328
Adjusted R^2	0.9326

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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