The Impact of Credit Scores on the Overpayment of Rent as a Means to Obtain Shelter

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Abstract

Dramatic increases in home prices and rents during 2021 have highlighted the importance the rental market in providing shelter, especially for low- to moderate-income households. Although it is well understood that home prices and rents are positively correlated with one another and with credit scores, the two do not move at the same rate as scores change. At a CBSA level, data across cities show a wide distribution of the cost of renting relative to the cost of buying a three bedroom property (the rent versus buy ratio, or ñRVBò). Cities with low credit scores traditionally have RVBs that are higher than those with good scores. This paper uses across-city data to estimate the wealth loss to renters as scores declines. As scores decline, rents fall slower than home prices fall. Each 20 unit drop in credit score means, on average, the monthly cost of shelter obtained through renting falls by 60 bps (about $10 per month on a $1,765 monthly rent for a three bedroom property in a city like Chicago), but the cost of owning falls by 126 bps. Again, the rent versus buy ratio gets worse with each drop in score. Low credit scores can impede the purchase and rental market in a city from functioning freely and reaching equilibrium. I ascribe this CBSA market failure also to individuals i.e., I show that renters with low scores pay too much to obtain shelter.

Key words: housing, rental markets, housing investors, household wealth, equity
Economic Literature Codes: R0, R31, D14, D63

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1. Background

The market for shelter is split each month between households who live in a house which they own and others who live a house which they rent (or an apartment). Owning versus renting are substitutes forms of obtaining shelter. Households should be indifferent to consuming an identical property either by purchasing, or by renting (a homogeneity condition) across all CBSAs. Across time, if the cost of renting in one city becomes too large, renters should be motivated to buy in that city or a different city. This behavior would raise the price of homes (under the new higher demand) and rents should fall (under reduced demand). This homogeneity condition thus functions like a cross-sectional time-sensitive error-correction term pushing RVB towards 1.0.

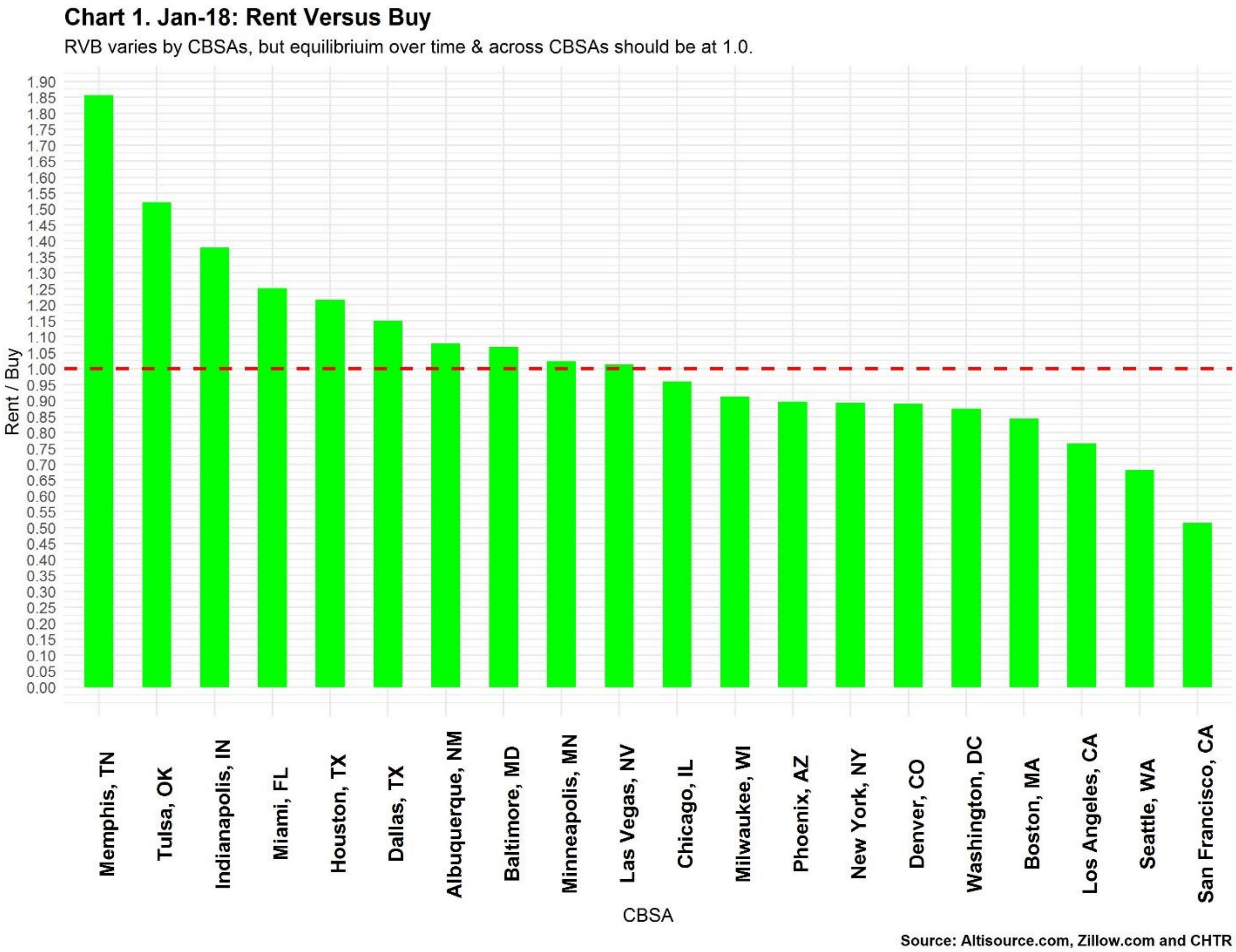
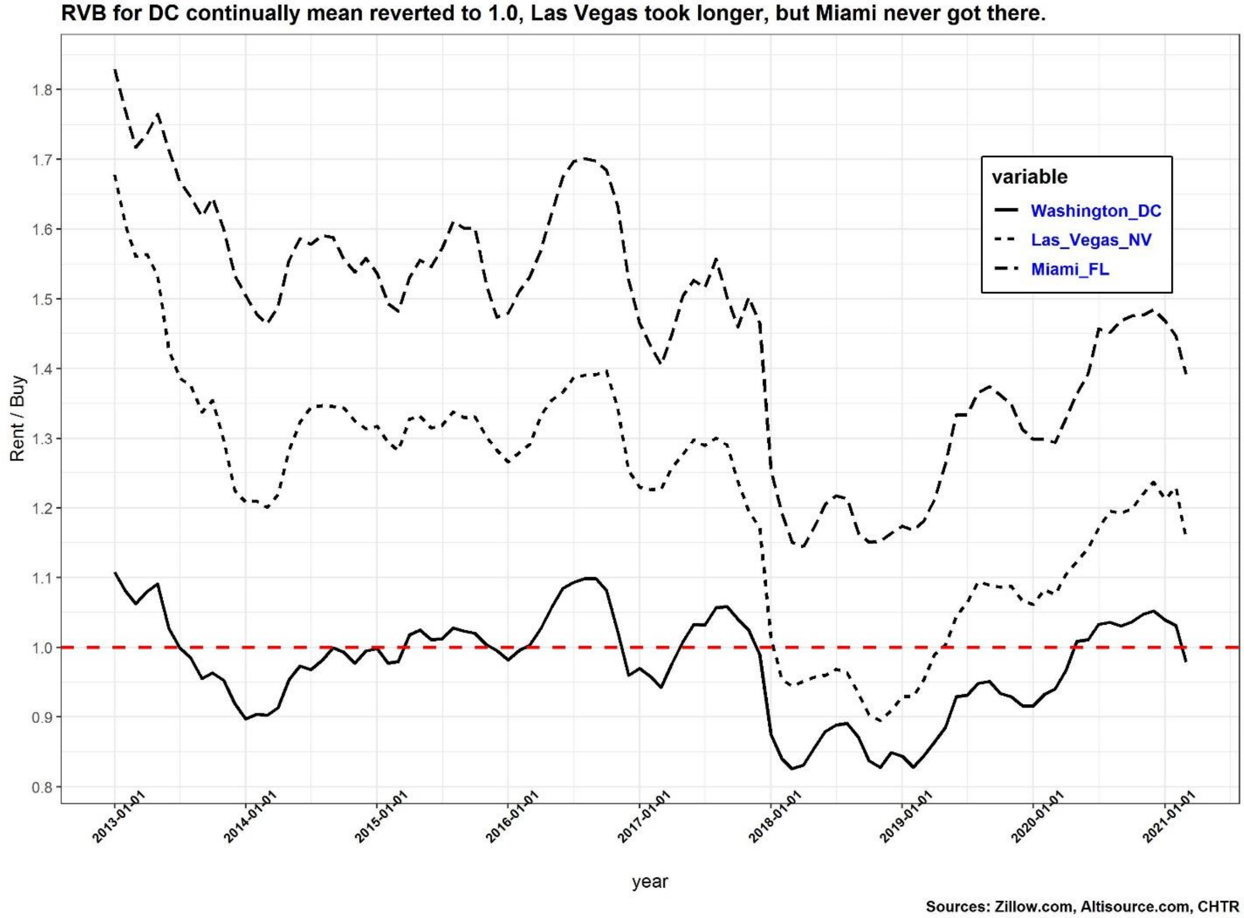


Chart 1 shows the relationship between renting and the cost of owning a three bedroom single family residential property (SFR) as a ratio of rent versus buy (RVB, or R/B) for 20 CBSAs. The buy variable (B) is the monthly cost to own the median 3 bedroom home paid either by a homeowner who intends to live in the home, or paid by an investor. The rent variable (R) is the median cost to rent a 3 bedroom house.[1] Chart 1 makes it clear that RVBs vary across cities. I measure cities as core-based statistical areas (CBSA).

In Chart 1, Las Vegas, NVôs RVB on Jan-18 was almost exactly 1.0, exactly as theory would predict. However Chart 2 shows that, after the financial crises of 2007 to 2010, it took time for the RVB (dotted line) to mean revert to 1.0. We also see that the RVB for Washington, DC (solid line) bounced around 1.0 for a period of five years but continuously reverted near 1.0 (mean reversion) until Jan-18 when the Federal Reserve began a series of interest rate hikes which made the denominator larger. We also see that RVB for Miami, FL never gets near 1.0.

Chart 2. RVB for Las Vegas, NV, Washington, DC and Miami, FL
RVB for DC continually mean reverted to 1.0, Las Vegas took longer, but Miami never got there.



It is understandable that the enormous economic dislocation from the Great Recession drove home prices in Las Vegas to exceedingly low levels, but how can we explain why Miami, FL never hits 1.0 after eight years? Where is the reversion of RVB to the mean of

[1] My rent data is only for three bedroom detached single family properties. It excludes rental units in multi-unit structures. Thus the RVB ratio is an apples-to-apples comparison.

1.0? It appears that the housing market in Miami, FL is stuck in a steady-state disequilibrium.[2]

Having said that, there are a number of things that could cause RVB to be different by city. Property tax rates in each CBSA are a factor causing RVB to show strong variation. Both owners and landlords have to pay property taxes which vary by CBSA. Thus taxes are the first possibilities for why RVB for an identical property might vary across two CBSAs. The incomes and credit conditions of renters and the behavior of new property investors and existing landlords are additionally influencing factors. I will utilize rents, home prices, credit scores, income of the buyers, property taxes, and investor shares of the stock of homes for twenty CBSAs to estimate the impact of credit scores on RVB. Going one step further, I use the estimated coefficients and actual rental and home price data for Mar-21 to estimate the average monthly wealth lost by a renter household in a typical city like Chicago, IL.

At the outset, it is important to note three limitations that shapes the direction of my analysis. In particular, my data is at the CBSA level. One might argue that the data is not granular enough and that the three bedroom single family detached rental properties in Miami, FL are likely not in the same neighborhood as the three bedroom single family detached houses which are sold and purchased that month. My data does suffer this weakness. Data at the zip code or county level is more granular. I, however, argue that the median prices paid in a CBSA is a representative price and that the information trade-off is worth it. By using data at the CBSA level, I gain information on employment rates, property tax rates, income, investor shares of purchases and credit scores. The impact of the investors and credit scores on home prices and rents have never been clearly laid out because the data never existed at the CBSA level before. I rely on CBSA level data because rents paid by individuals as scores change are not obtainable from any source. Data on average scores at the county, or zip code certainly do not exist.

A second limitation is in how rents are assessed. Renters generally enter into a contract with the landlord for one year. It is only when the tenant leaves the property is the landlord able to raise (or lower) the rent. My data are median rents charged each month for three bedroom single family residential properties. Thus my rent data consists of rents that were newly contracted that month and all of the rents which were contracted the prior 11 months. The rent data in Chart 1 is thus a rolling average of prior months whereas the sales price data reflects sales that transpired that prior. One could argue that this makes the RVB ratio not a true apples-to-apples comparison. There are two points that I need to make. One thing we have learned over the months since the beginning of the Covid-19 pandemic is that both

[2] The test for mean reversion RVB for individual CBSAs are available from the author.

landlords and tenants recognize that the rental contract are negotiable (or that tenants can just walkout). Rents are not written in stone. Second, Chart 1 is a static snapshot of all prior periodôs information and how market participants have responded in both markets. The numerator and denominator reflect all historical information. They are a reflection of what costs would be seen by the would-be homebuyer at time t.

Third, I am imbuing individual renter behavior to each CBSA. Do individuals function like a CBSA and vice-a-versa? Across time, out of my 20 CBSA sample, the housing market in four CBSAs never seem to mean revert to 1.0. Some CBSAs appear to be stuck in a steady state disequilibrium. Thus these four CBSAs do not approximate the textbook model of a perfectly competitive market. These CBSAs never seem to fully adjust and RVB is always high. It is almost as if they are caught in a negative wealth spiral. Do some renters have such poor credit that they never become financially solvent? Also RVBs get larger with smaller scores. Claiming that both of these observations about CBSAs also apply to renters in general makes this paper unique. My central goal is determine the lost wealth per unit of credit score that can be attributed to renting.

This paper is organized as follows: Section 2 presents theory and reviews prior research on owning and renting. In Section 3, I explain the data collection process and data sources. Section 4 introduces three models, my results and an application of the results onto the average renter. The last section is my conclusion.

2. Theory and prior research

2.a The user cost of capital (UCK)

In modelling home prices and rents, one has to go back to Poterba (1984) who develops the home buying/rent decision in terms of a user cost of capital. The cost of buying a house with a price of P can be written as the price times the user cost of capital (P * UCK), or

$$P * UCK = P * ([k + \tau_p + m - E(\pi)] - [(k + \tau_p) * \tau_f]) \quad (1)$$

Where P is the home price; k is the mortgage rate; τ_p is the property tax rate, a tax payment relative to house price; m is the maintenance cost, $E(\pi)$ is the expected home price appreciation and τ_f is the federal tax rate. Poterba argues that in equilibrium, the entire cost of owing (buying) must equal the cost of renting an identical house. Or, for every city, markets adjust until,

$$R_{it} = UCK_{it} * P_{it}, \quad \text{or } R_{it} = B_{it}, \quad (2)$$

The housing and rental markets at time t do seem to function in major cities nearly in the classical framework of perfect competition. Marginal buyers and sellers have access to a very large information set, and can substitute (at the time immediately before the transaction, time t) without costs between renting and buying. A potential buyer of a home faces the choice outlined by Equation 2, (the rent/buy decision). And if we think of each CBSAs as being an economic agent, home prices should adjust upward under higher demand until the R_{it}/B_{it} approximates 1. Markets in every city adjust until $R_{it}/B_{it} = 1$, barring an external shock. This relationship between B and R introduces an error correction term into the long-run market framework and is the first form of dynamics.

There are two additional forms of market dynamics: second is the response to an exogenous shock and third is how each CBSA gradually changing through its own economic viability. Starting from the information in Equation 1 that RVB varies for some reason, every time the thirty year mortgage rate adjusts, or when property tax rates adjust or when the deductibility of mortgage payments is altered, the RVB for each CBSA is altered. These are external shocks. Each market must adjust again. Home prices change and rents change as demand and supply for shelters adjusts. The adjustment process, however, is different for each CBSA even though the thirty year mortgage rate is a national rate. Each CBSA adjusts back towards equilibrium with their own speed of adjustment (Washington, DC and Las Vegas, NV). But others never seem to fully adjust (Miami, FL). Each CBSA, nonetheless has internal economic growth which creates demand for shelter and an ability (or a lack of ability) to pay for homes to be built and purchased. So the third form of market dynamics is the CBSAǿs response to the individual CBSAǿs internal economic status, much like individual household behavior.

2.b Long-run models of housing

Earlier studies of house prices using a variety of methodologies and covering many time periods, countries and cities have found evidence of serial correlation and mean reversion. These characteristics are a pervasive and ubiquitous feature of housing. See Abraham and Hendershot (1996), and Capozza, Hendershott and Mack (2004), and Fout, Haidorfer and LaCour-Little (2018). Underlying the concept of mean reversion is the basic notion that in the long-run, market tend towards equilibrium. It is reasonable to assume that in each time period t, and in each CBSA, that there is a long-run equilibrium value for the unit price of a house that that it is determined by economic conditions, or $P_{it}^* = f(\mathbf{X}_{it})$, where P_{it}^* is the equilibrium price of a house and $\mathbf{X}_{it}$ is a vector of explanatory variables. This relationship can be viewed as a reduced form arising from a supply-and-demand relationship. Thus an equilibrium relationship exists between P_{it}^* and $\mathbf{X}_{it}$, and the values of P_{it}^* can be thought of arising from fundamentals. If P_{it} is below P_{it}^{*} then P_{it} must adjust upward (mean revert). Researches often estimates a long-run log linear inverse demand function such as,

$\text{ln}P_{it}$ = const + Ŭ$\mathbf{X}_{it}$ + Ů$_{it}$ (3)

Some research have argued that all of the information contained in the variables included in $\mathbf{X}_{it}$ in Equation 3 is contained in R_{it} (Gallin, 2006 and 2008, Kuttner, 2011, Verbrugge, 2008 and Fout, Haidorfer and LaCour-Little, 2018). Under that assumption, a long-run inverse demand function for housing is stated as,

$\text{ln}P_{it}$ = const + Ŭ$\text{ln}R_{it}$ + lnUCK_{it} + Ů$_{it}$ (4)

For my purposes, I will include the UCK in the buy variable (B) and specify the long run model as,

$\text{ln}B_{it}$ = const + ŭ $\text{ln}R_{it}$ + Ů$_{it,}$ (5)

and reversing the causality as,

$\text{ln}R_{it}$ = const + ŭ $\text{ln}B_{it}$ + Ů$_{it}$ (6)

Additionally, one could think of a model which tracks how B and R move together, or

RVB_{it} = Ŭ1.0 + Ů$_{it}$ (7)

RVBs should be very close to 1.0, so on average Ŭ in Equation 6 should be close to 1.0. However, Charts 1 and 2 clearly show that this has not been the case. Housing markets in some U.S. cities do not function as expected. This is violation of the mean reversion -- and first form of market dynamics. Below, I estimate a more detailed specification of each of these three models.

2.c. Urban characteristics as friction

Chart 2 shows that some cityôs (Las Vegas, NV) prices and rents adjust slowly over time to R/B not being near 1.0. Indeed, we have witnessed through time that housing adjusts slowly to exogenous shocks. Some of this slow adjustment can be attributed to market friction. Extending the idea of disequilibrium, Di Pasquale and Wheaton (1994) argue that product heterogeneity and costly search lead to a slow clearing in the housing market. Specifically, if the housing market is in equilibrium and a shock occurs, this creates a form of the disequilibrium mentioned above, causing a wedge between the equilibrium price (P_{it}^{*}) and the actual price level (P_{it}) due to such rigidities.

On the supply side, if the demand for housing is greater than the existing supply, a positive wedge would appear between actual price of housing and the equilibrium price. House prices being higher than what they should be, should bring on additional supply. But new housing supply comes on very slowly as it takes time for builders to adjust and try to estimate time lines of supply. In some CBSAs, there may be severe zoning or land restrictions. So supply might not adjust unless there are bid price increases. CBSAs are, of course, heterogeneous. Some have limited amounts of buildable land or there are severe zoning rules. In these markets, higher prices do not bring about a significant amount of new construction. So a homebuyer might be rational paying too high a price because he recognizes (expects) price gains to exceed income growth. This is then a bet that now is better than later, because later might never come. These individuals might also see the long term potential of such urban cores.[3] These transactional and geographical frictions certainly exists, but are difficult to measure precisely over time.[4] Using rental properties obviates the need for estimating CBSA spatial allocations of properties.

2.d Credit scores as friction

Renters also are heterogeneous. In addition to search costs, there are hard constraints on renters: difficulty gathering a down payment, unstable income, and impaired credit, among others. It is not just the price of the house but also the ability of the renter to get into the house. This is the reason I focus on the buy variable (B) instead of P. The variable B is at least a reasonable estimate of the user cost of housing incorporating the effect of interest rates and property tax rates on the buying decision. If $(R_{it}/B_{it}) > 1$ (or, $R_{it} - B_{it} > 0$) as it has been in Miami, FL for over 10 years then it is cheaper to own than to rent and the rational would-be renter should choose to buy rather than rent and home prices should rise. The decision maker in this paper is the would-be buyer (the renter) right before he decides to own or rent (it could also be any investor right before he decides to purchase a rental property) each month. Conceptually, I ascribe to each CBSA the decision making ability of the household and vice-a-versa. Could it be that buyers in Miami, FL were/are irrational? Chart 3 below suggests that the reason R/B remains significantly above 1.0 is not that renters in Miami, FL are irrational, it is that their average credit scores are weak. The CBSAs which have the lowest credit score in Chart 3 are often CBSAs with RVBs that do not approach 1.0, i.e., their housing markets operate in a state of long-run steady-state disequilibrium.

[3] See Glaeser and Gyourko (2005).
[4] See Gyourko Joseph, Jonathan Hartley & Jacob Krimmel (2019).

The expected relationship between credit scores and home prices is straightforward ï higher credit scores allow individuals to compete for a home and thus drive up home prices. Higher credit scores facilitate homebuyers paying more for homes. Each CBSA has a median price that is a positive function of each CBSAôs scores. The same is also true with rents. Landlords will rent better (more expensive properties) to renters with better scores and charge higher rents.

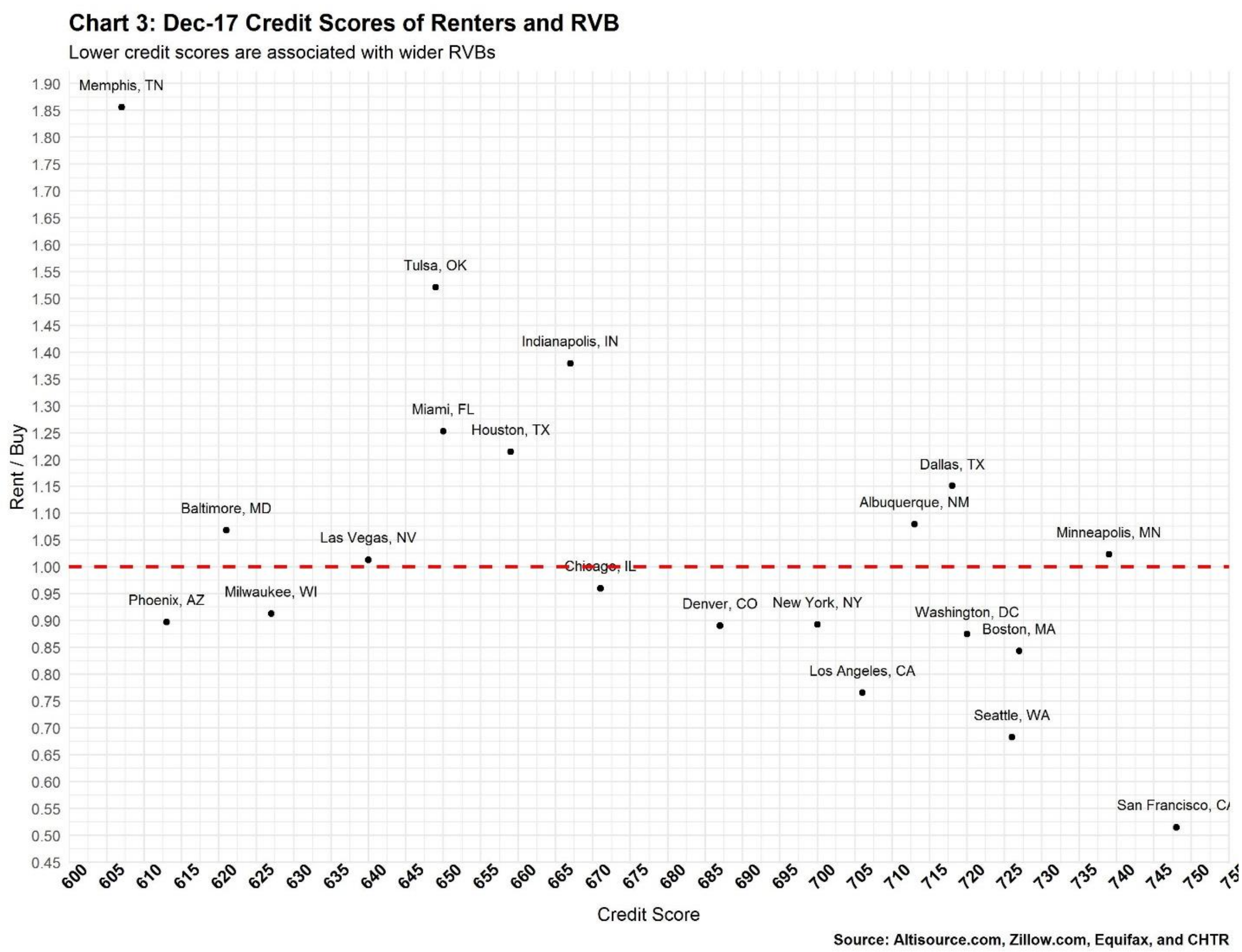


Chart 3 shows a relationship between R/B and credit scores. The relationship between RVB and score, however, is negative. In Chart 3, as we decline along the credit spectrum, both rents and home prices (captured by the buy variable (B)) are decreasing, but home prices and the buy variable are decreasing faster than rents decrease and R/B steadily increases. Thus CBSAs with lower credit scores have an RVB that is higher than CBSAs on the higher end of the credit spectrum. In the case of Memphis, TN, renters pay nearly twice as much to live in an identical 3 bedroom SFR property as do property owners. In Miami, FL renters pay 1.5 times as a much. Then going from left to right across Chart 3, credit scores improve and the RVB ratio goes down in a linear fashion. Equilibrium is being met in the CBSAs where RVB is around 1.0. The RVB ratio then falls below 1.0 in the CBSAs with very expensive housing. The results is that we see a negative relationship between RVB and score. Any changes in a local economy would push both rents and prices in the same dimension, but perhaps with different magnitudes.

The picture in Chart 3 is static. It is a relationship between CBSAs at a given point in time. Quite a few CBSAs have a RVB with a range between 0.85 and 1.15 (a loose definition of equilibrium).[5] What Chart 3 does not show is that scores could be so low that even if it is cheaper to buy than to rent, RVB never gets close to 1.0 at a later point in time.

2.e Investor share of new purchases

There, however, is another force going on. It is not just the negative impact of weak scores. Moving from right to left in Chart 3, credit scores decline. As credit scores decline, renters lose bargaining power which in turn gives landlords, who have an ability to raise rents more pricing power. Thus moving from right to left, rents fall slower than home prices and RVB increases. It could be that landlords take advantage of the renterœs weakened borrowing power. Investors in single family detach rental properties are more prevalent in CBSAs with households which have low credit scores and low incomes.[6] The low scores and low income might preclude individuals from buying a home (even if it is cheaper to own rather than rent). Thus it could be that landlords and new investors fill the gap between the need for shelter by renters and the inability to buy a home. Investor perform a positive function, but they extract a slice of social welfare and possibly charge excessive rents if market concentration become high enough.

Thus there are at least four sources of friction to RVB adjusting freely: 1) high transaction costs: 2) some geographies do not have buildable land; 3) potential homebuyers do not have access to credit; 4) investor exercise more bargaining power than renters.

2.f Other confounders

I also consider the impact of income, vacancy rate and home ownership rates in a CBSA. Because I am estimating a long-run model where my dependent and independent variables are in levels, and because I cannot account for transaction costs, and other unobserved fixed-effects confounder, I estimated a fixed-effect model.

3. Data

[5] The notion of equilibrium is ambiguous and my definition of equilibrium is arbitrary.
[6] See Haidorfer (2022b)

Economic and property data by CBSA are widely available. By merging data on income and credit scores to prices and rents, I consider each CBSA as an economic agent much like a person with a demand function to either buy or rent. The periodicity of the data is monthly except where noted. The variables that I use in the three models are:

3.a Home prices: Home price data are median prices on three bedroom properties. Source: Zillow.com

3.b Rents: Rent data are median rental rates on three bedroom single family detached properties. Source: Altisource.com

3.c A user cost of capital, and mortgage rates: As specified in Equation 1, the user cost of capital is largely driven by the 30 year mortgage rate (k), property taxes (Ǘ$_p$) and federal income tax rates (Ỉ$_f$). The mortgage rate is the 30 year FRM from Freddie Mac. Maintenance cost (m) for the UCK are estimate to be 3.5 percent per year for a three bedroom property for all 20 CBSAs. I assume that the homebuyer uses a 100 percent LTV mortgage. I make no attempt to estimate E(´).[7]

3.d Property and income taxes: Property tax rate are calculated for each CBSA for each month. The IRS reports the average property tax amount paid each year for each income cohort. The property taxes here are from the cohort of adjusted gross income from $50k to $75k which I felt to be a good match to homebuyers of three bedroom properties. I divide the IRS data on average yearly property taxes paid by the median price of the home each month to get a property tax rate (PTR) each month. Since the property prices are reported monthly, the calculated property tax rate have a monthly periodicity. The federal income tax rate for each CBSAs is based on the combined IRS reported amounts of federal income tax receipts for all households in a CBSA with adjusted gross income between $50k to $75k divided by the number of reported households in that bracket.[8] The result is a federal income tax rate with an annual periodicity. Source: IRS Report of Income.

3.e Average credit score of all households: The credit score of both renters and owners in $CBSA_i$ are for the year 2019. The value for a CBSA obtained for 2019 is used for all time periods. The values are thus static across time. Source: Equifax.

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[7] The notion that renters, homebuyers or investors have expectations that are known and possibly measureable is a very strong assumption with no empirical justification.

[8] The IRS data is only for those who itemize. Tax data on those taking the standard deduction are thus not included.

3.f Average personal income: Income is the average personal income. The data come from hourly earnings reported by the BLS. Periodicity: Monthly.

3.g Landlord share of existing homes: The landlord share is ($Llord_i = 1$ ï HOR_i). Where HOR_i is the homeownership rates, a ratio of the housing stock. The denominator includes the total number of units (rented and owned) in $CBSA_i$. Thus the denominator includes apartment units rented, single family detached units (properties) rented and properties owned and occupied. The numerator are just units owned. Source: Census, Periodicity: quarterly.

3.h Investor share of purchases

Investor shares are counts of properties purchased by investors divided by the total number of homes purchased in that CBSA that month. An investor property is determined if the primary address of the owner is different from the address of the property. The data does include second homes which could not be factored out. Source: Corelogic, periodicity is monthly.

3.i Vacancy rate: Vacancy rate for all properties in a CBSA. Source: Census, Periodicity: quarterly.

I have twenty CBSAs in my data sample. All data extends from Jan-13 to Mar-21. This gives me 1980 observations for my data sample. See Summary Table 2 in the Appendix for data on three bedroom properties.

4. Model and results

4.a Three long-run models,

I specify a long-run model of the RVB ratio as,

$$\ln(RVB)_{it} = \text{ϐ}_1\, SCORE_{it} + \text{ϐ}_2\, INC_{it} + \text{ϐ}_3\, Llord_{it} + \text{ϐ}_4\, Inv_{it} + \text{ϐ}_5\, Vac_{it} + e_t. \quad (8)$$

A long-run model of rent (R) as,

$$\ln R_{it} = \text{ɔ}_1\, SCORE_{it} + \text{ɔ}_2\, INC_{it} + \text{ɔ}_3\, Llord_{it} + \text{ɔ}_4\, Inv_{it} + \text{ɔ}_5\, Vac_{it} + \text{ɔ}_6 \ln B_{it} + e_t, \quad (9)$$

and a long-run model of buy (B) as,

$$\ln B_{it} = \text{ǔ}_1\, SCORE_{it} + \text{ǔ}_2\, INC_{it} + \text{ǔ}_3\, Llord_{it} + \text{ǔ}_4\, Inv_{it} + \text{ǔ}_4 \ln R_{it} + e_t. \quad (10)$$

Where, RVB_{it} is the median rent divided by the median price of home; B_{it} is the calculated buy variable (or B=P * UCK); R_{it} is the median household rent; $SCORE_{it}$ is the average credit score; INC_{it} is the average pre-tax individual income; $Llord_{it}$ is the landlord share of existing homes; Inv_{it} is the investor share of purchases; VAC_{it} is the vacancy rate for detached properties. Since UCK which is used to calculate B includes both the mortgage rate and property tax rates, Equation 8 captures both R and B adjusting over time as mortgage rates and property tax rates change given each CBSAôs static credit score before the change. It captures how R/B adjusts to both external shocks, mean reversion and internal CBSA market dynamics. The goal is to estimate the impact of credit score changes on the change in rents relative to buying, holding as many other things as possible constant. Each CBSAs is different. Explicit possible confounders to credit scores are personal income (as a measure of credit worthiness), landlord share of homeownership rates in each CBSA, investor purchases of rental properties and vacancy rates.

Low credit scores retard the response to mean reversion or external shocks. The anticipated sign on $ϐ_1$ is thus negative. Lower incomes, similar to low credit scores, indicate renters have less ability to buy or move to another CBSA (the sign on $ϐ_2$ in Equation 8 should be also be negative).

The impact of the landlord shares of housing stock and of the investor share of purchases on RVB was not known apriori because RVB is a ratio. However it was expected to be positive for rents (i.e. $ɔ_3 > 0$, and $ɔ_4 > 0$). One can also think of the landlord share of properties as investors already existing in the market, as it is the inverse of the home ownership rate. More landlords means fewer homeowners. As the landlord share rises, or in other words, as the proportion of the existing residential housing stock that are rental properties increases, this could give landlords in CBSAs where the housing stock is more concentrated with landlords, more market power and an ability to raise rents more than price are bid up (i.e. $ϐ_3 > 0$). Or, it could increase competition among landlords and new investors drive rents down more than prices are bid up (i.e. $ϐ_3 < 0$, and $ϐ_4 < 0$).

The same loss of renter bargaining is associated with lower vacancy rates (I would expect $ɔ_4 < 0$). Thus a lower vacancy rate mean renters have less bargaining power and should be associated with a wider RVB, but vacancy rates here are also measured economic prowess across CBSAs. CBSAs which are doing better economically will have lower vacancy rate, higher prices and higher rents. The sign of $ϐ_4$ was not known apriori. Counterintuitively the sign of $ϐ_4$ turned out to be negative.

4.b Results

I am trying to quantify the impact of credit scores across markets and across time on RVB. In my sample, credit scores range from 607 for Memphis, TN to 748 for San Francisco, CA. Using logs for the dependent variable allows for a direct interpretation of the coefficient (β_1) as measuring the impact of a one unit change in my independent variables on the average percent change of RVB. My coefficients are semi-elasticities. The results from Equation 8 are in Column 1 of Table 1. The value of the β_1 coefficient is -0.0005. As scores drop by 1 unit, the R/B increases by 5 bps. As scores drop by 20 units, the R/B increases by 1 percent.

In Column 1, low incomes also inhibit renters from buying. Income is expressed in thousands. The β_2 coefficient of Equation 8 indicates that each $1000 of reduced income increases RVB by 1 percent. Thus each additional $10k decline in personal income results in renters paying about 10 percent more in rent than cost of buying. More landlords reduce RVB, or more landlords in a market appear to compete against each other to restrain rents. Higher vacancy rate are positively related to RVB.

Table 1. Drivers Of R/B For SFR 3 Bedroom Detached Rental Properties

	(1)	(2)	(3)
	lnRVB	**lnR**	**lnB**
SCORE	-0.0005***	0.0003***	0.0006***
	0.0001	0.0001	0.0001
INC	-0.01***	0.001	0.012***
	0.001	0.0005	0.0007
Llord	-1.19***	0.6056***	0.464***
	0.07	0.06	0.09
Investor	-0.0838°	-0.05°	0.0210
	0.044	0.028	0.05
VAC	0.05***	0.0009	
	0.003	0.002	
lnR			1.326***
			0.02
lnB		0.48***	
		0.010	
R-squared	0.68	0.89	0.91
Number of obs	1980	1980	1980
Standand Errors are below coefficients.			
Codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '°' 0.1 ' ' 1			

It is widely recognized that CBSAs with higher credit score have higher rent and prices. The ɔ$_1$ in Column 2 of Table 1 (using Equation 9) shows that each one unit reduction of score is worth 3 basis points of higher rent, holding B constant. A twenty unit reduction in score is worth 60 bps of lower rent. Column 3 in Table 1 (using Equation 10) shows each one unit reduction of score is worth 6 basis points of lower cost of owning. Thus a twenty unit reduction in score is worth roughly 120 bps of lower cost of owning (buying).

4.c Application

To provide a direct interpretation of the б$_1$, ɔ$_1$, ŭ$_1$, coefficients I create two new variables (RENT and BUY) using the median rent and median cost of owning for Chicago, IL and my estimated coefficients to calculate the change in RENT and BUY as scores change.

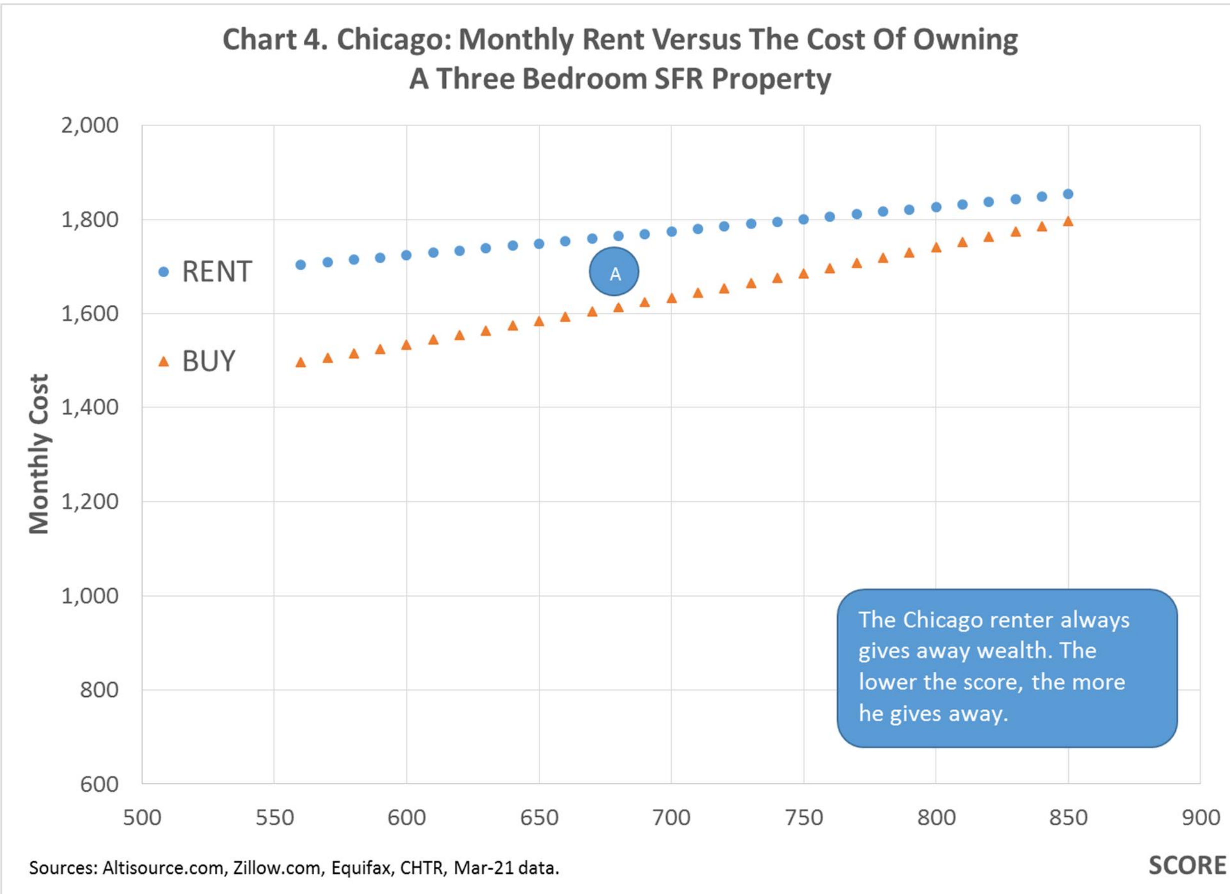

Chart 4. Chicago: Monthly Rent Versus The Cost Of Owning A Three Bedroom SFR Property

I apply these average percent changes to the median cost of renting and owning a three bedroom SFR detached property in Chicago, IL. The average credit score in Chicago, IL is 671. The median rent in Mar-21 was \$1,765 and the median cost to own a property was \$1,613 (roughly point A on Chart 4). Renters in this score category of 670 are losing \$150 per month in wealth (the difference between RENT and BUY). In Chart 4, I graph the relationship between SCORE and RENT and BUY using the estimated coefficient values of 0.0003 and 0.0006 taken from Columns 2 and 3.

There are two important take-aways from Chart 4: First, because mortgage rates were so low in Mar-21, owners in Chicago, on average, paid less for shelter than renters. They made a cost effective decision at time t and thus refrained from a continuous wealth transfer of wealth to the landlord in contrast to renters. Second, each backward movement by 20 units of score lowers RENT by $10.00 per month and BUY by the larger amount of $20.00 per month. RENT falls slower than BUY falls and the wealth lost by renters with low scores is even higher than renters with better credit scores. Renters are now losing $160 per month. On an individual household level, using the ɔ$_1$ and ŭ$_1$, coefficients which are averages of 20 CBSAs, renter households in Chicago, IL lose larger amounts of wealth, the lower the credit score as the slopes of the RENT and the BUY lines are different. Using the ɓ$_1$ tells us the same information. Furthermore, the RENT line in Chart 4 is always above BUY line. Renters in Chicago are always pursuing a losing strategy. Low credit scores and low incomes combined with an inability to gather a downpayment keep renters from buying a house and accumulating wealth. These forces create a negative wealth spiral. This seems to be the fate, on average, of all renters of three bedroom SFR properties.[9]

Switching the focus back to the CBSA level, economic theory tells us RVB in equilibrium should equal 1.0 or be trending towards 1.0. The RENT and the BUY curves for Chicago, IL in Chart 4 should be shifting towards each other over time. Credit scores and low incomes can keep a housing market in a CBSA from functioning as economy theory would predict. The same exercise for Miami, FL would show a RENT line and a BUY line that were more distant that that for Chicago, IL.

5. Conclusions

This paper is the first research to show the impact of credit scores on the cost of renting for the average renter household in America. My approach is unique in that I use CBSA-level data. This facilitates simultaneously analyzing the rental and the purchase markets for detached single family properties over a long period of time to make statements about renters. It combines rents, home prices, credit scores, the income of the buyers, property tax rates, investor shares of the stock of homes, investor share of purchases at the CBSA level in a unified framework. This paper calculates precise property tax rates using IRS data for each of the 20 CBSAs over time which are then used to calculate a robust user cost of capital for each CBSA.

[9] One could argue that money not invested in housing could be invested in equities which might be a reason for voluntarily choosing not to buy. However, housing has been a good investment vis-à-vis equities. One could also argue that landlords are providing an essential service that renters are not willing to provide for themselves.

Two conceptual viewpoints are woven through this paper: 1) the CBSA, and 2) the renter household. Sixteen out of the 20 CBSAs seem to function as economic theory would predict. Prices and rents move towards each other and RVB mean reverts towards 1.0. The speed of the adjustment process varies by CBSAs.[10] Four CBSAs (Miami, FL, Memphis, TN, Indianapolis, IN and Tulsa, OK) never seem to mean revert to 1.0 over the entire period covered in my sample. These four CBSAs appear stuck in a steady-state disequilibrium (again, arbitrarily defined as a RVB greater than 0.85 but less than 1.15). Low credit scores, low income, and high vacancy rates act as friction and impede the rental market from fully functioning and impede RVB quickly equilibrating. All four of these CBSAs have low credit scores and/or low incomes, and in regression runs on individual CBSA they have a higher sensitivity to income than most of the other sixteen.[11] At some point, if too many renters have poor credit scores and cannot afford to purchase a home then the market can get stuck in a steady state dis-equilibrium. I, however, have not been able to show conclusively that this is inability to mean revert to 1.0 is due solely to low credit scores and low incomes. More research is needed.

The relationship between both rents and home prices with credit score is positive. The relationship between RVB and score, however, is negative. My empirical results show that for each one unit decline in credit score, rents relative to the cost of owning (the RVB ratio) go down by an average 5 bps in the three bedroom market. In other words, home prices and the cost of owning decline faster than rents as credit scores decline across CBSAs. I am then able to use the results from this across CBSA analysis to plot the wealth loss to renter households in each CBSA as credit scores decline within that CBSA. I imbue this same market failure of some CBSAs to fully mean revert to households with low incomes and credit scores. These renter households do not function as expected. I am not saying that low- to moderate-income renters who do not become first time homebuyers are irrational by paying too much for shelter (a market failure), I am saying that economic theory makes no allowances for behavior that does not conform to theory.

[10] See also Fout, Haidorfer and Lacour-Little (2018) for a more in-depth research on individual speeds.
[11] Since my credit scores for each CBSA are from 2019, I cannot test the impact of scores on CBSA RVBs over time.

Appendix

Table 2. Summary Statistics										
CBSAname	RVB	Price ($,000)	Rent ($,000)	BUY ($,000)	UCK	Score	Landlord share	Investor share	Vacancy rate	INC ($,000)
Albuquerque, NM	1.18	144.6	1220.6	1044.2	0.08	713	0.33	0.21	7.42	47.1
Baltimore, MD	1.21	191.6	1673.1	1397.0	0.08	621	0.34	0.16	6.58	59.1
Boston, MA	0.96	346.3	2314.2	2430.8	0.08	727	0.39	0.25	3.58	72.6
Chicago, IL	1.14	160.8	1589.0	1415.1	0.10	671	0.36	0.32	6.10	59.6
Dallas, TX	1.39	131.8	1481.0	1109.6	0.10	718	0.41	0.23	7.85	56.1
Denver, CO	1.08	288.8	1937.1	1843.6	0.08	687	0.36	0.14	4.55	61.9
Houston, TX	1.44	121.3	1467.0	1042.2	0.10	659	0.40	0.25	8.77	56.7
Indianapolis, IN	1.63	96.4	1143.2	720.8	0.09	667	0.35	0.22	7.69	55.6
Las Vegas, NV	1.22	165.3	1319.2	1115.6	0.08	640	0.47	0.32	10.05	47.7
Los Angeles, CA	0.90	472.0	2783.1	3127.5	0.08	706	0.52	0.22	3.69	60.5
Memphis, TN	2.15	54.0	1012.4	477.5	0.11	607	0.40	0.32	9.85	47.2
Miami, FL	1.47	184.9	2063.5	1436.6	0.09	650	0.41	0.31	7.39	49.7
Milwaukee, WI	1.08	132.8	1260.8	1189.7	0.09	627	0.40	0.14	4.58	56.2
Minneapolis, MN	1.19	190.5	1550.9	1326.8	0.08	739	0.30	0.19	3.65	60.4
New York, NY	0.99	304.4	2328.1	2365.5	0.09	700	0.49	0.39	4.07	65.8
Phoenix, AZ	1.03	192.2	1315.8	1288.9	0.08	613	0.37	0.43	7.52	54.0
San Francisco, CA	0.62	781.0	3055.9	5010.4	0.07	748	0.46	0.18	3.37	76.8
Seattle, WA	0.84	339.3	1911.7	2344.2	0.08	726	0.40	0.27	3.74	74.6
Tulsa, OK	1.81	71.7	1057.4	592.1	0.10	649	0.35	0.22	7.91	51.4
Washington, DC	0.97	302.4	2001.6	2066.4	0.08	720	0.37	0.11	5.00	71.5

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