Town versus Gown: The Effect of a College on Housing Prices and the Tax Base

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7 July 2009

Town versus Gown: The Effect of a College on Housing Prices and the Tax Base

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November 2009

Abstract: This paper investigates whether the presence of college increases house prices and the tax base. Colleges provide cultural and recreational amenities to the surrounding area but lifestyle choices of students may create negative externalities that depress property prices. In addition, colleges are exempt from property taxes. While the property tax exemption reduces the tax base, the amenity value of the college may cause more development on the remaining land. Previous literature considers the impact of a wide range of amenities including open space, however, none try to capture the effect from a college in a given area. We find that the presence of a college is associated with house prices that are about 11 percent higher. However, the interaction of the college dummy and enrollment is also significant and negative. Taken together, the results suggest that small colleges have the largest effect on house prices and the positive effect on house prices disappears once the college enrollment reaches about 12,500 students. We also find that the effect on house prices is stronger for four-year colleges (14 percent higher) and that the source of the differential is the degree to which the college is residential. For the tax base, the story is simpler. The presence of a college is associated with a tax base that is about 24 percent higher. As is the case with house prices, the effect of a four-year college on the tax base is stronger (about 32 percent) than the effect of a community college. However, neither the size of the college nor the degree to which the college is residential has an impact on the tax base.
Keywords: tax base, college, local amenities

Acknowledgments: The authors gratefully acknowledge support from the New Jersey Department of Environmental Protection. Martijn Dröes offered a series of helpful comments and Samuel Taylor, Pingli Jiang, and Cory Yemen provided valuable research assistance.

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1 Introduction

Colleges provide culture, high technology, recreational facilities, open space, and fun. If an entrepreneur is looking for talent and technology, college towns can often provide them. In addition, the college campus is often a source of civic history and pride. As a consequence, some college towns attract significant development, including private research and technology firms. Colleges also hold cultural and sporting events and offer first-rate recreational facilities including swimming pools, tennis courts, and summer camps. In most cases, the facilities and events are open to the public. Not surprisingly then, Gopal (2008) reports that property values in college towns have appreciated immensely.

Colleges are not only bastions of knowledge and culture, however. College students have a reputation for loud parties and at times, drunk and disorderly conduct. This reputation makes areas near some colleges into recreational Meccas for people of college age, including many who are not students. Such rambunctiousness has been known to lead to vandalism and abusive behavior in nearby neighborhoods. Naturally the noise and heavy transient traffic is also a nuisance to neighbors. Even during business hours, traffic and parking issues typically arise in municipalities from student ownership of vehicles, their occupation of mid- to high-density housing, and society's increasing propensity to use autos to traverse ever shorter distances. Together these nuisance factors potentially offset the value of the existing and future amenities these towns offer.

Not surprisingly, municipalities have responded by passing ordinances designed to reduce the nuisances that students create. For instance, in Ewing New Jersey, where The College of New Jersey is located, the township council approved revised regulations of residential rental units and a revised noise and nuisance ordinance on February 1, 2009. The regulations require, among other things, annual inspections of all rental units and off-street parking spaces for every licensed driver. The revised noise ordinance allowed fines of up to $3,000 for violations.[1]

But student behavior is not the only complaint that residents of college towns place before their municipal governments. Residents and their municipal governments have also complained about the imbalance between the public services provided to colleges and payments, in-kind or otherwise, which the colleges offer in return. Because colleges are tax exempt, properties that they own are not on local tax rolls. Consequently, municipalities often contend that colleges place an undue burden on the services they provide. For example, municipalities must provide for the upkeep of roads that lead to and from the campus as well as for off-campus security response to rowdy student behavior.[2] As a result, colleges may induce higher tax rates in their home municipalities. Tax rates may rise to enable municipalities to provide the extra public services, both to the college and to the rest of the town. Higher tax rates necessarily imply lower local property values to compensate for the extra costs of the taxes that must be paid.

Of course, the presence of the college may well raise the value of existing properties and attract more development because of the amenities noted above. Moreover, from the perspective of commercial properties, a sufficiently large student body can serve as a solid market for retail and personal service businesses. Thus, if the college-oriented development is large enough, the

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[1] The relevant portion of the ordinance requires that "self-contained, portable, hand-held music or sound amplification or reproduction equipment shall not be operated on a public space or public right-of-way in such a manner as to be plainly audible at a distance of 50 feet in any direction from the operator between the hours of 8:00 a.m. and 10:00 p.m. Between the hours of 10:00 p.m. and 8:00 a.m., sound from such equipment shall not be plainly audible by any person other than the operator." See Township of Ewing Ordinance number 06-26. http://www.state.nj.us/state/secretary/ordinances/Ewing-Township-Ordinance-No.-06-26.pdf

[2] For instance, the City of Pittsburgh is attempting to institute a 1 percent tuition tax on local university and college students. The city argues that the tax is justified because students use city services – roads, police, and fire protection – and should pay for them. See Maher (2009).

related property-value premium arising from it may offset any negative consequences of the college's tax exemption.

This paper aims to measure the net effect of a college on house prices and the tax base using municipal-level data for the state of New Jersey. Two main questions will be investigated. First, does the presence of a college cause its home municipality's tax base to be more or less than would otherwise be expected? That is, does the greater intensity of development and the associated tax revenues induced by the presence of the college compensate for the lack of tax base caused by the college's tax exempt status? Second, do colleges towns have higher than expected house prices? That is, does the amenity value of the college, which derives from cultural activities and athletic facilities among others, outweigh disamenities associated with college students, such as loud parties and traffic congestion? Our analysis uses a dummy variable for the presence of a college or university in a given municipality. In addition we consider the differential impact of four-year colleges and community colleges as well as any effects from the size of the college (measured in enrollment terms). Finally, we analyze whether the degree to which the college is residential has any impact on house prices or the tax base.

We find that colleges in New Jersey are associated with house prices that are about 10 percent higher. That is, after controlling for series of factors, municipalities that have a college within their borders have house prices that are about 11 percent higher. However, the interaction of the college dummy and enrollment is significant and negative. Taken together, the results suggest that small colleges have the largest effect on house prices and the positive effect on house prices disappears once college enrollment reaches about 12,500 students. We also find that the effect on house prices is stronger for four-year colleges (14 percent higher) and that the source of the differential is the degree to which the college is residential.

For the tax base, the story is simpler. The presence of a college is associated with a tax base that is about 24 percent higher. As with house prices, the effect of a four-year college is stronger (about 32 percent) than that of a community college. However, neither the size of the college nor the degree to which the college is residential has an impact on the tax base.

2 Literature Review

No studies explicitly examine the amenity value of a college or the impact of a college on the tax base. But a large body of literature does valuate a wide range of amenities, including open space and the quality of primary and secondary schools. Because amenities are typically capitalized into house prices, we may value the amenities by gauging their impact on house prices. In essence, a residential property is viewed as a bundle of attributes. Each attribute affects the sales price of the final good. To gauge the effect of primary and secondary school quality, researchers have examined house prices in the US, Australia, and the UK (Haurin and Brasington, 1996; Black, 1999; Weimer and Wolkoff, 2001; Downes and Zabel, 2002; Rebeck, 2005; Gibbons and Machin, 2006; Bayer et al., 2007; Davidoff and Leigh, 2008).

Early papers typically estimated cross-sectional hedonic regressions but later papers criticized this empirical strategy for failing to adequately separate neighborhood effects from school effects. If better schools tend to be located in better neighborhoods, then inadequate controls for neighborhood quality will overstate the value of better schools. Later papers attempt to overcome this problem by either comparing houses on opposite sides of a school district boundary (Black, 1999; Gibbons and Machin, 2006; Bayer et al., 2007; Davidoff and Leigh, 2008), including a large set of neighborhood controls (Weimer and Wolkoff, 2001), exploiting a change in the school district boundaries (Reback, 2005), or examining the relation between changes in school quality and changes in house prices (Downes and Zabel, 2002). While the measure of school quality is typically a standardized test, the nature of these tests varies across locations. Differences in the tests notwithstanding, U.S. results show that a one standard deviation increase in test scores results in house prices that are between 1 to 14 percent higher.

However, the likely causes of a link between primary and secondary school quality and house prices is far different than the causes of the link between the presence of a college and house prices. Purchase of a house in a particular municipality confers the right to enroll all school-age children in the household in the local primary or secondary school. By law, all municipalities must provide all residents access to a primary and secondary school. All that differs across municipalities is the quality of the schools. In addition, the schools are often financed primarily through local property taxes and higher property taxes reduce house prices.

By contrast, purchasing a house in the same municipality as a four-year college confers no right to attend the college. For colleges, state residents (in the case of four-year state colleges) and county residents (in the case of community colleges) typically pay lower tuition, but residential location does not prevent enrollment. The funding sources for colleges are also different. Rather than local property taxes, colleges rely on tuition, endowments, and state and federal funds. Because colleges produce geographic concentrations of college-age men and women, they may be a source of disamenties described above (e.g., rowdy behavior).

One additional characteristic of colleges is the college campus. A college campus is often the focal point of a municipality. Green areas, water bodies, and open space are all common on college campuses. Thus, through higher demand for this unique confluence of amenities a campus itself may cause house prices to be higher. Luttik (2000) finds that an aesthetically pleasing environment causes house prices to be higher. Houses that overlook water have, on average, prices that are 8-10 percent higher, and houses that have a pleasant view overlooking open space have, on average, prices that are 6-12 percent higher. Restoration has also been a source of valuing environmental amenities at residential locations as Earnhart (2001) has found. Earnhart finds that water-based and land-based features generate higher utility than no natural feature. Among the category of land-based features, forests generated the highest utility. Water-based features such as marshes generate relatively high utilities when they are restored. Restored marshes generated roughly $40,578 in benefits, while disturbed marshes generated negative benefits of $32,412, representing 16.6 percent and 13.2 percent of the median house price, respectively.

More generally, a long series of papers examine the impact of open space on house prices using hedonics (Geoghegan et al. 1997; Bolitzer and Netusil 2000; Espey and Owusu-Edusei 2001; Lutzenheiser and Netusil 2001; Shultz and King 2001; Irwin 2002; Geoghegan 2002; Geoghegan et al. 2003; Wu 2003; Anderson and West 2006; Vandegrift and Lahr 2009). For instance, Bolitzer and Netusil (2000) consider the impact of open space on property values in Portland, Oregon. Properties located near open spaces such as public parks, natural areas, and golf courses may experience higher prices but the net effect of this proximity is undetermined since traffic congestion and noise may negate the benefits received from these amenities.

Bolitzer and Netusil find that open space within 1,500 feet of a home has a positive and significant effect on house prices. They also find that the open space type has an important effect on property values. Golf courses had the highest positive effect on housing price, while public parks were second. Finally, Bolitzer and Netusil find that open space had the largest impact on property values when the open space was 401-700 feet from the property and parameter estimates for open space less than 100 feet from the housing unit were generally insignificant. Bolitzer and Netusil explain that this is likely the result of congestion effects around public parks. Likewise, colleges may offer open space amenities that are under certain conditions diminished by congestion effects.

In addition to open space, colleges also provide access to recreation facilities and the arts. Haurin and Brasington (1996) employ a hedonic price model that includes an accessibility index, arts index, population growth index, and recreation index among several other house characteristic variables. Distance to a central business district was positive, but not statistically significant. The four indices used were all statistically significant except the population growth rate index. This suggests that housing prices within towns that provide arts and recreation increase due an amenity value present. Since college towns are well known for providing such value to those who are not enrolled, it is hypothesized that housing prices in college towns should be higher due to the availability of recreation and arts there.

3 Data and Methods

All variables are collected for the year 2000. We use data for the year 2000 because a series of housing-related control variables are available only in census years. The New Jersey Department of the Treasury supplied the data on mean house sale price by municipality for the year 2000. Data on the tax base by municipality is from the New Jersey Department of Community Affairs. Open space expenditures and state open state expenditures are from the New Jersey Department of Environmental Protection. This department also provided data on travel distance to New York City and Philadelphia. Municipality population, school age population, median rooms per housing unit, median family income, seasonal housing units, and the proportion of housing units built before 1960 are from the U.S. Census Bureau. Land use/land cover data is a composite of 1995/97 land use/land cover analysis developed by NJDEP and updated for 2000 using information developed by Richard Lathrop at The Center for Remote Sensing and Spatial Analysis at Rutgers University using satellite images. Data on tax rates, commercial and residential land values, and the ratios of assessed property values to market values are from the New Jersey Department of Community Affairs. We do not include housing characteristics in the tax base specifications because high value land may contain a large number of smaller housing units or a small number of large (and expensive) housing units.

Lastly, the college related variables measuring the presence of a college, whether the college is a four-year college or a community college, enrollment, and the percentage of enrolled students that live on campus were collected from the State of New Jersey's Commission on Higher Education for the year 2000. For the enrollment variable, Fall 2000 total enrollment was used for each college. Some municipalities contained multiple colleges (e.g., Newark). The main campus for Rutgers University is located in two municipalities (New Brunswick and Piscataway). Therefore we assign a value of one to the college dummy for each of these locations and split the total enrollment of the University across the two locations.

Because the tax rate and tax base are determined simultaneously, we need instruments to identify the tax rate (Brett and Pinske 2000; Ladd and Bradbury 1988). On one hand, a larger tax base may allows a municipality to levy a certain tax at a lower rate. On the other hand, higher tax rates deter development. Thus, higher property tax rates may reduce the size of the base. We use the ratio of residential to commercial land values and the percentage of population that is of school age as instruments. As the ratio of residential to commercial land values rises, the tax rates should rise because residents are more intensive users. Increases in the population that is of school age should also cause higher tax rates. This is the following model:

(1) $R_i = f(N_i, K_i, A_i)$

(2) $B_i = g(N_i, K_i, \hat{R}_i)$

where A_i are instruments used to identify the tax rate (or the change in the tax rate), B_i is the tax base per acre of land for municipality i (or the percentage change in the tax base over the period 1995-2000). R_i is the equalized tax rate per $100 of property value (or the percentage change in the tax rate over the period 1995-2000), and $\hat{R}_i$ is the fitted value for R_i. Also using Lutzenhiser and Netusil's hedonic pricing model gives us a new logical estimation of the model:

(4) $R_i = j(S_i, N_i, K_i, A_i)$

(5) $P_i = k(S_i,, N_i, K_i, \hat{R}_i)$

where S_i is a vector of housing characteristics for municipality i, N_i is a vector of neighborhood - locational characteristics for municipality i, and K_i is a vector of land use variables for municipality *i*. The dependent variable (P_i) is house sale price. Because many of the independent variables take on zero values, the log-log linear specification causes a large number of lost observations; therefore, we report only semi-log linear specifications here.

4 Results

4.1 House Price and Colleges

Table 1 shows the means and standard deviations for the dependent variable (House Price, Tax Base) and the independent variables. The variation in average house prices across the state was large. Chart 1 shows that in general the highest house prices are concentrated in the corridors that runs from New York City to Princeton and along the New Jersey coast. Out of the 566 municipalities, only six reported no house sale data for the year 2000. The expected sign for the college present dummy variable is indeterminate. As noted above, colleges provide both amenities and disamenities. To check for a differential impact across different college types, we create dummies indicating a four-year college and a community college. In addition, we interact the presence of a college with enrollment level to determine whether the amenity effect of the college varies with college size. Finally, we interact the four-year-college dummy with the percentage of students that live on campus to determine whether the degree to which the college is residential affects amenities or the tax base. We use this variable since we expect it is the presence of student residence that induces most disamentities associated with colleges. Statewide, about 7.6 percent of municipalities have a college within their boundaries (43 municipalities). About 4.6 percent of municipalities have a four-year college (26 municipalities) and 3 percent of municipalities have a community college (17 municipalities).

Since bigger houses on larger lots should ceteris paribus raise house prices, we expect that house prices will increase with average residential parcel size per housing unit (*Average Parcel*) and the median number of rooms per house (*Rooms*). For the open space variables, we expect that higher expenditures on open space per housing unit (*Open Space Exp*) will raise house prices. More open space translates into greater amenities and the value of the amenities is capitalized into the house price. We gauge these open space purchases in monetary rather than acreage terms because the value of an acre of land (or an acre of open space) differs across locations. That is, an acre of land should be more valuable where residential property values are higher. Because the dependent variable is house price, we construct the open space spending measure on a per-housing-unit basis.

The remaining variables (*Pre-1960*, *Nyc Dist*, *NycPhl*, *Seasonal*, and *Undeveloped*) capture various aspects of the desirability of the location of the municipality. Because of the labor market opportunities and the amenities offered by New York City, we expect that greater distance from New York City (*NYC dist*) will lower house prices as suggested as early as Alonso (1964). *NycPhl* is the square root of the sum of the squared distances from the municipality to Philadelphia and New York City and it is designed to capture distance from the corridor that connects New York City and Philadelphia. Because of disamenities associated with population density (e.g., traffic congestion, school quality, etc.) properties directly on the corridor tend to have lower values than those away from it. Likewise, recreational opportunities associated with easy access to Atlantic beaches will raise house prices. We capture this effect with the percentage of total housing units that are seasonal (*Seasonal*).

We expect that higher percentages of housing units constructed before 1960 (*Pre-1960*) will be associated with higher house prices because many of the older municipalities are clustered near New Jersey cities, Philadelphia, and New York City. Likewise, larger percentages of undeveloped land (*Undeveloped*) will reflect lower demand for land, lower land prices, and therefore, lower house prices. In constructing *Undeveloped*, we exclude any land acquired as open space. Less desirable locations will also be associated with less intensive land use. The independent variables are generally uncorrelated. However, average parcel size is highly correlated with both undeveloped land and the median number of rooms ($r = 0.66$ and 0.56, respectively). We correct for this problem by regressing average parcel size on undeveloped land and use the residual to control for parcel size in subsequent analyses. This allows us to interpret the parcel size coefficient as the effect of parcel size after controlling for the scarcity of land in the municipality.

Table 2 reports three regressions on the log of average house price. The first regression includes only a dummy for the presence of a college and an interaction term for college enrollment. The second regression uses separate dummies for four-year colleges and community colleges. The final regression adds an interaction term to capture the percentage of four-year college students that live on campus. (None of the community colleges have on-campus housing.) Because the equalized tax rate is endogenous, we instrument for the tax rate using the ratio of residential to commercial land values and the percentage of population that is of school age. Tests indicate the instruments are valid. An F-test of the instruments is significant in each of the three specifications (F (2, 544) = 10.66, $p < 0.001$; F (2, 543) = 11.80, $p < 0.001$; F (2, 542) = 21.33, $p < 0.001$) and the partial R^2 of the instruments is 0.11; 0.11; and 0.13, respectively. In addition, tests indicate that the instruments are exogenous (Hansen J Statistic = 0.535, p = 0.46; J = 0.485, p = 0.44; Hansen J Statistic = 0.838, p = 0.37).

While the instruments are valid, each of the equations shows strong evidence of spatial autocorrelation. We conducted the tests using two bands, 0-15 miles and 15-30 miles. Moran's I was significant for each of three equations (0-15: I = 0.099, $p < 0.001$, 15-30: I = -0.011, p = .08; 0-15: I = 0.097, $p < 0.001$, 15-30: I = -0.010, p = .11; 0-15: I = 0.097, $p < 0.001$, 15-30: I = -0.009, p = .14). Consequently, we corrected for the spatial autocorrelation using a spatial weights matrix based on inverse distances over the range 0-30 miles. Thirty miles is roughly the 25th percentile distance measurement of all the distance measurements in the data set.

From the first column of Table 2, we see that the presence of a college (*College*) is associated with house prices that are 10.8 percent higher.[3] Using the mean value for house price, this suggests about a $22,500 increase in house prices associated with the presence of a college. However, the interaction of the college dummy and *Enrollment* is also significant and negative. If we drop the interaction term for enrollment from the first specification, the estimate for the presence of a college (*College*) on house prices is cut in half (i.e., a five percent increase) and it

[3] Halvorsen and Palmquist (1980) show that interpretation of a dummy variable coefficient in a semi-log equation is not simply the coefficient multiplied by 100. Instead, the effect is 100[exp(c) – 1].

is not statistically significant ($p = 0.15$). Taken together, the results suggest that small colleges have the largest effect on house prices and the positive effect on house prices disappears once the college enrollment reaches about 12,500 students ($12.5 * 0.0086 \approx .108$).[4] In the second column of Table 2 we attempt to determine whether the amenity value of a four-year college differs from a community college. The estimates show that a four-year college raises house prices by 14 percent and a community college raises house prices by about 6.5 percent. However, the community college estimate cannot be statistically bounded from zero.[5] Using the mean value for house price, this suggests a $29,000 increase in house prices is associated with the presence of a four-year college.

Column 3 tests whether the residential character of the college is the source of the stronger effect on house prices from four-year colleges. In New Jersey, none of the community colleges offer a residential option. Thus, we interact the ratio of the number of beds on campus (*On Campus Pct*) to the total enrollment with the dummy for a four-year college. The results suggest that the degree to which the college is residential predicts the effect on house prices. A 10 percentage point higher ratio of beds to total enrollment implies house prices that are 7 percentage points higher. Using the mean value of the ratio (27 percent), we find that house prices that are 19 percent higher.

Open space expenditures per housing unit show a consistent, positive, and significant effect on house prices across both specifications. From column 4 in Table 2, we see that a one dollar increase in open space expenditures per housing unit is associated with house prices that are 0.0015 percent greater. Using the mean value for house price, this implies that an additional

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[4] There are six New Jersey municipalities with college enrollments in excess of 12,500 students: Cherry Hill Township, Camden County; Montclair Township, Essex County; Jersey City, Hudson County; Piscataway Township, Middlesex County; New Brunswick City, Middlesex County; and Newark City, Essex County.

[5] Enrollment levels across four-year colleges and community colleges are about the same (6,500 versus 7,400).

one dollar of open space spending per housing unit raises the average house price by about $3.15. A one room increase in the median number of rooms is associated with an increase in house price of about 23 percent (or about $48,000) while an increase in average parcel size of one acre is associated with an increase in house price of 18 percent (or about $39,000). Because *Rooms* is correlated with *Parcel Size*, the introduction of *Parcel Size* depresses the estimate for rooms. A similar effect occurs for *Parcel Size* if we remove *Rooms* from the regression.

As expected, increases in the distance from New York City are associated with lower average house prices. However, the marginal effect of another mile from NYC on house prices diminished with distance. Holding constant the distance from NYC, houses further from the NYC – Philadelphia corridor had higher prices, however, once again, the marginal effect of another mile on house prices diminished with distance. Undeveloped land has a statistically insignificant effect on house prices. In addition, the estimates for the effect of open space expenditures are not sensitive to excluding the undeveloped land variable from the model. The percentage of housing in a municipality that is seasonal also shows a significant positive effect on average house price across specifications. A one percentage-point increase in the percentage of seasonal housing units is associated with house prices that are about 1 percent (about $2,100) higher. Finally, the tax rate has a significant negative effect on house prices in all three specifications. The estimates based on the fitted value suggest that one dollar more in equalized tax rate per $100 of value (about 40 percent higher) reduces a municipality's average house price by about $42,000.

4.2 The Tax Base and Colleges

The average tax base per acre across New Jersey municipalities in 2000 is $367,860 (Table 1). Like house prices, tax bases per acre vary dramatically across New Jersey municipalities. Chart 2 shows that in general the highest tax bases per acre are clustered near New York City, Philadelphia, and along the New Jersey coast. From a theoretical perspective, the effect of a college on the tax base is indeterminate. We do not know whether the potential increases in development or higher property values brought about by the presence of a college make up for the lost tax base due to the college's tax-exempt status. With higher densities or property values, the tax base is also higher. On the other hand, colleges remove land from the tax rolls and lower the tax base. We do not include housing characteristics in the tax base specifications because high value land may contain a large number of smaller housing units or a small number of large (and expensive) housing units. Table 3 reports regressions on the log of the tax base by municipality.

Following the specifications reported Table 2, the first regression in Table 3 includes only a dummy for the presence of a college and an interaction term for college enrollment. The second regression uses separate dummies for four-year colleges and community colleges. The final regression adds an interaction term to capture the percentage of four-year college students that live on campus. Because the equalized tax rate is endogenous, we once again instrument for the tax rate using the ratio of residential to commercial land values and the percentage of population that is of school age. Tests indicate the instruments are valid. An *F*-test of the instruments is significant in each of the three specifications (F (2, 552) = 5.75, p = 0.003; F (2, 551) = 5.93, p = 0.003; F (2, 550) = 8.25, p < 0.001) and the partial R^2 of the instruments is 0.03;

0.03; and 0.04, respectively. In addition, tests indicate that the instruments are exogenous (Hansen J Statistic = 0.340, p = 0.55; $J = 0.395$, $p = 0.53$; $J = 0.387$, $p = 0.53$).

While the instruments are valid, each of the equations shows strong evidence of spatial autocorrelation. We conducted the tests using two bands, 0-15 miles and 15-30 miles. Moran's I was significant for each of three equations (0-15: $I = 0.197$, $p < 0.001$, 15-30: $I = -0.044$, $p < 0.001$; 0-15: $I = 0.196$, $p < 0.001$, 15-30: $I = -0.045$, $p = .11$; 0-15: $I = 0.195$, $p < 0.001$, 15-30: $I = -0.045$, $p < 0.001$). Consequently, we once again corrected for the spatial autocorrelation using a spatial weights matrix based on inverse distances over the range 0-30 miles.

From the first column of Table 3 we can see that the presence of a college produces a significant positive effect on the tax base per acre. When a college is present within a municipality, a tax base per acre is about 24 percent higher (about $88,000). College size measured in terms of enrollment shows no significant effect on the tax base. As in the house price equations, the effect of a four-year college is stronger than a community college. The presence of a four-year college is associated with a tax base per acre that is 32 percent higher while the effect of community college on the tax base cannot be statistically bounded from zero. The third column adds the interaction between the ratio of the number of beds on campus to the total enrollment and the dummy for a four-year college. The results suggest that the degree to which the college is residential has no effect on the tax base per acre and therefore the differential impact of a four-year college on the tax base is likely not the result of the residential character of the college.

The equalized property tax rate shows a significant negative effect on the tax base across all specifications. A $1 per $100 of value tax increase is associated with a tax base per acre that is about 60 percent lower (about $220,000). Open space expenditures per housing unit indicate a negative effect on the tax base per acre. Each dollar spent by a household on open space is associated with a tax base per acre that is about 0.006 percent lower (about $22).

Holding constant the distance from NYC, municipalities further from the NYC – Philadelphia corridor had higher tax bases, however, once again, the marginal effect of another mile on the tax base diminished with distance. Among the remaining variables, only *Undeveloped* and *Pre-1960* yield a significant effect on the tax base per acre. Larger percentages of undeveloped land (*Undeveloped*) reflect lower demand for land and a lower intensity in land use. A share of undeveloped land that is one percentage point higher is associated with a tax base per acre that is 3.7 percent lower (about $13,500). Finally, higher percentages of structures built prior to 1960 are associated with higher per acre tax bases. A one percentage point increase in *Pre-1960* structures is associated with a 0.8 percent increase in the tax base (about $3,000).

5 Conclusion

Colleges and their surrounding local governments and residents have argued for decades over disruptions caused by noisy students and the economic impact of colleges on the surrounding community. Local communities have in response to complaints about students enacted various ordinances to regulate noise, square footage per tenant in rental units, and on-street and off-street parking. In addition, communities have often sought payments from colleges in lieu of taxes. Municipal leaders often argue that the colleges consume costly services but pay little or nothing because they are tax exempt. Despite this long-running debate, there is no economic literature that attempts to measure the net amenity value of the college and its impact on the tax base.

We find that the presence of a college is associated with house prices that are about 10% higher, at least in New Jersey. However, municipalities with larger enrollments tend to have lower house prices. Taken together, the results suggest that small colleges have the largest effect on house prices. Moreover they suggest that colleges' positive effects on house prices disappear when the college enrollment reaches about 12,500 students. We also find that the effect on house prices is stronger for four-year colleges (a 14 percent higher) and that the source of the differential is the degree to which the college is residential. A 10 percentage point increase in the ratio of beds to total enrollment raises house prices by 7 percent. Using the mean value of the ratio (27 percent), we find that house prices that are 19 percent higher. Thus, small four-year colleges that are primarily residential exert the largest impact on house prices.

In addition, colleges increase the size of the tax base despite their tax-exempt status. We find that the presence of a college is associated with a tax base about 24 percent. As is the case with house prices, the effect of a four-year college on the tax base is stronger (about 32 percent) than the effect of a community college. However, neither the size of the college nor the degree to which the college is residential has an impact on the tax base. This is surprising given that each of these variables affect house prices. This suggests that the largest colleges and universities increase the density of development and perhaps the type of development around the campus. As the college increases enrollment, house prices fall and density of development and/or the level of commercial development (rather than residential development) rises.

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Table 1. Means and Standard Deviations

Variable	N	Mean	Standard Deviation
House Price	560	210,786	139,732
Rooms	566	6.09	1.02
Average Parcel	566	0.448	0.414
Pre-1960	566	49	21.1
Pct Seasonal	566	4.51	12.84
Nyc Dist	566	48.05	31
NycPhl	566	81.28	17.53
Undeveloped	566	28.5	23.4
Open Space Exp	566	451.86	2244.7
Tax Base	566	367,860	434,501
Tax Rate	566	2.52	0.792
Residential/Commercial Ratio	565	7.44	12.72
Pct School Age	566	25.28	4.42
College	566	0.076	0.265
4Yr College	566	0.046	0.209
Comm College	566	0.030	0.171
Enrollment	43	7.10	5.64
On campus pct	26	26.91	17.96

House $Price_i$ = average price per housing unit in dollars for municipality i in 2000.
$Rooms_i$ = median number of rooms per housing unit for municipality i in 2000.
Average $Parcel_i$ = average residential lot size in acres for municipality i in 2000.
$Pre\text{-}1960_i$ = percentage of total housing units that were built prior to 1960 for municipality i in 2000.
Pct $Seasonal_i$ = percentage of total housing units that are seasonal units for municipality i in 2000.
Nyc $Dist_i$ = distance (in miles) between the municipality and New York City.
NycPhl = $[(\text{Distance to NYC})^2 + (\text{Distance to Philadelphia})^2]^{1/2}$

$Undeveloped_i$ = Undeveloped land (less acreage acquired as open space) as a percentage of total acreage as of 2000 for municipality i.
Open Space Exp_i = total real open space expenditures (in 2000 dollars) as of 2000 per housing unit for municipality i.
Tax $Base_i$ = total assessed tax base (land and improvements) in dollars per acre for municipality i in 2000 multiplied by the market to assessed ratio.
Tax $Rate_i$ = general property tax rate per $100 of assessed value for municipality i in 2000 multiplied by the assessed to market ratio.
Assessed to $Market_i$ = ratio of total market value to assessed value expressed as a percentage for municipality i in 2000.
Residential/Commercial $Ratio_i$ = ratio of residential land values to commercial land values for municipality i in 2000.
Pct School Age_i = percentage of the total population that is between the ages of 3 and 18 years of age for municipality i in 2000.
College = dummy variable denoting the presence of a college (four-year or community college) in a municipality in 2000.
4Yr College = dummy variable denoting the presence of a four-year college in a municipality in 2000.
Comm College = dummy variable denoting the presence of a community college in a municipality in 2000.
Enrollment = total enrollment (in thousands) of college students (four-year or community college) in a municipality in 2000.
On campus pct = percentage of enrolled students who live in on-campus housing atr four-year colleges for a municipality in 2000 (conditional on the presence of a college).

Table 2. Regressions on the Natural Log of House Prices

Dependent Variable:	Ln_House Price	Ln_House Price	Ln_House Price
Constant	4.02***	4.12***	4.34***
	(1.09)	(1.08)	(1.06)
Op Space Exp	0.000015***	0.000015***	0.000014***
	(0.0000052)	(0.0000052)	(0.0000051)
Nyc Dist	-0.017***	-0.017***	-0.017***
	(0.0019)	(0.0019)	(0.0019)
Nyc Dist Squared	0.00013***	0.00013***	0.00013***
	(0.00017)	(0.00017)	(0.00017)
NycPhl	0.0188***	0.0188***	0.0198***
	(0.0047)	(0.0047)	(0.0046)
NycPhl Squared	-0.00014***	-0.00014***	-0.00014***
	(0.000030)	(0.000030)	(0.000030)
Pct Seasonal	0.011***	0.011***	0.010***
	(0.0021)	(0.0021)	(0.0017)
Pre-1960	0.000039	0.000069	0.00025
	(0.00060)	(0.00060)	(0.00057)
Undeveloped	0.00025	0.00019	0.00009
	(0.00058)	(0.00058)	(0.00055)
Rooms	0.236***	0.234***	0.227***
	(0.023)	(0.022)	(0.020)
Average Parcel [a]	0.190***	0.186***	0.180***
	(0.051)	(0.051)	(0.049)
Tax Rate [b]	-0.170***	-0.180***	-0.210***
	(0.077)	(0.074)	(0.057)
College	0.103**		
	(0.048)		
College * Enrollment	-0.0086**	-0.0087**	-0.010**
	(0.0042)	(0.0043)	(0.0054)
4Yr College		0.132**	-0.044
		(0.065)	(0.089)
Comm College		0.063	0.076
		(0.043)	(0.048)
4yr College * on campus pct			0.0070**
			(0.0030)
R^2	0.85	0.86	0.86
N	559	559	559

a = residual; b = fitted value; * = significant at 0.1 level, ** = significant at 0.05 level, *** = significant at 0.01 level.

Table 3. Regressions on the Natural Log of the Tax Base

Dependent Variable:	Ln_Tax Base	Ln_Tax Base	Ln_Tax Base
Constant	5.50***	5.53***	5.49***
	(1.51)	(1.51)	(1.50)
Op Space Exp	-0.000064***	-0.000065***	-0.000066***
	(0.000022)	(0.000022)	(0.000022)
Nyc Dist	-0.0018	-0.0018	-0.0018
	(0.0078)	(0.0078)	(0.0077)
Nyc Dist Squared	0.000030	0.000032	0.000035
	(0.000074)	(0.000074)	(0.000070)
NycPhl	0.033**	0.034**	0.034**
	(0.015)	(0.015)	(0.015)
NycPhl Squared	-0.00025**	-0.00025**	-0.00026***
	(0.00011)	(0.00011)	(0.00010)
Pct Seasonal	0.0018	0.0016	0.0013
	(0.0065)	(0.0065)	(0.0062)
Pre-1960	0.0079**	0.0080**	0.0082**
	(0.0038)	(0.0042)	(0.0037)
Undeveloped	-0.0370***	-0.0370***	-0.0370***
	(0.0027)	(0.0027)	(0.0027)
Tax Rate [b]	-0.596**	-0.615**	-0.634**
	(0.30)	(0.30)	(0.28)
College	0.221**		
	(0.107)		
College * Enrollment	0.010	0.0097	0.0097
	(0.012)	(0.012)	(0.012)
4Yr College		0.287**	0.262
		(0.120)	(0.181)
Comm College		0.135	0.137
		(0.134)	(0.131)
4yr College * on campus ratio			0.0010
			(0.0064)
R^2	0.79	0.80	0.80
N	565	565	565

a = residual; b = fitted value; * = significant at 0.1 level, ** = significant at 0.05 level, *** = significant at 0.01 level.

Chart 1. Average Residential Sale Prices

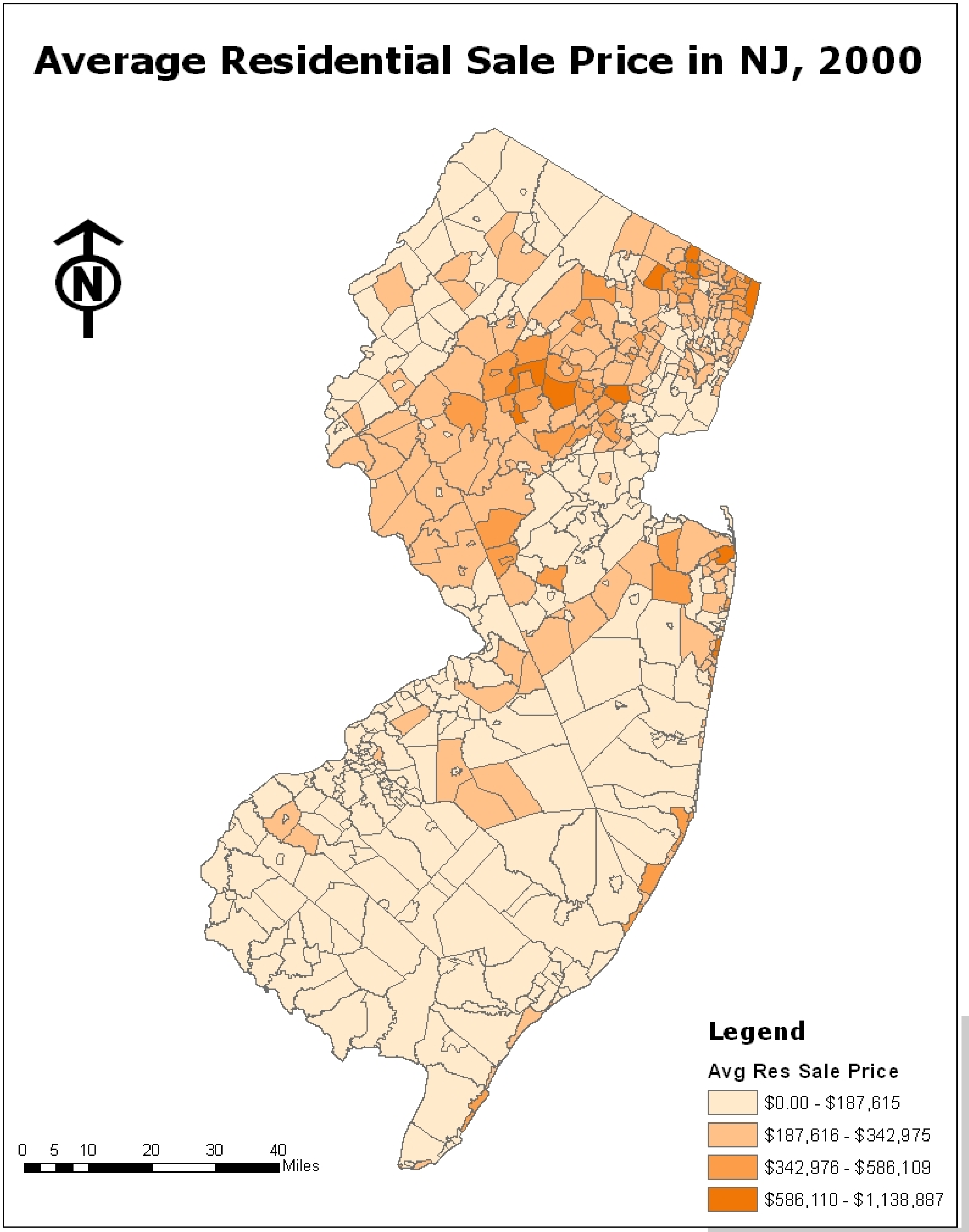

Chart 2. Tax Base per Acre