DISCUSSION PAPER SERIES

IZA DP No. 2438

Checkerboards and Coase: Transactions Costs and Efficiency in Land Markets

Randall Akee

November 2006

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

Checkerboards and Coase: Transactions Costs and Efficiency in Land Markets

Randall Akee
IZA Bonn
and Harvard University

Discussion Paper No. 2438
November 2006

IZA

P.O. Box 7240
53072 Bonn
Germany

Phone: +49-228-3894-0
Fax: +49-228-3894-180
E-mail: iza@iza.org

IZA Discussion Paper No. 2438
November 2006

ABSTRACT

Checkerboards and Coase: Transactions Costs and Efficiency in Land Markets *

The Coase theorem emphasizes the role transactions costs play in efficient market outcomes. We document inefficient outcomes, in the presence of a transactions cost, in southern California land markets and the corresponding transition to efficient outcomes after the transactions cost is eliminated. In the late 1800s, Palm Springs, CA was evenly divided, in a checkerboard fashion, and property rights assigned in alternating blocks to the Agua Caliente tribe and a non-Indian landowner by the US Federal government. Sales and leasing restrictions on the Agua Caliente land created a large transactions cost to development on those lands; consequently, we observe very little housing investment. Non-Indian lands provide a benchmark for efficient outcomes for the Agua Caliente lands. Once the transactions cost for Agua Caliente lands was removed, there is a convergence between American Indian-owned and non Indian-owned lands in both the number of homes constructed and the value of those homes.

JEL Classification: R14, O12

Keywords: land markets, coase theorem, economic development

Corresponding author:

Randall Akee
IZA
P.O. Box 7240
D-53072 Bonn
Germany
E-mail: akee@iza.org

* I am grateful to David Evans, Armin Falk, Erica Field, William Fischel, Ed Glaeser, Lakshmi Iyer, David Jaeger, Miriam Jorgensen, Joseph Kalt, Michael Kremer, Emily Oster, Sonal Pandya, Bruce Sacerdote, Albert Saiz, Raven Saks, Matthew Snipp, Rebecca Thornton, Robert Urbatsch and Jeffrey Williamson. I give special thanks to Sendhil Mullainathan and Mark Rosenzweig for their insight on this project. Katherine Spilde was exceptionally helpful in providing me with assistance in starting this research. I am especially indebted to the Mada Brown and the TESA Office in Palm Springs, CA. Providing invaluable assistance was Casey Merrill of Merrill Associates. Zoe Levitt provided excellent assistance in compiling the data. Any errors, omissions, or oversights are my own.

I. INTRODUCTION

The Coase theorem tells us that under a strict set of conditions (no transactions costs, well-defined property rights, perfect information and competition, no income or wealth effects) economic agents bargain their way to efficient outcomes regardless of how property rights were originally assigned (Coase 1960). The theorem highlights the importance of "other things" in the determination of efficient and optimal outcomes in markets. Establishment of markets and property rights alone does not ensure optimal outcomes; the theorem conditions represent potential obstacles to market functions and clearing mechanisms.

Economists and legal scholars have investigated the validity of this theorem for decades. Researchers have raised concerns regarding the possibility of long-run entrants into the bargaining process, non-separability of cost functions, and non-convexities of production.[1] Many of those arguments have been effectively dealt with by taking a broad definition of transactions costs, assignment and completeness of property rights, competitive markets and the non-existence of income or wealth effects.

Whether or not these theoretical concerns invalidate the Coase theorem in real-world situations is an empirical question. Given the debate on the relevance of the Coase theorem, only a relatively small amount of non-laboratory empirical research has been conducted on the topic.[2] Existing studies have examined the validity of the Coase theorem when there are changes in property rights or liability laws or when significant externalities exist in a particular market.

In this research, we investigate the impact of a large transactions cost on efficient outcomes in a southern California land market. In the late 1800s, the US government assigned property rights in a checkerboard fashion and divided Palm Springs, California equally between the Agua Caliente Tribal Nation and the Southern Pacific Railroad in alternating blocks. Sales

[1] See Medema and Zerbe (1999) for an excellent survey of the literature.
[2] A long literature exists on experimental tests of the Coase theorem and its conditions. See Hoffman and Spitzer (1982, 1985 and 1986) for experimental research that tends to confirm Coase theorem predictions. Schwab (1988) has experimental outcomes that tend to go against Coase theorem predictions.

and lease length restrictions on American Indian lands severely hindered the investment on those lands relative to the non Indian-owned lands. Prior to 1960, very few homes were located on American Indian lands in Palm Springs; the few homes that existed on American Indian lands were much lower in value than homes located on non Indian-owned lands. Average home value in 1960 dollars for a structure located on Agua Caliente lands was $5000, while those on non Indian-lands were valued at $26,300 (US Census of Population and Housing 1960).

In 1959, the US Federal government increased lease lengths for Agua Caliente tribal lands from 25 to 65 years. Prior to 1955, the maximum allowed lease lengths had been only five years. The change in the lease law resulted in a reduction of transactions costs in the Palm Springs land market. The particular institutional set up in Palm Springs allows us to answer the following question: Will a reduction in the transactions cost in the Palm Springs housing market produce the same investment outcomes (in terms of quantities and values) on American Indian lands as there are on non Indian lands, holding other things constant? Our results indicate the answer is yes. There is convergence between American Indian-owned and non Indian-owned lands in both the number and value of homes following the change in the lease length. Essentially, the only friction in the land market in Palm Springs was the lease length restriction on American Indian lands.

This research improves upon previous empirical tests of the Coase theorem by controlling for endogenous property rights assignment. Anderson and Lueck (1992) examine agricultural productivity between American Indian reservations and non-Indian lands with no control for the non-random assignment of American Indian reservations. They attribute lower agricultural investment and productivity on American Indian reservations to their unique land tenure status. It is not possible to rule out, however, lower land quality as the cause. Other Coase theorem empirical research relies on selection-correction techniques that may not be well-identified (Cymrot et al. 2001). The equalization of land assignment in Palm Springs ensures there is no selection problem.

Our research also provides a dynamic look at the effect of eliminating a transactions cost on market outcomes. Previous work focused on a static examination of two different US states with different institutional regimes. Gisser (1983) examined the efficiency of water allocation at one point in time between Arizona and New Mexico which have non-market and market allocations systems respectively. Our research traces the change in investment outcomes (allocations) over time as an important transactions cost is eliminated. Other empirical research that does contain a dynamic time component lacks a well-specified efficient outcome measure (Vogel 1987). In examining the Palm Springs case, non Indian-owned lands which are free from all restrictions on sales and leasing (free from the transactions cost) serve as the perfect comparison group.

We confirm the insights of the Coase theorem that, even in the absence of market imperfections, no wealth or income effects, and a well-specified assignment of property rights, transactions costs remain an important obstacle to efficient bargaining and optimal outcomes. Reduction of these transactions costs results in optimal (using non Indian-owned lands as the benchmark) investment regardless of who originally held the property rights.

Section II details the historical and institutional setting for American Indian lands and the original checkerboard assignment of lands in Palm Springs. Section III provides information on the data set. We detail how the data set was compiled from the 1950-2000 US Censuses and from the Riverside County Tax Assessor's Office. We also discuss the mapping requirements that assisted in locating properties on both the American Indian owned and non Indian-owned parcels. Section IV documents the convergence in the stock of housing on American Indian and non Indian-owned lands in Palm Springs from 1960-2000 using the Censuses of Population and Housing. Additionally, we compare the current value of homes located on American Indian-owned and non Indian-owned lands using market-based assessed values of all Palm Springs homes. Utilizing an instrumental variables approach, we find that there is no statistically

significant difference between the current values of homes on American Indian owned or non Indian-owned lands. Section V concludes.

II. PALM SPRINGS AND AGUA CALIENTE HISTORIES

The Agua Caliente Indian reservation was established by Executive Order in 1876 with additional lands added in 1877 and 1907 for a total of 31,500 acres. Located in the Coachella valley in the southern California desert, the land area was divided in a checkerboard pattern. Half of the parcels (the odd-numbered parcels) were assigned to the Southern Pacific Railroad, which were subsequently sold to finance further railroad construction southward. The remaining parcels were assigned to the Agua Caliente tribal nation.[3] This natural experiment ensures there is no endogenous assignment of property rights; effectively there has been an equalization of treatment with regard to land quality across the two types of land tenure status. While the reservation lands were originally given the Agua Caliente tribal nation as a whole, the Bureau of Indian Affairs later provided private land allotments to individual Agual Caliente tribal members (Royster 1995; Shoemaker 2003; Kray 2004).

American Indian land tenure differs from that of fee simple property in the United States. American Indian lands, including those of the Agua Caliente tribal nation and its tribal members, are held in trust by the US federal government (trust lands). This alternative land tenure status makes it difficult to sell or to use as collateral in mortgages.[4] The restrictions on sales of American Indian lands eliminates the so-called "endowment effect" (Kahnemann, et. al. 1990) that has been raised as a serious objection to the Coase theorem.[5] The parcels adjacent to the

[3] Two exceptions to this numbering scheme are one half of block 10 and the entirety of block 16 which were originally designated as fee lands, although they are part of the even numbered blocks. The rest of the even numbered blocks were allotted to Agua Caliente tribal members.

[4] Some sales of American Indian lands to non-Indians occurred in the early 1960's and very few subsequently. These sales necessitate the use of instrumental variables in the regressions that follow.

[5] Thaler (1980) uses the term "endowment effect" to explain the increase in value of an item when an individual possesses it; alternatively, the "endowment effect" can be thought of as a form of loss aversion. In experimental research, Kahnemann et. al. showed that the reservation price for sellers far exceeded that of the bidding price for buyers which precluded many efficient transactions. Given that the American Indian lands were not going to be sold, simply leased out for a fixed time period, we should not expect any of the difficulties associated with this "endowment effect".

American Indian lands, originally owned by the Southern Pacific railroad, are held in fee simple status and are free from the restrictions on sales and are able to be used as collateral in mortgages (fee simple lands). Therefore, these fee simple lands serve as benchmarks for optimal development levels on the American Indian trust lands once leasing restrictions are reduced.

There are at least two reasons why trust land status may pose an obstacle to development on American Indian lands. First, trust lands are unable to be used as collateral in standard commercial mortgages. Trust lands administered by the US federal government cannot be foreclosed upon or seized by banks. For much of the 20th century, the Agua Caliente tribal nation and tribal members were relatively poor and had had little access to credit markets. Therefore, the few homes that were built upon the Agua Caliente land in the first half of the 20th century were self-financed and were of poor construction. The homes located on the Agua Caliente lands contrasted greatly with the neighboring luxury hotels and homes of the Hollywood elite in Palm Springs in these early days. Homes on American Indian lands were often described in the local newspapers at the time as a "mess", a "slum" and a "nuisance" (Kray 2004).

Second, American Indian trust lands are also subject to the leasing regulations of the US Department of the Interior Bureau of Indian Affairs. The Bureau of Indian Affairs set maximum lease lengths for American Indian lands at five years in the 1930's. These short lease lengths discouraged potential leasees and housing developers from investing in long-term investments such as housing on American Indian lands. The five year leases increased the appropriation risks faced by non-Indian investors and effectively eliminated their investment incentives. In the mid-1950's, the lease length was extended to 25 years and, in September 1959, the Equalization Act set maximum leases for the Agua Caliente tribe at 65 years.

III. DATA DESCRIPTION

A. Time Series Data

The time series data in this study comes from the US Census of Population and Housing. Utilizing the block level counts for the 1960-1980 censuses and regional maps, we assigned

census blocks to either the trust or non-trust lands in Palm Springs. For the 1990 and 2000 censuses, the distribution of housing by trust or non-trust status was available electronically on the US Census website.[6] These counts were then used to compute the growth of the housing stock in Palm Springs by decade and land tenure status. The 1950 US Census only provided aggregate data for Palm Springs. It was not possible to distinguish between American-Indian owned and non Indian-owned land parcels and housing in this census.

B. Cross Section Data

The cross sectional data comes from the County of Riverside Tax Assessor's office and is available in an electronic format from DataQuick, Inc. Utilizing the electronic data, the tax assessor maps and the reservation map, we coded dwellings according to whether they are located on the trust or fee simple sections of Palm Springs. The creation of this trust land dummy variable, based on the original checkerboard reservation map, was the key to the two-stage least squares procedure. A more detailed discussion of the creation of this data set is described in Appendix I. The data contains all of the characteristics of the actual dwelling as well as the lot size, construction and latest sale dates, assessed value of the property and location variables. There are approximately 40,000 housing units contained in this data set.

Two issues with regard to the dependent variable should be mentioned here. The first is that the dependent variable, log assessed property value, contains both the value of the house and land. In purchases on fee simple lands, an individual will pay for both the housing structure and the land. This sales price reflects the current market value of those two separate items. The tax assessor is required by law to use the sales values as the basis for all assessments. A simple regression of log assessed value on log sales values shows that there is a statistically significant

[6] Computation of the 1990 and 2000 housing stock for Fee(non-Indian) and Trust(Indian) lands was adjusted for the inclusion of the trust housing units in the Palm Spring data. It was necessary to subtract out the growth of trust housing units from that of Palm Springs as a whole; otherwise there would be a double counting of homes in the area.

slope coefficient of 0.98. Therefore, we can conclude that the assessed values follow the sales value very closely on average.

On American Indian trust lands, when an individual purchases a single family home or a condominium, the sales price only reflects the actual price of the physical structure. The price of the land is not included in the sales price of a home on trust lands; this is due to the very nature of trust lands – they cannot be sold. Therefore, an individual must lease the land that his home is located upon for some amount of time. These land leases are competitively negotiated with both sides aiming to get the best possible deal.[7] Once a land lease and sales price have been negotiated, the tax assessor uses the information from the lease terms to compute a present value for the land. The tax assessor uses the lease length, lease payments and current interest rates in his calculations. The present value of the land is added to the sales value of the structure to create the assessed value of the trust property (California State Board of Equalization 2002). The county tax assessor is charged with,

> "estimat(ing) the price a leasehold would bring on an open market under conditions in which neither buyer nor seller could take advantage of the exigencies of the other." [8]

Given the inclusion of the market-based present value calculation for lease land values, the property assessed value is comparable across both fee and trust lands. Otherwise, there is no explicit data on the value of trust lands. This estimation, based on market negotiated rates for the leases, is the best available data on the market value of both the land and structure. A detailed discussion of the tax assessor's valuation methods are presented in Appendix II.

[7] The Agua Caliente land owners are able to fully negotiate lease terms with extensive legal assistance from the Bureau of Indian Affairs as well as from the Trust Enforcement Services Agency.
[8] California State Board of Equalization, Assessment of Taxable Possessory Interests (2002), Chapter 3.

The second issue regards California Proposition 13. The proposition, passed in 1978, provides property tax relief for long-term home owners concerned about escalating property values in the booming southern California housing market. The law capped the amount that an assessment could increase per year at 2%. If land or housing values increased at rates above 2%, Proposition 13 artificially keeps the assessed value lower than it otherwise would have been. Once a house is sold or significant renovations occur, however, a new tax assessment is conducted and provides a current market value of the structure and property. As will be discussed in the empirical strategy section, we have accounted for this problem in two different ways – using nearest neighbor matching and by including multiple year of sale and housing characteristic interaction variables in the regressions. These methods provide the same confirming results that there is no statistical difference in the amount invested in homes by land tenure status.

IV. EMPIRICAL STRATEGY AND RESULTS

The empirical requirements for this research are both time series and cross-sectional housing investment data for Palm Springs. The time series data for the housing stock provides evidence of the change in investment that occurs once land leases are extended for American Indian lands. The cross-sectional data provides evidence that the current value of investments on trust and non-trust lands has converged in value.

A. Time Series

The time series data provides the stock of homes located on trust and non-trust lands at each housing census (1960-2000). Once the housing stock had been computed for each decade, which required assigning housing blocks to either the trust or non-trust lands based on the census block maps and reservation trust land maps, we computed a rate of growth over each decade. We also computed an annual rate of growth for the decade assuming that there was a constant rate of growth over all of those years.

The expansion of housing development in Palm Springs for the period 1960-2000 is provided in Table 1. The census data for the 1950 and earlier censuses did not provide data at the census housing block unit; data was aggregated to Palm Springs as a whole. As the table shows there were a little over 3400 homes in Palm Springs in the 1950 census. Figure 1 provides a graphical depiction of the Palm Springs housing stock by tenure status for 1960-2000.

By the 1960 Census, there had been an increase in total housing units of 4,077. Importantly, the decade between 1950 and 1960 is a time period before the lease lengths on trust lands had been extended to sixty-five years. There is a marked difference in both the number and value of homes by land tenure status in Palm Springs at this time. The median value of the housing structures located on trust lands was approximately $5000 in 1960 dollars; approximately 71% of the 2382 trust land homes were characterized as deteriorating according to the census data.[9] This is in sharp contrast to the situation on fee lands where the median value for homes was approximately $26,300 in 1960 dollars and only 5.8 % of the 5,104 homes were classified as deteriorating in the census data.

In the 1970 census, we observe growth in the housing stock on both fee and trust lands. The growth rate of the housing stock for the 1960s is 47% for trust lands and 66% for fee lands. The decade of the 1960s is the first in which the legal limits on lease lengths were extended to sixty five years. The growth in the housing stock on trust lands was not as high as it was on fee lands over the decade. The difference may be due, in part, to a lengthy court battle between the city of Palm Springs and the Agua Caliente tribe. The tribe attempted to assert its own zoning laws on its lands; the corresponding legal uncertainty appears to have discouraged some development. The Agua Caliente tribe settled the court case with the City of Palm Springs in the late 1960s and agreed to abide by the city's zoning ordinances.

[9] This estimate of average value on trust lands was only conducted for the downtown section of Palm Springs, which comprised the vast majority of housing development for trust lands in 1960 using the US Census data. As this was the most coveted location in Palm Springs it follows that adding in the other outlying areas would probably only decrease the average value of trust land homes. Also, all dollar amounts are in 1960 terms.

Consequently, the spike in housing development on trust lands occurs only after all the legal and zoning questions have been settled. Housing growth more than tripled on trust lands by the 1980 census, while it did not even double on fee lands. Figure 2 most clearly shows the spike in housing growth. The decade of the 1980s, shown in the census of 1990, also has similarly higher rates of growth for the trust lands compared to the fee lands. By the 2000 census, however, we see that there has been a saturation of housing development and little new growth occurs on either trust or fee lands in the Palm Springs area. The data indicates a convergence in the total number of housing units on both types of land in Palm Springs, CA.[10] Additional growth is occurring to the east of Palm Springs, where the mountain ranges are not an obstacle to housing development, in the younger cities of Cathedral City and Rancho Mirage.

B. Cross Section

The 1960 census data shows that there is a large disparity in the average value of properties between fee and trust lands – $5000 and $26,300 respectively in 1960 dollars. Unfortunately, the average home value is not reported in subsequent censuses. In order to assess the current value of homes in Palm Springs, we use the county tax assessor's data for 2004. This data provides a richer set of control variables than available in the census data: assessed value, size, age, year of sale, location, and trust status. The basic hedonic regression is provided below.

$$(1) \quad Log\ \ Assessed\ Value_i = \alpha + \beta \cdot TrustToday_i + X_i\delta + \varepsilon_i$$

In equation 1, the vector X represents all of the housing characteristics for each structure, epsilon represents the standard mean zero error term and TrustToday is a variable which signifies whether a structure is located on trust lands in the current period. Additionally, the vector X contains a number of location and environmental dummies for the individual structure. These variables help to measure the community amenities or qualities which affect the value of a home

[10] There are 42,165 housing units in Palm Springs in the 2000 US Census, but in the cross-section data that I use there are only 30,710 housing units. This difference is due to the fact that the census counts each dwelling as an individual unit, which includes apartments and duplex homes. In the cross-section data I have restricted my sample to only individually owned single family residences or condominiums.

such as the number of adjacent hotels, commercial enterprises, mobile homes, or apartment complexes.

The first stage of the two-stage least squares estimation is given by the equation below:

(2) $$TrustToday_i = \eta + \mu \cdot Trust_i + X_i\theta + \zeta_i$$

Identification of this estimation strategy is derived from the fact that the original assignment of trust land blocks was done in the late 19th century and there was an equalization of treatment with respect to land quality and location. If all of the trust lands, as assigned in the late 19th century, remained under tribal control today then we would have an equalization of treatment and could simply run the ordinary least squares regression as described above. However, in the early 1960s, some trust lands were converted to fee simple property and sold out of the trust status. Conversion of trust lands seldom occurs today; remaining trust lands are held by the American Indian individual owners or by the Agua Caliente tribal government. The important issue is whether the parcels that were sold were more or less valuable than the lands that were not converted into fee simple status and sold off. The instrument allows us to correct for this potential selection problem. It should be noted, however, that the land itself is fairly homogenous as it is all desert plains in this region.

In order to identify this model, it is important for the instrument to satisfy both the exogeneity and correlation requirements. Trust status originally was assigned in a uniform, checkerboard fashion in the environs of Palm Springs. Thus the original status is an important predictor of whether land is in trust status today. Conversion of land held in fee status to trust status is incredibly difficult; it almost never occurs and requires extensive approvals by the Bureau of Indian Affairs and the Department of the Interior. As for the exogeneity requirements, this is not testable, but should satisfy a logical examination of the underlying process which assigned land parcels in the first place. It is clear that there was no selection going on with regards to the assignment of the original even numbered parcels that were given to the Agua

Caliente tribe. Looking at the original map in Figure 3, we can see that there was an equalization of treatment with respect to the assignment of land parcels – the land was divided into evenly-sized square mile parcels and numbered accordingly. Figure 4 provides photographic confirmation of the large grid that was created for Palm Springs lands. Major roadways divide the desert into square blocks as originally assigned in the late 1800s. As was described earlier, the tribe was given the even numbered parcels, while the railroad was given fee patent to the odd numbered parcels. It is therefore reasonable to infer that there is no relationship between the assessed value of homes today and the assignment of trust or fee status in 1891, except through the variable of interest which is trust status today.

In addition to this instrumental variables regression, we have conducted several other checks on these results. One check is to add different interaction terms for the year of sale and housing characteristics in the regression equation. These interactions will capture any trend differences that occur over different years; essentially, this variable will control for any housing trends that cause homes with certain amenities in a particular year to appreciate faster than others. The concern here is that different types of homes may have systematically been built on either Indian-owned or non Indian-owned lands according to the particularities of housing demand at that time period. The three new variables that we have included are interactions between the year sold variable and the number of bathrooms in a home, the number of bedrooms in a home and the number of square feet in the structure. These three variables are important determinants of the price of homes and would appear to be the most important characteristics that require interaction dummy variables.

A second check on the original instrumental variables regression result uses the nearest neighbor matching procedure.[11] Matching individual houses along the observable characteristics (excluding land tenure status) attributes any residual differences in housing value to land tenure status. Our main assumption in this procedure is that we have effectively explained away all of

[11] Stata code provided by Becker and Ichino (2002) for the nearest neighbor matching procedure.

the heterogeneity between the value of housing units using all of their observed characteristics. Any residual differences in housing values are attributable to the effect of the land tenure status. Given the equal nature of land assignment, it seems reasonable that the observed characteristics should account for the vast majority of the structure and land parcel's value. The nearest neighbor matching procedure makes a direct comparison of housing structures on American Indian owned lands to similar structures located on non Indian-owned lands. All of these additional checks confirm our initial results of no statistical difference in current homes values by tenure type.

We now turn to a discussion of the actual data and estimation results. Table 2 presents the means of the cross section variables. We see that the log assessed value between trust and fee lands differs by a relatively small amount, 0.03 log points. However, this difference is statistically significant. The simple difference in means shows that there is at least a small systematic difference in housing values; in non-log terms the difference is about $4000 in 2004 dollars.

In contrast to the simple comparison of means above, I control for characteristics of the house, land and surroundings in Table 3. The first specification provides the results of the first stage regression as well as the second stage regression. In the first stage, we see that the original assignment of trust land status is indeed an important determinant of trust status today; the coefficient is large, holding other things constant, having been originally assigned as trust lands increases the probability of that parcel being trust today by almost 50%. The other variables are interesting, but they do not have a causal interpretation here and may be merely correlated with the trust status today variable. The second stage of the procedure provides the important result that the coefficient on trust lands today is not statistically significant from zero. Additionally, the magnitude of the coefficient is small, it says that being located on trust land today increases the log assessed value of the land and parcel by less than 2%, ceteris paribus. This amount is much smaller in magnitude than the 16% difference in log values of homes in the 1960 census. The

overall R-squared value for this IV regression is high at 72% and confirms the belief that many of the important determinants of the value of the home has been accounted for in this regression specification.[12]

The other variables of interest in the second stage of the specification are of the usual sign and significance. Specifically, we see that an increase of 1% on the size of the structure increases the assessed value by 0.82%, which is the largest coefficient in this regression. We would expect the size of the structure to have a very large and significant impact on the value of the home. The lot size has a positive and statistically significant impact on the log assessed value, but only a relatively small impact overall. A 1 % in the size of the size of the lot is associated with a 0.08% increase in the assessed value of the overall parcel. The other items of interest are the characteristics of the house itself. An increase in the number of bedrooms, given a fixed size of house, decreases the overall assessed value. While an increase in the number of bathrooms, even for a house of fixed size, tends to increase the assessed value. Pools, garages and air conditioning all tend to increase the value of a home as expected. Older homes have lower assessed values, as one would expect. The surrounding characteristics matter a great deal as well. Having a home located on a block with apartment buildings will tend to lower the assessed value of the home. However, being located on a block with more condominiums, hotels, commercial enterprises or single family homes tends to increase the value of a home. Finally, homes located on a block with many vacant lots have a lower overall assessed value.

The second and third specifications of the two-stage least squares regressions repeats the procedure as described earlier, except additional interaction variables have been included. In the second specification, there are year sold and bathroom interaction variables as well as year sold and bedroom interaction variables. The results show little difference from that of the first

[12] Additionally, to allow for differences in the variance of different neighborhoods, I clustered the standard errors at different levels of aggregation and found no difference in my results. Using zip codes and census tracts as two different levels of clustering, I find that this alternate measure of standard errors does not change the outcome reported above.

regression specification. The third specification adds in year sold and square foot interaction variables and again we see that there is no change in the statistical significance of the coefficient on trust land today.

In table 4, we have conducted a further test of the difference in home values by land tenure status. Homes on trust lands today are matched with homes with similar characteristics located on fee simple lands. The housing values are matched using the same variables used in the two-stage least squares regression procedure described above. The estimated difference in housing values between the two tenure types is not statistically significant different from zero. This result provides additional confirmation of the two stage least squares results already presented.[13]

V. CONCLUSION

This researched focused on the effect of reducing a significant transactions cost on the efficiency of outcomes in the land market in Palm Springs, California. The special conditions present on the Agua Caliente lands in Palm Springs provide a unique opportunity to test explicitly the impact of transactions costs on economic efficiency. The checkerboard assignment of land and property rights by the US Federal government ensures there is no selection with regard to land quality or location. Our key finding is that the housing values in Palm Springs California do not differ by ownership status once lease lengths have been lengthened to sixty-five years.

We learn that transactions costs can effectively halt bargaining and economic efficiency even when land markets are complete. Until the reduction of the transactions costs in 1959, half of the developable land in Palm Springs went mostly unused. We have provided evidence that development on the Agua Caliente lands trailed the non Indian-owned lands in both number of housing units as well as in value of those housing units.

[13] There are concerns about the accuracy of standard errors in any propensity score matching procedure. In general, it is assumed that the estimated standard errors are smaller than the true standard errors. This would increase the standard errors for this estimate and further diminish the statistical significance; the point estimate would still remain positive.

Once the land leases were extended, however, housing development expanded rapidly on the Agua Caliente lands. Although the Agua Caliente owned lands are still non-collateralizable and face strong sales restrictions, the housing market overcame these limitations after lease lengths were extended to 65 years. Land developers leased the Agua Caliente lands and invested in housing developments to the same level as previously developed non Indian-owned lands.

While the results presented here are in line with the Coase theorem prediction that efficiency ensues once large transactions costs are reduced (given the other theorem conditions are met), the Coase theorem, and this research, says nothing about the equity issues resulting from a move towards efficiency in markets. The Agua Caliente lands have been developed and economic efficiency has resulted; however, how has this change impacted the landowners themselves? One would assume that the American Indian landowners are better off given the ability to lease their lands and to receive compensation for the use of the land; whereas, prior to long-term leases the landowners received no lease income. While this is most certainly true, the true counterfactual question remains: would the American Indian landowners have been better off if they had the ability to sell their lands outright?

An asset with sales restrictions may preserve ownership of an asset and achieve efficient market outcomes given proper leasing opportunities, markets and contract enforcement. However, it is not immediately clear how the sales restriction impacts individual landowner welfare and the ability to smooth shocks in the short-run. What is the trade-off to such land ownership status? One can not answer these questions given the data provided here and this merits further research. The concern is an important one from a development policy perspective as this form of land ownership, trust status, is not unique to American Indians alone but holds for the scheduled castes of India, First Nations of Canada and other indigenous peoples. The competing objectives of asset retention and asset development for people with little market experience provide an interesting future research topic. We have established in this research that

trust land status entails no efficiency trade-off; it remains to be seen if there are any equity trade-offs.

APPENDIX I – DATA SET CREATION

The data for the time series is comprised of five different US Censuses of Housing and Population. The 1950 Census provided data on the total number of homes built in Palm Springs, there was no distinguishing between trust and non-trust structures. The 1960 US Census provided the first instance of micro-level data for Palm Springs. In order to create the total amount of homes on either trust or non-trust lands, we used the census block maps and the census block data provided in the census. We used the total count of homes by census blocks and located these homes using the provided US Census maps by decade. Once we had located the census blocks on the US Census maps, we then identified whether a particular census block was located on trust land or fee simple lands using the Bureau of Indian Affairs trust land map. In most cases, census blocks did not cross reservation boundaries. When a census block crossed between reservation and non-reservation lands, we divided the total amount of homes for that census block and added an equal proportion to both categories of land. If there is a bias present in this method, it would tend to inflate the amount of homes built on reservation land; this is only a real concern for the 1960 census. Only a fifth of all housing units included in the total trust land housing units fell into this category and an even smaller amount for the fee lands.

The same process was repeated for subsequent decades, 1970 and 1980. By the 1970 census, there were far fewer census blocks that crossed reservation and fee land boundaries; revisions of census block numbering and dimensions had occurred. Only 7 percent of housing units included in the trust land total were on census blocks that crossed boundaries. From 1980 onward, the census blocks were completely separate between the reservation and fee lands.

In order to calculate the 1990 and 2000 homes, we used the American Fact Finder Web Page at the US Census Bureau web page. The 1990 US Census bureau tables available on the US Census website provided the total number of homes on Agua Caliente lands. Unfortunately, when reporting homes located in Palm Springs, the Census Bureau reports an aggregate amount

that includes homes located on the Agua Caliente Indian reservation. To avoid double counting of housing, we deleted the number of homes located on the Agua Caliente Indian reservation from the Palm Springs housing totals. The total number of homes, 21,129, is provided in Table 1. We replicated this process, in order to omit the double counting of homes, for the 2000 Census data as well.

The data for the cross-section, as described earlier, was purchased from DataQuick, Inc. which provides an electronic version of the same data available at the Riverside County Tax Assessor's Offices. The primary work involved in the creation of the data set used, in addition to the normal cleaning and standardizing of variables, was the creation of a trust originally variable dummy. The data contains information on whether or not a parcel is currently, in 2004, located on trust lands. However, the main component behind the identification strategy for the two-stage least squares is the equalization of assignment of lands, which is captured in the trust originally dummy variable. Therefore, we assigned the thirty thousand housing units according to whether they were located on trust land originally.

In order to accomplish this, each section of the tax assessor's plat maps were examined in conjunction with the reservation boundary map of Palm Springs. Each housing unit consists of a unique number assigned by the tax assessor's office which corresponds to the book, section and lot number for a particular housing unit. We went through each section of the Palm Springs map (see attached map) and found in the tax assessor's plat maps the relevant book, section and lot number for homes that were on lands originally designated as trust. These were then selected out from the entire DataQuick data (which has data on the entire Riverside County). We created a number of data sets, one for each section of either Palm Springs or the Agua Caliente reservation. We then created a dummy variable to indicate the trust originally status of a parcel; the variable equals one if the current housing unit is located on lands originally assigned to the Agua Caliente tribe. Once this was completed, we merged the entire data set to create the final cross section data, with dummy variables for trust land today and trust land originally.

APPENDIX II – TAX ASSESSOR CALCULATION OF TRUST LAND VALUE

The cross section data has both the sales value and assessed values for housing units in Palm Springs and Agua Caliente reservation. Trust lands, as described earlier, cannot be sold, therefore the sales prices that is reported to the tax assessor contains only the price of the physical structure, but not the value of the land. For fee lands, however, the sales price is inclusive of the value of the structure and the land. In order for this work to be meaningful, we need to compare variables that are measuring similar things.

One solution would be to remove the value of the land from the sales value of the fee properties. This information is not available in the data, it would require estimating some sort of value function for fee lands and then subtracting this amount out. The other alternative is to estimate the value of trust lands and add this amount to the sales price of housing units located on trust properties. In essence, this is exactly the process that the tax assessors use in estimating an assessed value for homes on trust lands.

The county tax assessor is charged with , "estimat(ing) the price a leasehold would bring on an open market under conditions in which neither buyer nor seller could take advantage of the exigencies of the other." From Chapter 3 in Tax Assessor Handbook. Additionally, we have spoken with several tax assessors in the county tax assessor's office as well as private firms engaged in assessments in Palm Springs. The primary method for creating the present value of a leasehold interest is the sales approach method.

Once the purchase price of a housing structure is reported, a present value amount is added to the price in order to determine total assessed value for trust lands. The calculation of the present value of the land proceeds as follows: the assessor gets information on the lease agreement signed by the lessee and lessor. These lease agreements are negotiated between the two parties and can be assumed to contain market rates for land use in the area. A present value calculation incorporates the duration of the lease, the annual lease amount paid and the discount rate. The discount rate is calculated by looking at either the market rate of return on comparable

possessory interests, or by looking at fee simple market rates of returns or by using a weighted average of capitalization rates for debt and equity. In any case, these three different methods provide a discount rate that is market determined.

Finally, the present value of the lease (land value) and the sales price are added together to provide the assessed value for a housing unit located on trust lands. As all of the components are market determined, the data should accurately reflect the true costs of land. This assessed value allows us to conduct the research with a dependent variable that measures the same items: physical housing structure and land value.

BIBLIOGRAPHY

Alchian, A.A. and H. Demsetz. 1973. The Property Right Paradigm. *The Journal of Economic History*. 33: 16-27.

Anderlini, Luca and L. Felli. 2006. Transaction Costs and the Robustness of the Coase Theorem. *The Economic Journal.* 116: 223-245.

Anderson, Terry L. 1992. *The Legacy of Allotment, in Sovereign Nations or Reservations? An Economic History of American Indians.* San Francisco: Pacific Research Institute for Public Policy.

Anderson, Terry L. 1995. *Sovereign Nations or Reservations*? San Francisco, CA: Pacific Research Institute for Public Policy.

Anderson, Terry L. and P.J. Hill. 1975. The Evolution of Property Rights: A Study of the American West. *Journal of Law and Economics*. 18(1): 163-179.

Anderson, Terry L. and P.J. Hill. 1990. The Race for Property Rights. *Journal of Law and Economics*. 33(1): 177-197.

Anderson, Terry L. and D. Lueck. 1992. Land Tenure and Agricultural Productivity on Indian Reservations. *Journal of Law and Economics.*. 35: 427-454.

Arcuri, Alessandra. 2005. A Different Reason for "De-Coasing" Environmental Law and *Economics. European Journal of Law and Economics.* 20: 225-246.

Barrington, L., ed. 1999. The Other Side of the Frontier: Economic Explorations into Native American History. Boulder, Colorado : Westview Press.

Becker, Sasha and Andrea Ichino. 2002. Estimation of average treatment effects based on propensity scores. *The Stata Joiurnal.* 2(4) : 358-377.

Besley, Timothy. 1995. Property Rights and Investment Incentives: Theory and Evidence from Ghana. *The Journal of Political Economy.* 103(5): 903-937.

Besley, Timothy and Robin Burgess. 2000. Land Reform, Poverty Reduction, and Growth: Evidence from India. *The Quarterly Journal of Economics.* 115(2): 389-430.

Bobroff, Kenneth H. 2001. Retelling Allotment: Indian Property Rights and the Myth of Common Ownership. *Vanderbilt Law Review*. 54(4): 1557-1624.

Brasselle, A., F. Gaspart, and J. Platteau. 2002. Land Tenure Security and Investment Incentives: Puzzling Evidence from Burkina Faso. *Journal of Development Economics*. 67: 373-418.

California State Board of Equalizations. 2002. *Assessment of Taxable Possessory Interests: Assessors' Handbook Section 510.* California State Government.

Carlson, L.A. 1981. Land Allotment and the Decline of American Indian Farming. *Explorations in Economic History.* 18: 128-154.

Carlson, L.A.. 1981. *Indians, Bureaucrats, and Land.* Westport, CT: Greenwood Press.

Carlson, L.A.. 1983. Federal Policy and Indian Land: Economic Interests and the sales of Indian Allotments 1900-1934. *Agricultural Economics.* 57: 33-45.

Cheung, Steven. 1973. The Fable of the Bees: An Economic Investigation. *Journal of Law and Economics.* 16(1): 11-33.

Coase, Ronald. 1960. The Problem of Social Cost. *Journal of Law and Economics.* 3: 1-44.

Coase, Ronald. 1992. The Institutional Structure of Production. *The American Economic Review*. 82(4): 713-719.

Cymrot, Donald and James Dunlevy and William Even. 2001. 'Who's on first': an Empirical Test of the Coase Theorem in Baseball. *Applied Economics.* 33: 593-603.

De Soto, Hernando. 2000. *The Mystery of Capital.* New York, NY: Basic Books.

Demsetz, Howard. 1967. Toward a Theory of Property Rights. *The American Economic Review.* 57(2): 347-359.

Department of the Interior, Bureau of Indian Affairs. 2004. 25 CFR Part 162, Trust Management Reform: Residential Leases and Business Leases; Proposed Rule. *Federal Register.* 69 : 27.

Dixit, Avinash and M. Olson. 2000. Does Voluntary Participation Undermine the Coase Theorem? *Journal of Public Economics.* 76: 309-335.

Do, Quan and Lakshmi Iyer. 2002. Land Rights and Economic Development: Evidence from Vietnam. Unpublished Manuscript.

Firmin-Sellers, K. 1995. The Politics of Property Rights. *The American Political Science Review*. 89(4): 867-881.

Gisser, Micha. 1983. Groundwater: Focusing on the Real Issue. *The Journal of Political Economy*. 91(6): 1001-1027.

Goldberg, Carole and Duane Champagne. 1996. A Second Century of Dishonor: Federal Inequities and California Tribes. Los Angeles: UCLA American Indian Studies Center. Chapter IV.

Hoffman, Elizabeth and Matthew Spitzer. 1982. The Coase Theorem: Some Experimental Tests. *Journal of Legal Studies.* 25: 73-98.

Hoffman, Elizabeth and Matthew Spitzer. 1985. Entitlements, Rights and Fairness: An Experimental Examination of Subjects' Concepts of Distributive Justice. *Journal of Legal Studies.* 14: 259-297.

Hoffman, Elizabeth and Matthew Spitzer. 1986. Experimental Tests of the Coase Theorem with Large Bargaining Groups. *Journal of Legal Studies.* 15: 149-171.

Iyer, Lakshmi. 2002. The Long-term Impact of Colonial Rule: Evidence from India. Unpublished Manuscript.

Johnson, R.N. and G. Libecap. 1980. Agency Costs and the Assignment of Property Rights: The Case of Southwestern Indian Reservations. *Southern Economic Journal.* . 47(No. 2): 332-347.

Kahneman, Daniel and Jack Knetsch and Richard Thaler. 1990. Experimental Tests of the Endowment Effect and the Coase Theorem. *The Journal of Political Economy*. 98(6): 1325-1348.

Kray, Ryan M. 2004. The Path to Paradise: Expropriation, Exodus, and Exclusion in the Making of Palm Springs. *Pacific Historical Review*. 73(1): 85-126.

Marks, P.M. 1998. *In a Barren Land.* New York, NY: William Morrow and Company, Inc.

McChesney, Frank .S. 1992. Government as Definer of Property Rights: Indian Lands, Ethnics Externalities and Bureaucratics Budgets. *Property Rights and Indian Economies,* ed. Terry.L. Anderson. Lanham, MD: Rowman & Littlefield.

McChesney, Frank S. 2003. Government as Definer of Property Rights: Tragedy Exiting the Commons. *Property Rights: Cooperation, Conflict and Law*. ed. Terry.L. Anderson and Frank.S. McChesney. Princeton, NJ: Princeton University Press.

McCloskey, D.N.. 1991. The Prudent President: New Findings on Open Fields. *The Journal of Economic History*. 51(2): 343-355.

McDonnell, J.A., The Dispossession of the American Indian 1887-1934. 1991, Bloomington, IN: Indiana University Press.

Medema, Steven and Richard Zerbe. The Coase Theorem in Boudewijn Bouckaert and Gerrit De Geest, eds., *The Encyclopedia of Law and Economics*. Aldershot: Edward Elgar Publishing, 2000: 836-92.

Meriam, Lewis., et al. 1928. *The Problem of Indian Administration.* Baltimore, MD: The Institute for Government Research Studies in Administration.

Milanovich, Richard. 1998. Statement of Richard Milanovich, Chairman of the Agua Caliente Band of Cahuilla Indians, Regarding H. R. 700. *The US Senate Indian Affairs Committee*.

Pender, J. and J. Kerr, The Effects of Land Sales Restrictions: Evidence from South India. Agricultural Economics, 1999. 21: p. 279-294.

Royster, Judith V. 1995. The Legacy of Allotment. *Arizona State Law Journal.* 27(1).

Schwab, Stewart. 1988. A Coasean Experiment on Contract Presumptions. *Journal of Legal Studies.* 17 : 237-268.

Shipek, Florence. 1988. *Pushed into the Rocks.* 1988, Lincoln, NE: University of Nebraska Press.

Shoemaker, J.A. 2003. Like Snow in the Spring Time: Allotment, Fractionation, and the Indian Land Tenure Problem. *Wisconsin Law Review,* p. 729.

Sutton, Imre. 1985. *Irredeemable America: The Indians' Estate and Land Claims.* Albuquerque, NM: University of New Mexico Press.

United States Census Bureau, US Department of Commerce. 1950. Census of Population and Housing.

United States Census Bureau, US Department of Commerce. 1960. Census of Population and Housing.

United States Census Bureau, US Department of Commerce. 1970. Census of Population and Housing.

United States Census Bureau, US Department of Commerce. 1980. Census of Population and Housing.

United States Census Bureau, US Department of Commerce. 1990. Census of Population and Housing.

United States Census Bureau, US Department of Commerce. 2000. Census of Population and Housing.

Williams, Ethel J. 1971. Too Little Land, Too Many Heirs--The Indian Heirship Land Problem. *Washington Law Review.* 46: 709-744.

Table 1: Housing Growth by Tenure Status Palm Springs, 1960-2000

			Housing	Annualized
1950	**Housing**		**Growth**	**Growth**
Total	3409			
1960				
Trust	2382			
Fee	5104			
1970				
Trust	3506		0.47	0.04
Fee	8450		0.66	0.05
1980				
Trust	11452		2.27	0.13
Fee	15952		0.89	0.07
1990				
Trust	20840		0.82	0.06
Fee	21129		0.32	0.03
2000				
Trust	20926		0.00	0.00
Fee	21239		0.01	0.00

Source: US Census of Housing and Population, 1950-2000

Figure 1. Palm Springs Housing Stock by Decade by Land Tenure Status

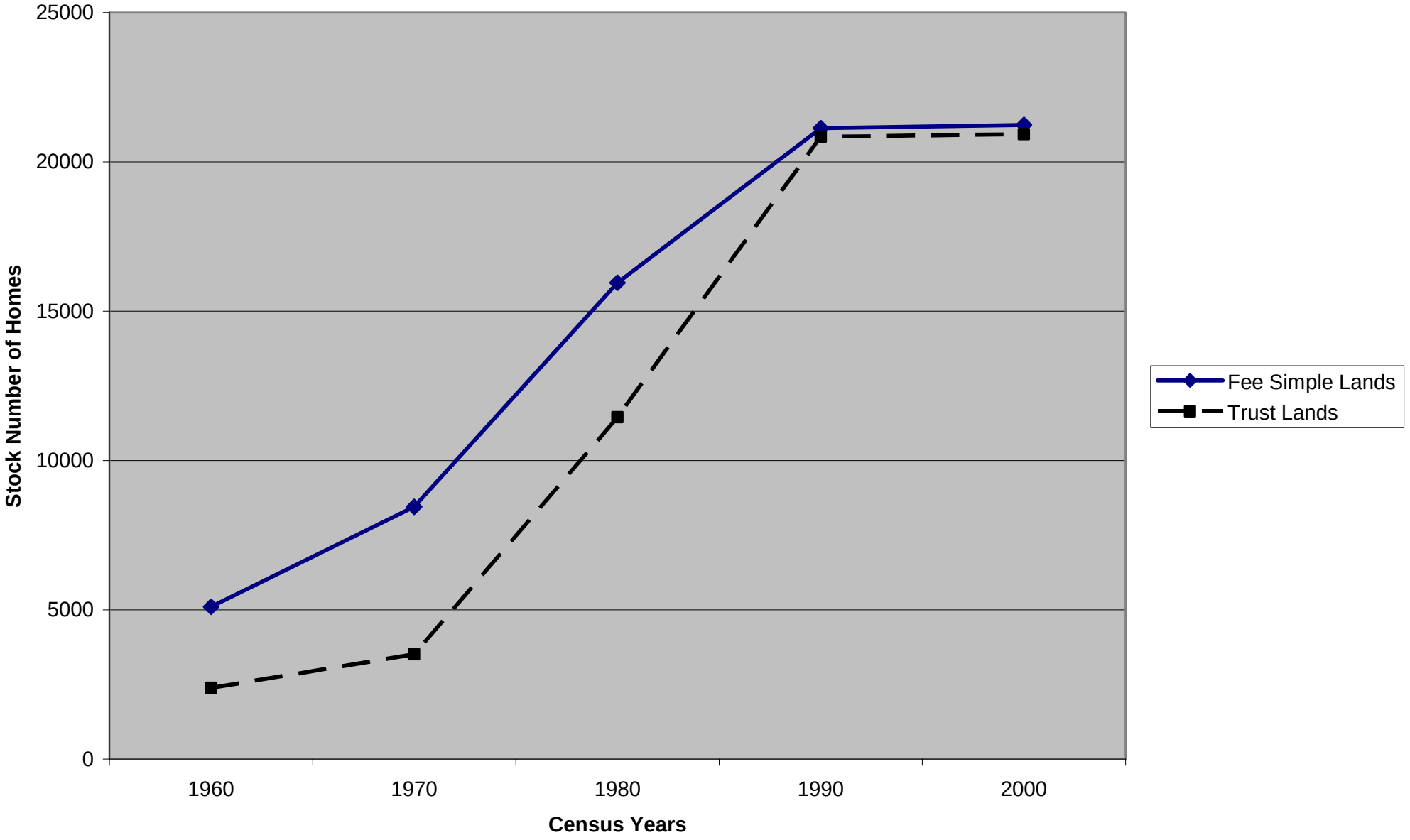

Figure 2. Decadal Growth Rate in Palm Springs Housing Stock by Land Tenure Status

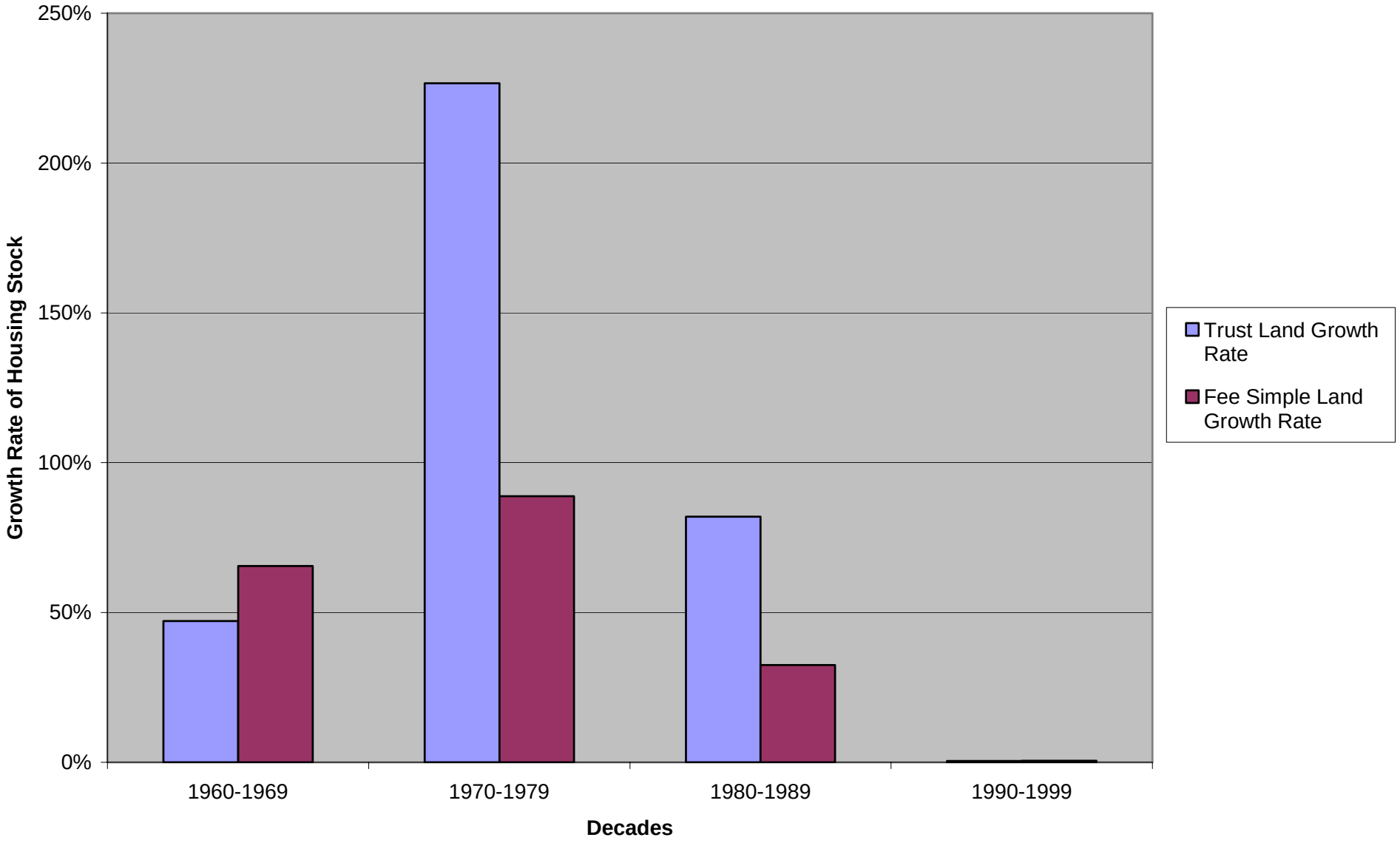

Figure 3 – Census Tract Map of Palm Springs, Ca. (US Census Bureau Map)

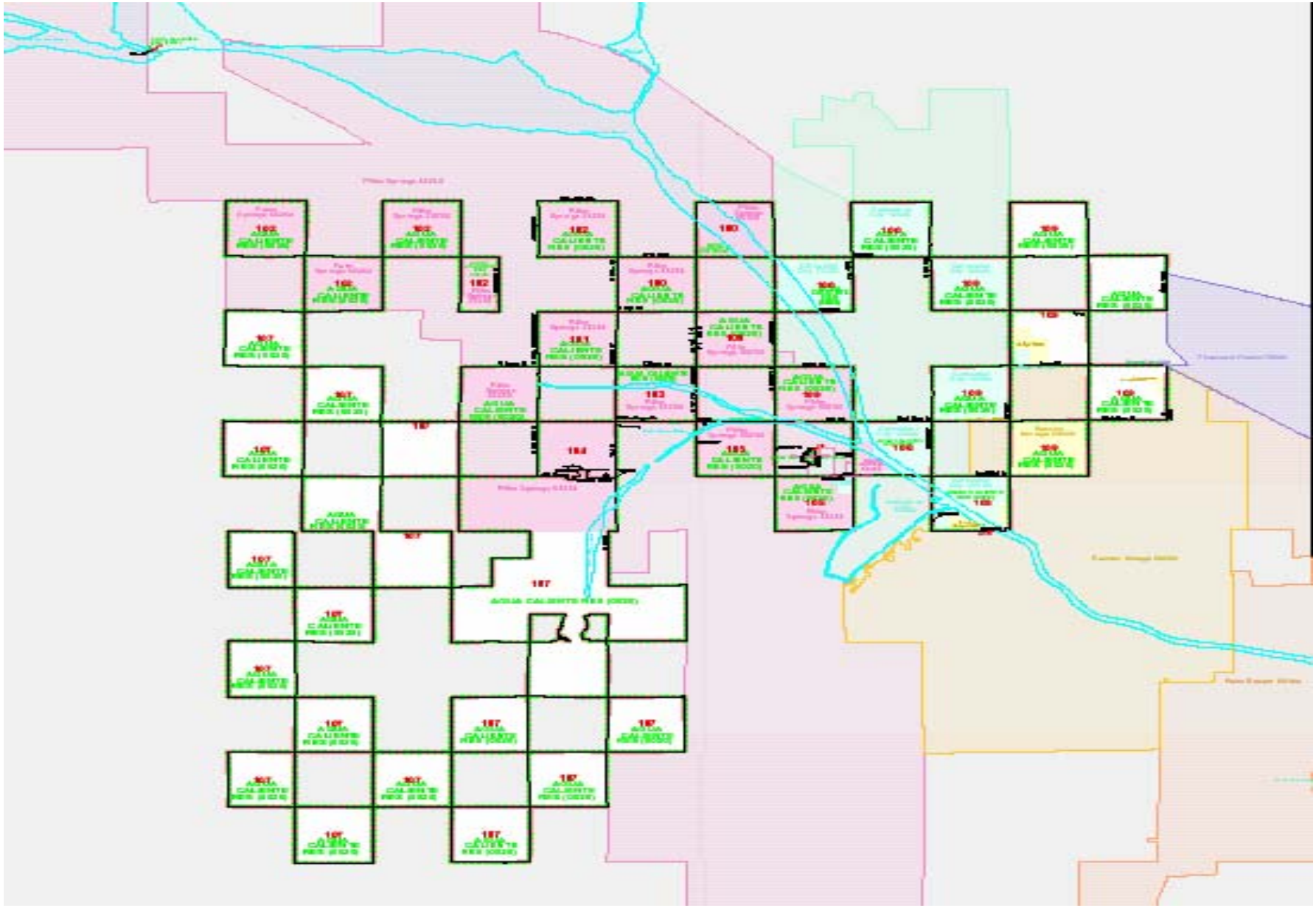

Figure 4 – Aerial Photographic Map of Palm Springs (US Geologic Service Photo)

Table 2: Mean of Cross Section Variables by Land Tenure for Palm Springs

Variable	Trust Today			Fee Simple Today		
	Number of Observations	Mean	Std. Dev.	Number of Observations	Mean	Std. Dev.
Log Assessed Value	7,492	11.79	0.58	22,675	11.82	0.69
Trust Land Today Dummy	7,492	1.00	0.00	22,675	0.00	0.00
Trust Land Originally Dummy	7,492	0.98	0.14	22,675	0.31	0.46
Condominium Dummy	7,492	0.73	0.44	22,675	0.34	0.47
Number of Bedrooms	7,492	2.21	0.69	22,675	2.75	1.07
Number of Bathrooms	7,492	1.92	0.57	22,675	2.06	0.74
Pool Dummy	7,492	0.12	0.32	22,675	0.35	0.48
A/C Dummy	7,492	0.96	0.20	22,675	0.82	0.38
Garage Dummy	7,492	0.70	0.46	22,675	0.64	0.48
Number of Stories	7,492	1.07	0.28	22,675	1.14	0.39
Age of Structure	7,492	24.34	7.27	22,675	26.65	15.37
Log Lot Square Feet	7,492	7.79	0.76	22,675	8.55	1.02
Log Structure Square Feet	7,492	7.26	0.41	22,675	7.36	0.40
Log Density of Structures Per Square Mile	7,492	7.25	0.50	22,675	7.13	0.59
Number of Apartments on Block	7,492	3.76	4.65	22,675	15.47	20.84
Number of Condominiums on Block	7,492	918.38	367.89	22,675	430.86	454.44
Number of Hotels on Block	7,492	0.30	0.57	22,675	2.51	6.43
Number of Commercial Enterprises on Block	7,492	47.36	57.74	22,675	35.02	44.16
Number of Mobile Homes on Block	7,492	0.11	0.31	22,675	0.36	1.98
Number of Single Family Residences on Block	7,492	387.68	378.20	22,675	738.57	446.92

Table 3: Instrumental Variables Regression of Log Value on Trust Land Today

	1		2		3	
Dependent Variable:	Trusttoday	Log Value	Trusttoday	Log Value	Trusttoday	Log Value
Trust Land Originally Dummy	**0.4937****		**0.4919****		**0.4919****	
	[0.0076]		**[0.0076]**		**[0.0076]**	
Trust Land Today Dummy		**0,0178**		**0,022**		**0,0213**
		[0.0193]		**[0.0193]**		**[0.0192]**
Condominium Dummy	-0.0199*	0.0369**	-0.0209*	0.0408**	-0.0214**	0.0406**
	[0.0083]	[0.0080]	[0.0082]	[0.0076]	[0.0082]	[0.0075]
Number of Bedrooms	-0.0198*	-0,0216	-0,0123	-0,017	-0,0111	-0,0143
	[0.0092]	[0.0133]	[0.0068]	[0.0135]	[0.0063]	[0.0124]
Number of Bathrooms	0.0291**	0.0894**	0.0165**	0.0544**	0.0240**	0.0692**
	[0.0047]	[0.0072]	[0.0053]	[0.0102]	[0.0052]	[0.0098]
Pool Dummy	-0.0240**	0.1830**	-0.0240**	0.1801**	-0.0243**	0.1797**
	[0.0045]	[0.0063]	[0.0045]	[0.0063]	[0.0045]	[0.0063]
A/C Dummy	0.0652**	0.0583**	0.0663**	0.0592**	0.0652**	0.0585**
	[0.0050]	[0.0088]	[0.0051]	[0.0087]	[0.0051]	[0.0086]
Garage Dummy	0.1394**	0.1046**	0.1385**	0.1035**	0.1382**	0.1046**
	[0.0048]	[0.0070]	[0.0048]	[0.0069]	[0.0048]	[0.0069]
Number of Stories	-0.1102**	-0.0124*	-0.1107**	-0,0114	-0.1109**	-0.0125*
	[0.0061]	[0.0061]	[0.0061]	[0.0061]	[0.0061]	[0.0061]
Age of Structure	0.0009**	-0.0065**	0.0009**	-0.0064**	0.0009**	-0.0064**
	[0.0002]	[0.0003]	[0.0002]	[0.0003]	[0.0002]	[0.0003]
Log Lot Square Feet	-0.0578**	0.0884**	-0.0568**	0.0934**	-0.0565**	0.0934**
	[0.0043]	[0.0055]	[0.0043]	[0.0053]	[0.0043]	[0.0053]
Log Structure Square Feet	0.0325**	0.8277**	0.0375**	0.8314**	0,018	0.7946**
	[0.0111]	[0.0156]	[0.0094]	[0.0140]	[0.0122]	[0.0194]
Log Density of Structures Per Square M	0.1517**	-0.0804**	0.1531**	-0.0802**	0.1540**	-0.0804**
	[0.0097]	[0.0111]	[0.0096]	[0.0108]	[0.0096]	[0.0107]
Constant	-0.4877**	5.3586**	-0.5336**	5.3365**	-0.4155**	5.5719**
	[0.0996]	[0.1299]	[0.0880]	[0.1141]	[0.1018]	[0.1404]
Year Sold Dummies	Y	Y	Y	Y	Y	Y
Location Dummies	Y	Y	Y	Y	Y	Y
Community Amenity Variables	Y	Y	Y	Y	Y	Y
Year Sold and Bathroom / Bedroom I	N	N	Y	Y	Y	Y
Year Sold and Square Ft Interaction	N	N	N	N	Y	Y
Observations	30170	30167	30170	30167	30170	30167
R-squared	0,55	0,72	0,55	0,73	0,55	0,73

Robust standard errors in brackets

* significant at 5%; ** significant at 1%

Table 4: Nearest Neighbor Matching for Homes in Palm Springs by Land Tenure

Number of Homes on Indian Lands	Number of Matches on non-Indian Lands	Estimated Difference in Log Assessed Value of Home	Standard Error	T Statistic
7714	3713	-0.037	0.108	-0.339

Outcome Variable is log assessed value

Matched on: condominium dummy, number of bedrooms, number of bathrooms, pool dummy, a/c dummy, garage dummy, number of stories, age of structure, year sold, log lot square feet, log structure square feet, log density per square mile, number of apartments on block, number of condos on block, number of hotels on block, number of commercial enterprises on block, number of mobile homes on block, number of residential homes on block, number of vacant lots on block.