The Impact of Local Households' Housing Tenure on Local Public Debt Levels

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Abstract

This paper investigates the relation between local housing tenure and local public debt. It does this by establishing housing tenure as a theoretical basis for the potential differences in how households view public debt. Homeowners capitalize the burden of local public debt into their home value, while renters do not. A hypothesis is generated that an increase in the renter share of households in a locality leads to higher levels of local public debt, all else equal. Using an instrumental variable approach, the empirical evaluation shows an increase in the proportion of renters in a county leads to higher levels of local public debt in a panel data set of U.S. local governments. Specifically, a one percentage point increase in the percent of renters increases unfunded local public debt per household by $300, which is about 5% of the local public debt burden per household in the average county and 18% of the burden in the median county.

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1 Introduction

The type of housing tenure a household has impacts its policy preferences. Homeownership generates an incentive to build a desirable community since it makes the housing stock more valuable. Renters may easily move across several jurisdictions in search of ideal policies, taking with them their valuable assets. While both types of households would be subject to the current policies in the locality where they reside, only homeowners are linked in perpetuity to a local jurisdiction through their house. As households consider their future in a jurisdiction, differences in preferences between homeowners and renters for future policies should emerge. Local public debt is a fiscal policy where differences in preferences should be pronounced. While public debt finances present expenditures, it merely shifts the timing of tax collection to future periods. Since a house will remain in the fiscal jurisdiction, the fiscal burden of these future taxes are inescapable for homeowners, while renters can leave the burden behind. Thus, the burden of public debt affects households differently through their housing tenure. This results in different preferences for local public debt between homeowners and renters, where renters prefer a higher utilization of local public debt relative to homeowners.

Although renters are not tied to the future jurisdiction, as current residents their preferences may be represented through local political processes. The policies enacted at any point in time likely reflect the incumbent residents' interests which makes intertemporal policies likely to exhibit observable differences in utilization based on the residents' housing tenure type. To the extent household preferences differ based on housing tenure and are all represented through policy outcomes, then local debt policy is dependent on the composition of households' tenure in localities.

This paper proceeds by establishing the theoretical basis for the potential differences in how households view public debt in order to establish a testable hypothesis. The hypothesis in this paper develops from observations of a specific class of Ricardian equivalence generating assumptions used in economic theory. This is not the only reason for potential differences

in public debt preferences across households, but it is a feasible one. Under specific assumptions necessary for capitalization, Ricardian equivalence regards public debt as equivalent to current taxation. However, the capitalization assumptions may only hold for some households in a local setting, specifically homeowners. The hypothesis states that higher shares of renting households leads to higher public debt levels.

Once the hypothesis is established, an empirical evaluation of the relationship between the renter share of households and local public debt levels shows the expected relationship. An increase in the renter share leads to higher levels of public debt. This relationship is robust across various specifications and estimation methods. Not only is the relation significant, but it also has an arguably meaningful impact. Specifically, a one percentage point increase in the renter share in a county increases unfunded local public debt per household by $300. The mean value in the dataset for unfunded local public debt per household is $5,500, so a one percentage point rise in renter share increases the average unfunded debt level by 5%. The median value for unfunded local public debt per household is $1,700, so the one percentage point increase raises the debt level by 18%.

The next section presents the theoretical foundation of the hypothesis first by establishing the different incentives operating on households' preferences, and then by examining one possible avenue for preference communication. In section 3, the hypothesis is tested empirically using U.S. local government data. The final section concludes.

2   Theory

As developed, Ricardian equivalence provides one view of the burden of public debt where current taxes are equivalent to public debt. While there are many conclusions stemming from Ricardian equivalence related to the real macro-economy, namely capital formation and consumption, only the debt burden is discussed here in order to simplify the analysis.

Ricardian equivalence,[1] a type of debt neutrality,[2] is a theoretical modeling phenomenon where the fiscal burden of public debt does not shift across generations (Eichenberger & Stadelmann 2010). Models that lack Ricardian equivalence show the potential for current generations to gain the benefits of public expenditures while placing the burden on future generations. This extreme divergence in results related to the public debt burden calls attention to the assumptions that Ricardian equivalence relies on. These assumptions are crucial in identifying differences across household types.

2.1 Ricardian Equivalence through Capitalization

Models for analyzing Ricardian equivalence typically make one of the following three assumptions that effectively incentivizes agents to be mindful of the future:[3] (1) agents are infinitely lived; (2) the utility of agents' posterity is in the agents' utility function; (3) agents value their durable, taxable assets. The first two assumptions are shown to be equivalent in Barro (1974) which uses a Samuelson-Diamond overlapping generations model to show that the utility of a successive generation in the utility function leads households "to act as though they were infinitely lived." The rationale for this assumption is based on familial

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[1]Ricardian equivalence gets its name from the observation by David Ricardo that taxpayers are aware of and plan for future tax liabilities emanating from public debts. The economic implications of Ricardian equivalence are described in The New Palgrave Dictionary of Economics (Abel 1991):

> The Ricardian Equivalence Theorem is the proposition that the method of financing any particular path of government expenditure is irrelevant. More precisely, the choice between levying lump-sum taxes and issuing government bonds to finance government spending does not affect the consumption of any household nor does it affect capital formation.

[2]According to Buiter (1986), debt neutrality is defined:

> Debt neutrality is said to occur if, given a program for public spending on current goods and services over time, the real equilibrium of the economy (private consumption, investment, relative prices, etc.) is independent of the pattern of government borrowing and lump-sum taxation over time.

Debt neutrality includes Ricardian equivalence. Barro (1974) formally extends Ricardian equivalence, under additional assumptions, to Barrovian neutrality (Buchanan 1976). Barro's version of debt neutrality includes similar assumptions and subsequently criticisms for actual application as Ricardian equivalence (Buchanan & Roback 1987).

[3]Other necessary assumptions include perfect financial markets, lump-sum taxes, no liquidity constraints, and rational forward-looking agents.

relationships and intergenerational bequests. This results in "families" being treated theoretically as fixed within the jurisdiction. Conversely, the third assumption establishes assets as fixed within the jurisdiction, allowing for individual mobility—an assumption much more appropriate in a local government setting (Daly 1969, Oates 1972).

The preferences of agents who make decisions about public debt depend on whether they can or cannot escape the future tax burdens arising from public borrowing. If one assumes that resident households and their descendants are tied in perpetuity to a locality that incurs new debt obligations, and that today's households are concerned with the well-being of their descendants, the burden of future debt service effectively falls on today's residents. Similar considerations apply in the context of long-lived assets, notably including land and other very durable and immobile forms of property. In this case, the burden of future taxes on property falls on today's property owners, directly, if they continue to hold the property, or indirectly, if they sell the property at a discounted price to new owners. These factors, operating separately or in combination, imply that there are agents who take future debt service obligations into account, and who therefore do not see current borrowing as an opportunity to escape the burden of financing current public expenditures by passing it to others.

Buchanan (1958) points out that while Ricardian equivalence may hold for some households that meet the assumptions, the assumptions may not hold for every household. This allusion to the "micro-foundations" of Ricardian equivalence brings attention to the potential heterogeneity of households within generations. While Ricardian equivalence typically focuses on the *intergenerational* distribution of public debt burdens, the distribution of the *intragenerational* burden has its own insights.[4] The possibility that local public debt is equivalent to current taxes for some households but not to others provides the opportunity for fiscal burdens to be shifted within the current generation.

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[4]Mankiw (2000) provides an inter- and intragenerational analysis of heterogeneous households, savers and spenders, which are differentiated by a bequest motivation. In that analysis where some households are effectively fixed, assets are treated as perfectly elastic.

Whether household heterogeneity affects the usage of local public debt is the primary motivation for this paper. In order to investigate this claim, I will focus on household heterogeneity as determined by ownership of one's home, since local public debts likely capitalize into one's home value.[5] Fiscal burdens capitalize into real property values within a jurisdiction due to the legal spatial boundaries of real property that are immobile and do not depreciate.[6] Public debt is tied—as is real property—to the political jurisdiction in which the debt is incurred. Thus, real property cannot leave the jurisdiction of the taxing authority and the public debt burden behind.[7] Other potential non-fixed tax bases, like capital or households, demonstrate mobility and have the option of 'exit,' and, thus, are not subject to capitalization. Furthermore, the openness of a jurisdiction and the mobility of tax bases impact the distribution of fiscal burdens. Exit allows households without real property to completely leave the burden of public debt behind, while households that own real property cannot put the burden off since it stays with the property. Specifically, households who rent their home may exit and cut ties with a jurisdiction quite easily, leaving a fiscal burden, while homeowners must divest their title to real property to fully exit, both person

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[5]Fiscal burdens are said to capitalize into real property values when, all else equal, higher burdens lead to lower property values. Through capitalization future benefits and costs impact the current value of property. The value of real property ownership is based on the summation of current and future flows of benefits and costs emanating from the property in perpetuity. If the future is conceptualized into consecutive asynchronous periods, then netting out the costs from the benefits within each period gives a flow value of the real property within each period. However, these values are not simply summed since a flow of value from real property in a near period is worth more than the same flow of value in a later one. The adage "a dollar today is worth more than a dollar tomorrow" asserts this fact, so the future values must be discounted into an equivalent present value. Once the values of each period are discounted, they are summed to equate the net present value of real property, which is simultaneously the price. Where t is time period which goes from zero to infinity, capitalization is written algebraically as, $Value = \sum\limits_{t=0}^{\infty} \frac{Benefits_t - Costs_t}{(1 + Discount\ Rate)^t}$.

[6]The benefits and costs that accrue to real property are broad and include many components that motivate estimation of capitalization effects and hedonic equations, including the climate, neighborhood features, community amenities (from both commercial and government sources), disamenities, taxes, debt, etc. (Oates 1969, Blomquist & Worley 1981, Yinger 1982, Hoehn et al. 1987, Blomquist et al. 1988). Since real property cannot be removed and the owner receives these benefits and costs based on the location, these all accrue to the value. To the extent the bundle of all the characteristics of a parcel of real property are more desirous than those of another, the subjective value people place on it will be higher. Then the subjective value is manifest through the bidding that occurs in the buying and selling of property to determine value pragmatically (Ellickson 1971, Oates 1972, Yinger 2015).

[7]A traditional legal definition of real property includes land and all that is of a permanent nature attached to the land, including occupancy rights associated with condominiums (Black 1910).

and property, from a jurisdiction.[8] Hirschman (1978) recognizes that exit from the state involves all forms of personal property evidenced by his discussion of Harrington & Morley (1887), which notes that mobility varies among property types, e.g., land and money.[9]

Consider a simple economic model where the stream of public expenditures is fixed and a shock to the fiscal burden occurs. If the jurisdiction is small and open, and households can relocate freely to other jurisdictions, then rents cannot be raised and fiscal burdens cannot be passed on to renters. Renters would simply find another jurisdiction to live in and escape the additional costs that reap them no benefits. Because of this, renters are not incentivized to care about future policies the same way that homeowners are. Buchanan (1958) does not explicitly mention the differences between homeowners and renters, but the focus on the unequal burdens suggests that individual level differences with respect to capitalization may affect public choice outcomes.

Numerous math-based theoretical models have been put forward to show that Ricardian equivalence can hold in a local government setting. Daly (1969) uses capitalization of local assets and residence based taxes to show Ricardian equivalence holds. Buiter (1989) models an important extension of debt neutrality and under certain assumptions shows:

> What matters for debt neutrality to prevail is that agents alive today possess ownership claims to the current and future after-tax income from all land, both that physically present today and any land [exogenously] 'emerging' in the future. In this way, the ownership claims to the land will, if the market for these claims is efficient, fully reflect all current and future land taxes.

This result is assuming a fixed quantity of land, full capitalization, and the use of Henry George's 'single tax' on land. Additionally, Akai (1994) shows Ricardian equivalence holds under fixed land quantity, full capitalization, mobile households, and an income tax. The

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[8]This discussion of full exit from a jurisdiction is dependent on the household caring about the value of the property, but, of course, the owner could just leave it and receive nothing for it.

[9]These two assets are extreme examples of mobility with the mobility of other assets likely falling somewhere in between.

assumption of a fixed land quantity and full capitalization allows decision makers to take into account the present effects of future taxes, such that the entire burden is priced into the land. However, since some households fall under the equivalence assumptions necessary to generate Ricardian equivalence by owning their home, some do not. Thus, households that do not capitalize future tax burdens may prefer higher levels of public debt since, to some degree, the burden rests on others.

For a difference in public debt burdens between renters and homeowners to exist, some capitalization is necessary. There is not a lot of empirical evidence of public debt capitalization. In a natural experiment of capitalization of local implicit debt, MacKay (2014) finds overcapitalization from news on the state of the San Diego pension system into local housing prices. In a Swiss study of capitalization of explicit debt, Stadelmann & Eichenberger (2014) finds partial capitalization on the order of 40-50%. Although there are few studies on the capitalization of local public debt, there are numerous studies that find at least partial capitalization of the property tax (Oates 1969, Yinger 1982, Palmon & Smith 1998).[10] Partial capitalization is sufficient to drive differences in burdens between renters and homeowners. Consider two forms of a housing transaction. When two distinct parties are involved in a housing transaction, e.g., a landlord and a tenant, the current burden may be split between the parties. When the house is owner-occupied, then one party is on both sides of the transaction. Splitting the party into two agents, an owner and a resident, then the owner-occupier bears some of the burden as the owner and some of the burden as the occupier; therefore, the owner-occupier must bear the entire current burden. So long as the total burden for renters is less than the total burden for homeowners, then the two types of

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[10]The fragile assumptions that theoretical full capitalization models rely on may explain why partial capitalization is commonly observed. Here are three potential reasons. First, real property includes a non-fixed capital component which depreciates over time and requires new investments to maintain. Thus, in practice, real property is not perfectly fixed. Second, land is not effectively fixed in quantity and can be altered endogenously through changes in zoning laws (Hamilton 1978) (A thorough review of this literature is found in Evans (1999)). And third, since the local governments provide public goods or services, these benefits may require the household to live within a local jurisdictional boundary which shifts part of the burden form the owner to the resident household in the housing transaction. Carroll & Yinger (1994) provides evidence that the property tax functions partly as a benefit tax by looking at rental prices and property tax rates, showing that renters bear only 15% of the burden of the property tax.

agents will have different preferences related to public debt usage.

Other things the same, renters prefer local fiscal policies that reduce current taxes and therefore result in higher debt levels. Which begs the question, do policies reflect the preferences of all resident households? While no specific collective choice mechanism is postulated in this paper, it is possible that local policies are determined partly through voting by residents in local democratic processes.

2.2   Voting

Voting is one possible way that resident households can effectively communicate their appetite for public debt to policy makers. Clearly, both homeowners and renters can vote, and many political economy theories emphasize the role of voting in policy determination. Households communicate preferences at the polls, and politicians who do not reflect the desires of their electors may find themselves replaced in forthcoming elections. Thus, in a democracy, policy makers may listen to the voice of the electorate, and translate the preferences voiced into policy.

Sometimes voting is necessary for governments to issue public debt. A referendum is a common mechanism that requires citizen approval prior to the imposition of property taxes or the issuance of public debt. Regarding 1840s legislation that imposed a state-wide referendum requirement to issue public debt in the state of New York, the Chairman of the Finance Committee said (McClelland & Magdovitz 1981),

> [W]e will not trust the legislature with the power of creating indefinite mortgages on the people's property . . . . Whenever the people were to have their property mortgaged for a State debt . . . it should be done by their own voice, and with their consent.

At the time, the state property tax in New York only represented 8% of state revenues at an ad valorem rate of only 0.05%, or a 0.5 millage rate (Wallis et al. 2004). The Chairman's

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justification clearly reflects an understanding real property cannot escape a fiscal burden. However, resident households do not typically require rights to real property in future periods to cast present period ballots. While a referendum requirement for public debt may protect property owners from lawmakers, it does not protect one class of resident voters (homevoters[11]) from another class (leasevoters[12]).

The distinction between homevoters and leasevoters drove some of the discussion of suffrage at the time of the founding of the U.S. Constitution. At that time, debates about the need for a property qualification to grant suffrage were common within the several states. In a letter to Thomas Jefferson, Edmund Pendleton of Virginia wrote (Jefferson 1955),

> I think [the right of suffrage] should be confined to those of fixed permanent property, who cannot suddenly remove without injury to that property or substituting another proprietor, and whom alone I consider as having political attachment. The persons who when they have produced burdens on the state, may move away and leave them to be born by others.

Jefferson responded, rather open-endedly, that suffrage should extend to all those with "a permanent intention of living in the country." This debate on the rights of general suffrage is not limited to debt policy but it shows an understanding of the incentives that households may have for using political voice to effectuate policy. This issue of suffrage appears in modern times as some bond offerings and special districts require the payment of property taxes or the ownership of land to participate in referendum required to issue debt. However, the law regarding this practice may not be completely settled. The U.S. Supreme Court has ruled (395 U.S. 701 (1969)), in a decision limited to particular facts so not setting a universal precedent, that limiting suffrage to property owners for issuance of a revenue bond violates the equal protection clause of the 14th amendment (Lewis 1970). While other cases have been filed regarding similar debt rules, it does not appear that this question has been taken

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[11]These are people who vote based on maximizing the value of their home (Fischel 2001*a*).

[12]These are people who vote based on minimizing their fiscal burden (Ahlfeldt & Maennig 2015).

up again by the court and, therefore, is allowed to continue as a policy.

Empirical observation of local politics shows that renters do not display the same level of community engagement and democratic participation. The literature demonstrates that homeowners are much more likely to participate in local elections (Rossi & Weber 1996), engage in community activism (McCabe 2013), and invest more in social capital (DiPasquale & Glaeser 1999). Furthermore, there are owners of real property that do not reside in the jurisdiction, and thus may not vote in local elections, but they may have significant interests in affecting public debt policy. They may contribute in other ways, like through financial means (Molotch 1976, Fleischmann & Stein 1998). These factors potentially weaken the prediction that renters' preferences are revealed in policy outcomes. There may be real issues to how impactful renters' votes are on policy outcomes.

Conversely, there is high confidence that homeowners preferences contribute to local policy outcomes (Fischel 2001a). Homeowners have substantial incentives to engage in policy determination for policies that can affect house values. Wolff (2014) reports that "[i]n 2013, owner-occupied housing was the most important household asset in the average portfolio breakdown for all households . . ., accounting for 29 percent of total assets." Fischel (2001b) cites Tracy et al. (1999) stating, "the typical household in 1995 had 66 percent of its total assets in real estate and *no* portion of its assets in corporate equity (emphasis in original)."[13] With so much net worth tied to the value of real property, the incentives to protect and enhance its value are substantial. These incentives are manifest in various ways, some of which were mentioned previously. In fact, largely debated theories of local politics are based on the notion of incentives stemming from property ownership (Molotch 1976, Fischel 2001a). Homevoters (and absentee landlords) have significant monetary interests in local policy that improves the value of their property.

While significant incentives to exercise control over local policies are borne out of real

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[13]Fischel (2001b) further notes that mutual funds and defined-contribution retirement funds are counted as equity but the present value of social security benefits is not. Other household assets include automobiles, consumer durables, and bank accounts.

property ownership, what can be said for resident households that do not own real property within the jurisdiction? Lipset (1960) suggests that the more voters are affected by policies, the more likely they turnout to vote. Leaseholders are affected by policies given their position as resident-consumers of local policies and have some incentives to participate (although arguably not to the same extent as homeowners). Hirschman (1970) points out those households who can easily move have few incentives to improve their communities. However, while renters live in a community, it is beneficial for them to put fiscal burdens off into the future. Thus, the ability for some electors to leave public debt behind weakens their incentives to match benefits and costs in establishing policy and bearing the responsibility of the burdens.

Given the incentives, leasevoters can rationally use voice to promote different debt policy than homevoters would. This gives a testable hypothesis that local public debt levels are expected to be higher where the renter share of households is higher, all else equal. In order to test whether a relationship between housing tenure and local public debt exists in practice, an empirical investigation of this relationship is developed to look at whether the housing tenure composition affects the differences in relative debt burdens between local governments. Although no formal voting model is presented, the observed policy outcomes may resemble the predictions that rational voting would suggest. Policy determination is a complex process with many types of parties and potential heterogeneity in those types. It is beyond the scope of this paper to model all of the parties and how their preferences are translated into actual policies. Voting is just one possible way resident household incentives are converted into policy outcomes. The goal in this paper remains to verify whether there is a measurable difference in local public debt levels stemming from the resident households' tenure composition.

3   Empirical Evaluation

3.1   Fiscally Distressed Localities

As a preliminary examination, this section presents data on the composition of housing tenure in localities under fiscal stress. First of all, assessing fiscal health is difficult, but typically there is a consensus of which local governments are fiscally distressed.[14] Fiscally distressed localities have a number of issues that can lead to a cycle of budgetary destruction. Oftentimes, these issues are structural in nature and can be prevented (Beckett-Camarata & Grizzle 2014). If, for whatever reason, a locality has insufficient revenue to cover expenditures it can do one of three things: borrow money, raise taxes, or cut spending. Borrowing money as a budget smoothing tool should be done with prudence, since eventually it will have to be offset with tax revenue (Buchanan 1958). Taxes affect behavior, and raising taxes can shrink the tax base. The tax base is comprised of households who are also the primary consumers of local public goods, so cutting public expenditures may also shrink the tax base. A shrinking tax base leads to insufficient revenue, and on and on. These options feedback into each other and can deteriorate the fiscal health of a locality until options to satisfy debts are limited. When the budget reaches insolvency, localities are either bailed out by larger jurisdictions, default on their debt, or some combination of both. Ultimately, default is the clearest indicator of fiscal distress as a direct manifestation of insolvency.

Under current limitations, it is unknowable how far from (or past, for that matter) insolvency a locality may lie at a given point in time (Ross & Greenfield 1980). This partly stems from the lack of market pricing mechanisms in the public sector. Thus, precise measurement of fiscal distress is presently impossible, so fiscal distress is usually defined by a number of indicators or indices that reflect poor performance relative to other localities (Levine et al. 2012).

Pennsylvania is a state that is proactive in assisting municipalities facing fiscal distress.

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[14]Levine et al. (2012) gives a history and review of the assessment of the measurement of fiscal health and the inherent challenges.

Table 1: Act 47 Financially Distressed Municipalities of Pennsylvania

Municipality	County	Dates	Renter Share	County Difference	State Diff.
Farrell	Mercer	12-Nov-87	0.30	0.06	0.01
Aliquippa	Beaver	22-Dec-87	0.40	0.14	0.11
Clairton	Allegheny	19-Jan-88	0.33	-0.01	0.04
Wilkinsburg	Allegheny	19-Jan-88	0.58	0.24	0.30
Shenandoah	Schuylkill	20-May-88	0.31	0.09	0.03
Braddock	Allegheny	15-Jun-88	0.50	0.16	0.21
Franklin	Cambria	26-Jul-88	0.25	-0.03	-0.04
Rankin	Allegheny	9-Jan-89	0.58	0.23	0.29
Ambridge	Beaver	10-Apr-90	0.48	0.22	0.20
Duquesne	Allegheny	20-Jun-91	0.48	0.14	0.19
Scranton	Lackawanna	10-Jan-92	0.45	0.13	0.17
Johnstown	Cambria	21-Aug-92	0.50	0.24	0.21
East Pittsburgh	Allegheny	13-Nov-92	0.57	0.23	0.28
Millbourne	Delaware	7-Jan-93	0.73	0.45	0.44
Homestead	Allegheny	22-Mar-93	0.58	0.25	0.30
Chester	Delaware	6-Apr-95	0.52	0.25	0.24
North Braddock	Allegheny	22-May-95	0.41	0.08	0.13
Greenville	Mercer	8-May-02	0.40	0.17	0.12
West Hazleton	Luzerne	27-Mar-03	0.39	0.10	0.11
Pittsburgh	Allegheny	29-Dec-03	0.48	0.14	0.19
Plymouth	Luzerne	27-Jul-04	0.16	-0.14	-0.12
Nanticoke	Luzerne	26-May-06	0.42	0.11	0.12
New Castle	Lawrence	5-Jan-07	0.35	0.11	0.05
Westfall	Pike	14-Apr-09	0.39	0.25	0.09
Reading	Berks	14-Oct-09	0.58	0.31	0.27
Harrisburg	Dauphin	20-Oct-10	0.61	0.26	0.31
Altoona	Blair	1-Apr-12	0.35	0.06	0.05
Shamokin	Northumberland	16-Jun-14	0.41	0.14	0.11
Colwyn	Delaware	6-May-15	0.37	0.08	0.07
Mahoney City	Schuylkill	18-Feb-16	0.30	0.05	-0.01

Usually, it involves some assumption of parts of the public debt by the commonwealth (usually with altered terms) along with supervision of local budgetary affairs. Since 1987, 30 municipalities have been designated as distressed by the Municipalities Financial Recovery Act (Act 47).[15] Table 1 lists the entire population of Act 47 municipalities. The table reports the renter share in the municipality and the difference in renter share between the locality and both the county and the state. The table shows that out of 30 municipalities three had a lower percent of renting households relative to their county, and three had a lower percent relative to Pennsylvania. Note that the county average is inclusive of the municipality in question, so the rest of the county must compensate in the opposite direction for the difference between the stressed municipality and the county. This compensation is even more pronounced in situations where the municipality in question has a large share of the household population of the county. The municipalities in the same county as other general purpose jurisdictions are subject to similar macro-economic shocks (like the decline of steel and coal in Western Pennsylvania), so it is quite telling which jurisdictions have excessively burdensome debts.

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[15]Act 47 determines financial distress based on the occurrence of 11 criteria within the legislation, including default on explicit or implicit debt and chapter 9 bankruptcy filing. The crisis faced by Philadelphia in 1991 was managed under Pennsylvania Intergovernmental Cooperation Authority Act for Cities of the First Class, also known as the PICA Act.

Table 2: Notable Fiscally Distressed Localities (South)

City	State	County	Year	Renter Share	Co. Diff.	State Diff.
Copperhill	TN	Polk	1988	0.25	0.06	-0.05
Lipscomb	AL	Jefferson	1991	0.22	-0.11	-0.05
North Courtland	AL	Lawrence	1992	0.24	0.07	-0.03
Ozan	AR	Hempstead	1995	0.15	-0.15	-0.15
Winstonville	MS	Bolivar	1997	0.41	0.02	0.13
Prichard	AL	Mobile	1999	0.42	0.11	0.14
Millport	AL	Lamar	2004	0.38	0.11	0.07
Marion	MS	Lauderdale	2007	0.60	0.25	0.30
Gould	AR	Lincoln	2008	0.34	0.09	0.01
Prichard	AL	Mobile	2009	0.42	0.09	0.11
-	AL	Jefferson Co.	2011	0.35	-	0.05
Hillview	KY	Bullitt	2015	0.24	0.05	-0.07

Table 3: Notable Fiscally Distressed Localities (Midwest)

City	State	County	Year	Renter Share	Co. Diff.	State Diff.
Cleveland	OH	Cuyahogha	1980	0.39	-	0.08
Kinloch	MO	St. Louis	1994	0.69	0.43	0.39
Macks Creek	MO	Camden	2000	0.33	0.15	0.03
Hillsdale	MO	St. Louis	2001	0.46	0.20	0.16
Reeds Spring	MO	Stone	2002	0.37	0.18	0.07
Brooklyn	IL	St. Clair	2003	0.47	0.14	0.14
Washington Park	IL	St. Clair	2004	0.43	0.10	0.10
Alorton	IL	St. Clair	2005	0.56	0.23	0.23
Washington Park	IL	St. Clair	2009	0.45	0.12	0.12
Hamtramck	MI	Wayne	2010	0.51	0.16	0.23
Detroit	MI	Wayne	2013	0.49	0.14	0.21
Chicago	IL	Cook	2016	0.55	0.13	0.23

Tables 2 through 6 list notable localities by region which have faced fiscal distress. These are general purpose governments that have filed ch. 9, are rumored to, have been bailed out by their state, or are well-known to be in a fiscally precarious situation. The tables also compare the renter share of the locality in question with both the county and state the locality is located in. Out of 43 localities that have distinguishable counties 36 have a higher proportion of renting households than the county they are situated in. The exceptions are

Table 4: Notable Fiscally Distressed Localities (East)

City	State	County	Year	Renter Share	Co. Diff.	State Diff.
New York City	NY	-	1975	0.77	-	0.30
Bridgeport	CT	Fairfield	1991	0.57	0.26	0.24
Philadelphia	PA	-	1991	0.41	-	0.12
Washington, D.C.	-	-	1995	0.60	-	-
Camden City	NJ	Camden Co.	1999	0.54	0.14	0.20
Waterbury	CT	New Haven	2001	0.52	0.15	0.19
Central Falls	RI	Providence	2011	0.78	0.31	0.38
Atlantic City	NJ	Atlantic Co.	2016	0.71	0.40	0.37
Hartford City	CT	Hartford Co.	2017	0.76	0.41	0.43
Groton	CT	New London	2017	0.48	0.16	0.16

generally small towns with the largest (Los Osos, CA) having a population of 12k and the smallest only 85 (Ozan, AR).

Although the renter share is consistently higher in fiscally distressed localities than the surrounding localities, this is not definitive proof that renters cause localities to become overburdened with debt. These results suggest a relationship exists and provide motivation for a more thorough analysis looking at the relation of the renter share and the level of public debt, since localities with higher debt levels relative to their budget should have more episodes of debt distress under equal conditions or shocks.[16]

3.2 Literature Review

Given the theory-based prediction that renters prefer higher levels of public debt, ceteris paribus, this paper analyzes this claim empirically. This paper appears to be the first empirical analysis of housing tenure and local public debt levels using U.S. data. There are, however, many studies that look at the housing tenure and other local government policy.

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[16]Note that, higher debt levels also means that the locality is maximizing the leverage granted them by the future tax base. It is customary in economics, using the principles of calculus, that maximization of outcomes occur when a budget constraint is fully and completely used up. A look at the optimal level of debt (or nearness to insolvency) under some objective is not a question undertaken in this paper. In summary, it is not possible to say whether fiscally distressed localities are better or worse off than their counterparts.

Table 5: Notable Fiscally Distressed Localities (Southwest)

City	State	County	Year	Renter Share	Co. Diff.	State Diff.
Westlake	TX	Tarrant	1997	0.07	-0.32	-0.29
Tyrone	OK	Adams	2000	0.24	-0.09	-0.08
Westminster	TX	Collin	2000	0.11	-0.20	-0.25
Kendleton	TX	Fort Bend	2001	0.26	0.07	-0.10
Rio Bravo	TX	Webb	2002	0.18	-0.16	-0.18
Muldrow	OK	Sequoyah	2005	0.32	0.07	0.00
Camp Wood	TX	Real	2005	0.25	0.02	-0.11
Marshall Creek	TX	Denton	2006	0.19	-0.17	-0.17
Moffett	OK	Sequoyah	2006	0.39	0.12	0.06

Table 6: Notable Fiscally Distressed Localities (West)

City	State	County	Year	Renter Share	Co. Diff.	State Diff.
North Bonneville	WA	Skamania	1991	0.36	0.10	0.01
-	CA	Orange County	1994	0.39	-	-0.05
Los Osos	CA	San Luis Obispo	2006	0.32	-0.08	-0.12
Vallejo	CA	Solano	2008	0.40	0.04	-0.04
-	ID	Boise County	2011	0.17	-	-0.13
Stockton	CA	San Joaquin	2012	0.48	0.08	0.04
Mammoth Lakes	CA	Mono	2012	0.53	0.09	0.09
San Bernardino City	CA	San Bernardino Co.	2015	0.50	0.12	0.06

Dollery & Worthington (1996) review the so-called "renter illusion" literature which looks at how higher shares of renting households increase local public expenditures. This relation is consistently observed in various empirical examinations using different data and methods. However, the theoretical explanations for this relation varies primarily from a distinction of whether renters are rational or deceived (i.e., face "illusion") in their behavior.[17] Bergstrom & Goodman (1973) is a well-known early example showing the empirical relationship. The authors estimate the demand for public goods using the income and tax price of the median household, and used percent of owner-occupied housing as a control. The percent of owner-occupied decreases the local public expenditures suggesting that renters differ from homeowners in their demand for public goods.

Besides the impact of housing tenure on expenditures, a couple papers look at the differences in voting behavior (Hanushek 1975, Moomau & Morton 1992). Moomau & Morton (1992) looks at how housing tenure affects voting for a change in the property tax base, using referendum results of a 1982 vote on the homestead exemption in the City of New Orleans. The study finds that voting precincts with higher proportion of renters were more likely to vote in favor of removing the homestead exemption, thereby expanding the real property tax base. The paper concludes that homeowners and renters revealed preferences vary choosing the real property tax base.

Another variation of housing tenure and policy is provided by Ahlfeldt & Maennig (2015), looking at whether housing tenure impacts voting for public service delivery, which affects housing values through capitalization. Framed as a test of the homevoter hypothesis (Fischel 2001a), the authors analyze a direct democracy referendum which would alter the geographic distribution of airport services in Berlin; a referendum that would change the distribution

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[17]Martinez-Vazquez (1983), Martinez-Vazquez & Sjoquist (1988), and Carroll & Yinger (1994) provide some evidence that renters behave rationally. Martinez-Vazquez & Sjoquist (1988) uses a theoretical model to suggest that finds that renters are wholly rational. In their model, homeowners and renters differ in their costs when local public expenditures are financed through a property tax. The model shows that for households of equivalent preferences for public goods and incomes the housing tenure choice affects the amount of public goods the households votes for. The conclusion persuasively argues that housing tenure should be included in all empirical studies of local public expenditures to avoid specification biases.

of aircraft noise and airport accessibility. The analysis shows that differences in voting patterns exist between homeowners and renters, with homevoters more likely to favor policy that would lead to appreciation of their real property values.

There are two papers that evaluate empirically whether the proportion of renters affects public debt usage. First, Stadelmann & Eichenberger (2012) estimates public debt usage as a function of the composition of housing tenure. The motivation for the analysis in the theoretical model is that rental market frictions prevent the rental price from adjusting to the capitalized public debt. The data used in the estimation are cross-sectional data of 171 communities in the Swiss canton of Zurich. The empirical model uses two dependent variables both scaled by tax revenue. One is a flow variable of new debt and the other the stock of debt. The estimation finds that proportion of homeowners in a community reduces the amount of debt and new debt. Second, Banzhaf & Oates (2013) uses open space referenda data to evaluate a "renter effect," which is defined as spending and debt differences in preferences between renters and homeowners. The estimation results do not find evidence of a "renter effect."

My paper advances the literature by investigating the relation of local public debt policy and housing tenure by providing a theory of rational household behavior as well as an empirical investigation. The theory in this paper eschews any position on a collective choice mechanism which aggregates households' preferences, but the empirical evaluation cannot abstain from this issue and make causal inferences. Minimally, it is assumed that local public democratic institutions play some role in translating aggregate household preferences into local fiscal policy, but a specific collective choice framework is not postulated (Persson & Tabellini 2002, Hettich & Winer 2005). In practice, local governments gain authority to incur debt in various ways. The authority may stem from merely the status as elected officials or may require authorization through a direct democracy tool like referendum. Ultimately the preferences of residents have a part in determining policy.

3.3 Basis for the Empirical Model

The empirical specification arises from the identity of a local government's long run budget constraint. Single period budget constraints combine to construct the long run budget constraint. The single period budget constraint is based on the cash flowing into public accounts being equal to the cash flowing out of public accounts net of debt/savings changes. Thus, the single period constraint is a flow constraint. In this simple formulation interest rates are ignored, and all debts from the previous period are fully repaid in the proximate period. Using subscripts to denote the time period, designated t, the single period budget constraint is written

$$Revenues_t + Debt\ Incurred_t = Expenditures_t + Debt\ Incurred_{t-1}. \tag{1}$$

Formulated this way, debt has a clear role of shifting the balance of expenditures and revenues across time periods. Also, equation 1 clearly shows that debt incurred is a substitute with current financing tools. Either future revenue or future debts must settle past debts. Single period budget constraints combines from the present (time 0) up to some arbitrary future date (time T)—when all debts are settled—to form the long run budget constraint:

$$\sum_{t=0}^{T} Revenues_t = \sum_{t=0}^{T} Expenditures_t + Debt\ Outstanding_0. \tag{2}$$

As an accounting identity, total revenues equals total expenditures plus debt outstanding. Or put another way, current and future government revenues must cover all current and future liabilities.[18] This is a stock constraint, and the public setting makes the market values of the components difficult to evaluate. For example, tax bases are not bought and sold in a market which starkly contrasts with the assets of firms. The long run budget constraint also implies there is no debt outstanding at time T. While it is not uncommon for local governments

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[18]It is recognized that in more rigorous derivations of the long run budget constraint with interest rates and time discounting show that it is the net present value of government revenues is equal to the net present value of expenditures plus debt outstanding (Romer 2006). That complexity is not necessary here.

to always carry some debt outstanding, this assumption disallows potential ponzi schemes, where governments incur new debt to pay for old debts ad infinitum.[19]

Equation 2 is the basis for the empirical analysis. In a multi-period setting, policy decisions are made to reflect what is best for today. In the context of this model, the incumbent households' preferences are being reflected by policy makers into observable outcomes at each point in time. For each observation the current time is zero. Current policies are only determined by current residents and the optimal policy outcomes for them. The estimated coefficient on the housing tenure variable reveals the difference in current household preferences, via housing tenure, for current public debt.

From the long run budget constraint, debt outstanding clearly is a principal component of any empirical analysis. And given the usage of an identity with three components, only one other component needs to be investigated with the other representing the remainder. In this analysis the net present value of revenues is the other component investigated. Thus, current and future expenditures are assumed to follow an optimal path and are taken as given.

Debt outstanding from equation 2 is the amount of funding that must be acquired in future periods to maintain solvency. However, debt as it appears in the data of fiscal accounts is the principal of debt outstanding and not the unfunded balance. There are two important things to note regarding available measures of debt. First, interest payments are not included in the measure. Municipal debt is overwhelmingly issued as fixed coupon bonds,[20] so interest payments are fixed at the time of the bonds offering. Thus the parties have effectively fixed the exposure to interest rate and inflation rate risk.[21] Absent wide variation in the underwriting spread at the time of issuance, the principal (or par value) of a bond issued

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[19]Each of these constraints implicitly assumes that default on debt is not possible. Borrowing is a result of lenders expectations of sufficient future revenues for repayment. In practice, interest rates include a default risk premium so that the lender's portfolio, with many loans, has sufficient returns in expectation. However, for a single government these constraints may break from time to time because of defaulted debt.

[20]According to Securities Industry and Financial Market Association (SIFMA) about 95% of municipal debt issued is fixed rate coupon.

[21]Fortunately, the period analyzed had relatively low and stable inflation rates which limits any potential issues of wide variations across jurisdictions from the timing of debt offerings.

reflects the net present value of the bond given the expectations of rates throughout the duration of the bond. When municipalities offer fixed coupon bonds as debt they have full and complete knowledge of both the amount and timing of interest and principal payments. This significantly simplifies debt management. For the purposes of this analysis, this type of issuance most closely resembles the basic single period budget constraint constructed above compared to other potential bond structures.

The second notable observation is that funds set aside to pay down debt effectively reduce the debt outstanding. An economically meaningful measure of debt reflects the unfunded portion of previous spending. To achieve this measure the total debt outstanding less the sinking fund is used.[22] This is henceforth referred to as "net debt." Simply put, net debt is the amount of debt net of cash which is set aside for debt settlement. Commonly in corporate finance, net debt matters more than debt outstanding for analyzing financial health. Since this analysis is interested in effective debt outstanding, it is the appropriate measure of debt. Using the measure of net debt as the effective measure of the debt level may also help alleviate concerns related to differences in debt duration across observations. Effectively, it is akin to thinking about the "unfunded" part of a pension fund, which is widely recognized as the most meaningful aspect of pension liabilities. Likewise with explicit debt, the only debt that puts a locality at risk of violating the budget constraint is the amount in excess of the funds set aside. Public finance economists at least as far back as Studenski (1930) knew of the importance of thinking about the relevant measure of debt as the actual debt outstanding less the cash on hand to pay it back. With this mention of public pensions, let it be clear that while implicit debts may represent a large portion of indebtedness by localities, it is not feasible to include them in this analysis.

In the fiscal data available, revenues are measured as single period flow variables. These are used to proxy the stock of the net present value of current and future revenues. Gov-

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[22]The sinking fund is cash set aside by local governments for the settlement of debt in future accounting periods. The treatment of these funds varies from state to state, but Kentucky treats the funds in the sinking funds as inviolate (KRS 67A.891).

ernment revenues are inflows of funds comprised of own source and non-own source revenue types. Own source revenues are those funds collected from households within the jurisdiction from taxation and fees. Non-own source revenue is money received from other governments through intergovernmental grants. At its core, local government revenue is grounded in the economic activity of households subject to the jurisdiction. With the main exception of severance taxes on natural resource extraction, the economic activity of households comprises the tax base (and the base for fee revenue). Additionally, the revenue from intergovernmental grants, while distributed politically (Holcombe & Zardkoohi 1981), are generally considered subsidies to the resident households within a jurisdiction (Boex & Martinez-Vazquez 2004). Thus, to the extent households have agency, local government's revenue is beholden to resident households.

The empirical design for the regression analysis uses net debt as the primary component of the dependent variable and is a function of the public's preference for cross-temporal financing and revenue requirements. Additionally, the determination of net debt and government revenues occurs under established fiscal institutions' practices and rules, partly a product of the federal system. So for organization, there are two central categories for the determination of net debt and revenues: household preferences and local government fiscal institutions. These categories define the explanatory variables sections.

3.4 Unit of Observation

Actual local governance in the U.S. has substantial variability in scope and scale. American federalism leaves the determination of local government functions to the several states allowing for state customs and institutions to generate distinct local governing structures. The functions of local governance are often distributed among multiple governing bodies, of both general and special purpose, each of which governs the same households in various ways.

The proliferation of special districts is a relevant distinction of the organization of public services by local governments between states (McCabe 2000). General purpose governments

create special districts by carving off some part of local governance, e.g., a particular administrative task, for a special district to perform. One issue with the carving off responsibility and authority is it expands the number of fiscal jurisdictions that can incur debt and impose taxes. A given household may be simultaneously subject to the jurisdictions of general purpose governments like a county government and a municipality, and many special districts with defined specific purposes such as an elementary school district, a high school district, a water district, a fire district, a prison district, a housing district, a sewer district, etc.

Overlapping local authorities create vertical fiscal externalities when governments impose fiscal burdens on a shared tax base (Greer 2015). Additionally, some authors have suggested that expanding the number of taxing authorities creates an opportunity for fiscal illusion (Dollery & Worthington 1996). This suggestion appears reasonable given the historic use of special district debt to subvert formal debt limitations (Secrist 1914, Studenski 1930, McClelland & Magdovitz 1981). Fortunately, the market can see through any potential fiscal illusion, as the bond prices reflect the value of all debt that is attributed to a tax base (Greer 2015).

Accurate representation of the local government revenue base requires the unit of observation to include all local governments. Thus, in this empirical analysis the fiscal data of all general and special purpose governments are aggregated to the county. In the data provided by the census of governments every local government is assigned to a county, so aggregation is done by this assignment. It is recognized that some special district jurisdictions overlap across multiple counties, but it should not affect the estimates so long as the assignment of overlapping districts are not systematic to counties with higher shares of renters (Carr 2006).[23] The county has many advantages and disadvantages as a unit of observation. One advantage is the stability of county borders through time, allowing for repeated observations and panel data methods. Another is that the county political designation is common to every state and with over 3,000 counties in the United States; thus, the panel has a large N

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[23]To evaluate the importance of overlapping special districts a subsample of states is used for an additional estimations as a robustness check.

dimension.[24] One disadvantage is that county governments do not directly determine much local fiscal policy.[25] However, as stated earlier, this model does not employ a specific collective choice framework, weakening the relevance of this disadvantage. Another disadvantage is that any within county variation is eliminated by aggregation. Ideally, households would be the unit of observation, requiring household level data as well as the data for each and every local government of which the households are part of. Clearly, this is not feasible. Under current data limitations, the county is the natural choice for this empirical analysis.

3.5   Dependent Variables

Counties vary in size across multiple dimensions, so the county measure of net debt is scaled for comparability. Two relevant dimensions are population (or number of households) and the size of the public sector (total government revenues). Although population generally tracks the size of the public sector, each is used to scale net debt.[26]

For the main models, net debt per household is the dependent variable. This is chosen first because of the interpretability of the coefficient and ease of applicability. Household was chosen to scale net debt over the very closely tracking general population and total household income.[27] Each of these three has very high correlation coefficients (0.97+) with

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[24]Due to its French heritage, Louisiana does not have counties but parishes. In the context of this study, these political units are equivalent.

[25]Counties account for 17.5% of local government debt and 23% of local government expenditures according to the 2012 Census of Governments.

[26]The calculated correlation coefficient in the data is around 0.94.

[27]Many researchers that want to assess "debt affordability" use a debt to GDP ratio. This is reasonable since GDP gives a general measure of the strength of the tax base that can be called upon in the future to settle the debt. However, there are a few issues with this at the local level. The first issue is household income from the census does not include imputed rents, an important aspect of economic output or GDP. The second issue is measurement of income inclusive of imputed rents. The assignment of GDP (inclusive of imputed rents) by the Bureau of Economic Analysis (BEA) is based on the residence, assuming the production of goods and services is done in the county where one lives. The amount of cross county commuting may distort this measure, especially in industrial centers. The main advantage of using GDP instead of household income is the assignments of rents (payments to owners of fixed factors) but the distortion from commuting may negate part of that advantage. Third, even with accurate assignment of GDP it is not necessarily the most accurate depiction of a local tax base. Federalism insists that local governments are engaged in harsher tax competition than higher levels of governments. Thus, at the local level sales and income tax bases have much higher elasticities. Generally, it is observed that local governments in the U.S. utilize property taxes. This helps to alleviate the pressure of fiscal competition for mobile resources. Finally, the correlation coefficient

one another so the choice is not meaningful in any statistical sense. Since the explanatory variables are all related to household characteristics, per household is a natural scaling value.

Another specification uses the ratio of net debt to total revenue as the dependent variable. This gives a rough approximation of the share of debt utilization in terms of all funding. Ideally the stock of the net present value of revenues would be used to assess the extent that debt is used as a share of the long run budget constraint. Instead the flow of revenues is used as proxy. However, in scaling net debt, a key question is how to make the net debt level comparable across counties. While it is not the ideal, this dependent variable is effective in portraying the size of the government, so this measure is highly useful. As a dependent variable it shares a correlation coefficient of 0.70 with net debt per household.

3.6 Explanatory Variables and Controls

3.6.1 Public Preference

Public preferences exercised in a political process determine net debt usage. This section describes the observed household characteristics used to represent household preferences.

The key explanatory variable is the renter share of households in the county. As predicted by the theory, a higher share of renters should result in higher levels of public debt, so a positive coefficient is expected. Since renters participate less in local politics than homeowners and absentee landlords (McCabe 2013), the regressions include the property tax share of revenue as a control variable to explain the influence "landed" interests exercise over policy. Landed interests should have a higher level of engagement to limit the commitment to future taxes they will pay in local governments that rely heavily on property taxes for revenue. Conversely, the landed interests have fewer incentives within jurisdictions where local governments rely very little on property tax revenue. This allows renters to still exhibit some form of preference and influence on debt policy even when they have marginal political activity.

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between BEA county GDP and households is relatively high anyway (0.9+).

The regressions include measures for general political preferences. County level political ideology is measured by the share of the presidential democratic candidate vote in the county, when only the two major U.S. political parties are considered. The nominate measure of state political ideology from Berry et al. (2010) is used as a state level control. Both measures of political ideology scale from 0 to 1 with liberalism increasing as the measure increases. It is not clear a priori how county and state political ideology will correlate with local public debt levels.

Also included are observable economic characteristics of households within the county. Median personal income is included and has long been associated with household preferences for public spending and taxation (Bergstrom & Goodman 1973, Greer & Denison 2016). The share of population with a college education controls for households' education levels. The county unemployment rate controls for cross county macro-economy weakness and also may reflect the use of public debt to smooth government spending. The poverty rate controls for tax base weakness at the lower end of the income distribution.

The models use controls for demographics with observable household characteristics. Each of these control variables is typical in empirical analyses of local public spending and the justification of their inclusion is borrowed from the literature. These include: population density, race population shares, and racial fractionalization. Population density controls for some of the differences between rural and urban counties. Racial share variables control for otherwise unobservable traits that may impact the public budget. Racial fractionalization measures of racial diversity, with higher numbers reflecting more diversity (Alesina et al. 2003). Increased racial fractionalization is associated with increased friction and thus lower public spending (Beach & Jones 2017). These variables are included with no prior inclination as what the relation with the local net debt level ought to be.

3.6.2 Institutional constraints

Municipalities operate in a federal free market system that imposes formal and informal institutional constraints on the issuance of public debt. The formal institutional constraints are divided into direct and indirect constraints. These institutional constraints fall outside of the realm of the public locality issuing the debt, that is to say, the imposition of constraints is outside the control of actors within the issuing jurisdiction.

Under American federalism, municipalities are strictly beholden to state policies in issuing public debt. States interests in municipal debt levels stems from a few sources. The fiscal health of a locality spills over into other local governments via fiscal externalities. Vertical fiscal externalities exist for localities that share a single tax base in an overlapping jurisdictions framework (Greer 2015). Horizontal fiscal externalities are present through a potential contagion effect across municipalities within states (Epple & Spatt 1986, Chung 2012, Gao et al. 2017). Consider Rep. Barney Frank's comments from a House Committee on Financial Services hearing:

> No State, no State legislators, no governor, can allow any one of its municipalities to default because then every other municipality would pay through the nose. So that is why this is not just some charity here; this is self-defense. . . . Because if any one municipality falters, every municipality in that State would pay, and there isn't a State governor and legislature in the country who doesn't understand that, and that's why the State guarantee is such a good one. (Chung 2012)

Many states come to the aid of distressed municipalities and bailout insolvent localities while other states may allow for localities to use Chapter 9 of the U.S. Federal Bankruptcy Code (Moldogaziev et al. 2017). Additionally, states can limit fiscal externalities by proactively constraining local debt issuance (Epple & Spatt 1986).

States may put explicit debt limits on the borrowing done by local governments through constitutional or statutory restrictions (Pogue 1970); however, these limits are not without

exceptions that frequently render these limits ineffective. Also, the use of net debt as a dependent variable somewhat quiets the issues related to debt limits, since net debt is not directly restricted. One typical direct formal restriction is that the local debt must not exceed a certain percent of assessed value on real property. Thus, the median house price controls for debt limit constraints. However, there are exceptions to this restriction, for example, it may apply only to general obligation and not revenue bonds or special districts may be exempted up to a certain level (McCabe 2000, Carr 2006). To control for this potential exception a local government fragmentation variable is included (Wagner 1976, Magaddino et al. 1980). This variable is an index of the number of jurisdictions within the county border constructed as an Herfindahl–Hirschman index using current operating expenditures by county and sub-county governments. Other common restrictions require a referendum within the jurisdiction or approval of state level agencies before debt is issued. Clearly, each of these restrictions is overcome with sufficient political support. Furthermore, state policies vary substantially in this respect and do not change often over the analyzed time period so most should be absorbed into the fixed effects of the empirical model.

Localities may also have indirect formal constraints on borrowing. This is typified by tax and expenditure limitations (TELs). While not a direct limit to the issuance of debt, the availability of future revenue effectively hinders the ability of a local government to leverage their tax base and borrow against future tax revenues. The most relevant form of TELs in this context is where states (all but CT, HI, NH, and VT) have imposed constitutional or statutory limits on real property tax rates and assessments (Maher et al. 2011). As with explicit debt limits, these too have exceptions through referendum; although, the choice for local voters may differ when raising the property tax rate versus incurring a higher debt burden. A disconnect of the debt burden from taxation may change the statutory burden of future taxes, but it is not given that it would shift the economic incidence. With evidence that the imposition of TELs reduce property taxes (Maher et al. 2011), the local TEL index is included to control for indirect formal constraints (Amiel et al. 2009).

The primary informal limit on local debt levels is imposed by the municipal bond market. Localities that approach the perceived limit of their debt capacity likely have higher interest rates to sell their debt and are less likely to introduce new bonds to the market. In this way, the interest rate functions as a price that the locality must pay to delay tax collection and the market price of debt signals access to the market. For many local jurisdictions to enter the market, an initial step is often to have the debt rated by a credit rating agency. Credit rating agencies assign ratings based on the likelihood that the debt will be paid back in full. Although the exact formulation of the ratings is proprietary, there is statistical evidence that ratings are based on many of the economic and institutional factors already included, among other things (Denison et al. 2007, Marlowe 2011, Johnson & Kriz 2005, Moldogaziev & Guzman 2015).

3.6.3   Other controls

Outside of the two categorizations above, there are a number of variables that are important determinants of public debt within the literature. Three population related variables are included for this purpose. Population controls for potential returns to scale in public service provision (Bahl & Duncombe 1993). In the fiscal distress cases of Detroit, Chicago, Puerto Rico and western Pennsylvania the jurisdictions have seen large outflows of population and tax base. Thus, the annualized population growth is included for changes in population. Jurisdictions may also vary in the relative size of current and future generations so the estimates control for the amount of population under 18 per household.

A ratio that describes differences in income distribution is also included. The mean to median income ratio is included to control for income distribution effects that may be associated with relative debt levels and may impact differences in renters' preferences relative to homeowners (Meltzer & Richard 1981, Martinez-Vazquez 1983, Martinez-Vazquez & Sjoquist 1988, Stadelmann & Eichenberger 2012). Intergovernmental grant revenue as a share of total revenue controls for an important source of local government funding that can be

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capitalized into local house prices and may be used as collateral for short term loans (Hilber et al. 2011, Ravitch 2014). Finally, the level of total expenditures per household is included from the budget constraint to control for fiscal requirements.

3.7   Data

Pierson et al. (2015) provides U.S. local government financial data that are gathered from the census of governments performed by the U.S. Census Bureau. The data include the entire population of local governments for years ending in "2" and "7" starting in 1972. Since local governments are aggregated to the county level, the estimates only uses years with the entire population of local governments. Thus, an observation is a county-year for quinquennial years. The decennial census collects economic and demographic variables, including housing tenure, from 1980-2010.[28]

Using these as my primary sources, my dataset includes virtually the entire population of local governments in the U.S. The only counties with missing data are all Alaskan counties and one county in Hawaii. Counties that were created or destroyed over the period are consolidated into the larger geographic county of which they were (or became) a part of so that the geographic boundaries are unchanged within the data.[29] The five counties comprising New York City are combined to accommodate the fiscal data for the consolidated government of New York City. This results in a dataset comprising 3,106 counties. To match the decennial census data with the quinquennial census of governments data, the decennial census is interpolated to the intervening years. Interpolation of 4 data points into 6 does not create any constant changes across time periods. The slope between each interpolated data point for a given county varies so long as the differences across three consecutive decennial censuses are not constant. Thus, the counties are observed in 1982, 1987, 1992, 1997, 2002, and 2007. With 3,106 counties and six years of data, the total number of observations used
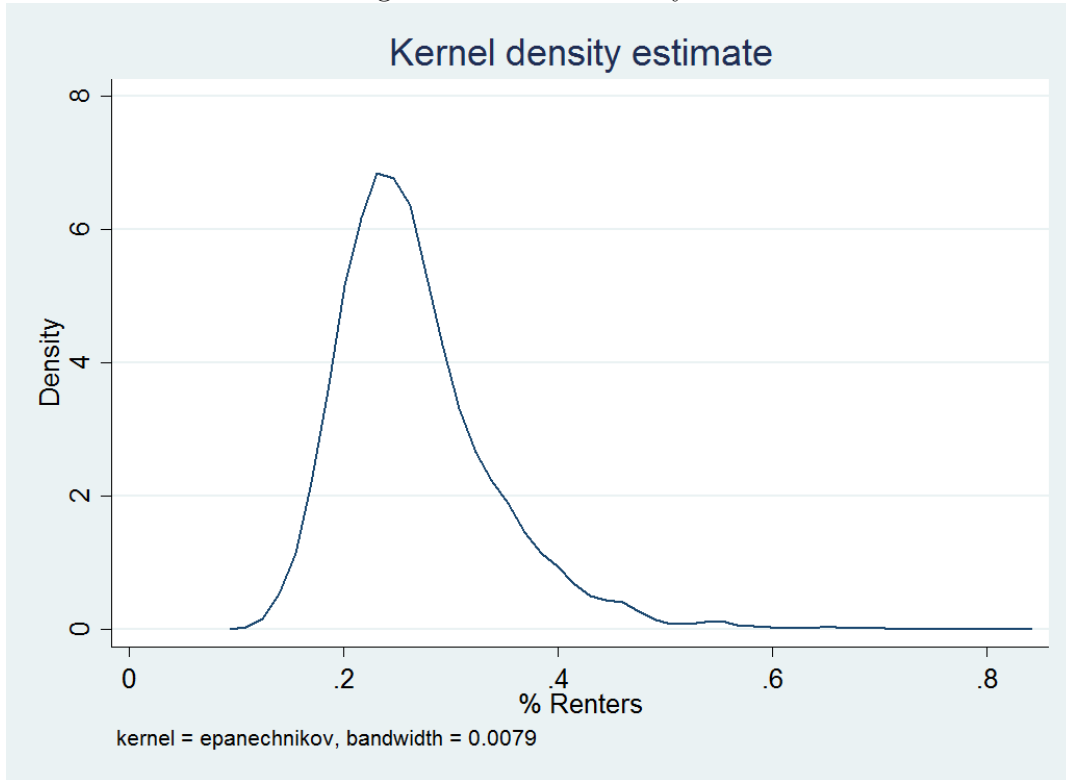
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[28]Median income, median house price, unemployment, and the poverty rate were generated by the American Community Survey for the 2010 census figures.

[29]The four counties created or destroyed over the period are La Paz, AZ; Cibola, NM; Broomfield, CO; and independent city Clifton Forge, VA.

Figure 1: Kernel Density of Renter Share

in the balanced panel is 18,636 county-years.[30] Figure 1 is a kernel density estimate of the renter share variable. Table 10 provides the summary statistics, figures 3 and 4 are scatterplots of the renter share against each dependent variable, and figure 5 shows the distribution of 5 year changes in renter share. These are available at the end of the paper.

3.8 Empirical Local Debt Model

Models of scaled long run budget constraints are estimated to examine the impact of the renter share on local public net debt. Borrowing from Bergstrom & Goodman (1973)'s proportionality theorem with accompanying assumptions, estimation using mixed explanatory variables of population share measures and median level measures is valid. The first scaling of the dependent variable (net debt per household) complicates the estimation procedure as

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[30] As an additional robustness check, non-interpolated data is used where fiscal data for 1982, 1992, 2002, and 2012 are used. While this loses one-third of the observations, the results are consistent with the dataset that interpolates two additional years.

median house price is arguably endogenous under this specification (Hur 2006). The endogeneity occurs due to the capitalization of net debt into real property values. In order to avoid this problem and since the coefficient on this variable is not at interest here, median house price will be proxied by the average age of the housing stock, which is computed for each county using decennial census data.

The estimation includes panel and time fixed effects to control for unobserved heterogeneity that is constant across counties and time periods. Robust standard errors are clustered at the panel (county) level. The estimation approach is as follows:

$$Y_{it} = \beta X_{it} + \gamma R_{it} + \alpha_i + \delta_t + \epsilon_{it} \tag{3}$$

For each model, i indexes counties and t indexes time,. Where α denotes the panel fixed effects, and δ denotes the time fixed effects. Then R is the independent variable renter share of households, X is a vector of included exogenous independent variables, and Y is the dependent variable.

Given the emphasis on the renter share, the exogeneity of this variable is paramount. This is arguably the case if all differences that are known between owning and renting are capitalized into the price to own, such that the household is indifferent between renting and buying an equivalent home since all meaningful differences are priced in. Stadelmann & Eichenberger (2012) instrument for potential endogeneity of the housing tenure decision based on the argument that "property owners choose to live in jurisdictions that can be *expected* to accumulate less debt in the future (emphasis added)." This is a curious line of reasoning if one generally accepts the capitalization hypothesis. Capitalization is a manifestation of the expectations of future costs and benefits. Expectations of future debts (though probabilistic) are capitalized into the price, and, as such, the burden is placed on existing owners and not prospective buyers.

To see how this is not an issue, consider an household's housing tenure decision under two

polar cases, either no capitalization or full capitalization. If there is no capitalization, then there is no difference in the burdens between the home-owning and renting options, and the household is indifferent between the two. Under full capitalization, the household will price in the current and expected future debts into the homeownership option—as it would be for a rental property—and if the housing market is in equilibrium, then the price of owning and renting should be the same for equivalent time periods. This renders any expected changes in public debt meaningless to the housing tenure decision. Furthermore, under partial capitalization, the potential resident will face the same share of the uncapitalized burden whether renting or buying. Thus, there is no opportunity for endogeneity to occur. Anything that is potentially endogenous is expected, and is the burden for owners that did not expect it before it was capitalized.

Another potential argument for endogeneity of the housing tenure decision is if there is asymmetric information, such that incumbent homeowners are fully aware of debt obligations while potential homeowners are not. Then the latter could sell to the former at a profit, of course, and the sale price would be somewhere between full and zero capitalization. If the current price shows less than full capitalization, the incumbent homeowners increase the debt and make more profit. However, if homeowners can get a profit through imperfect capitalization under higher levels of debt, then higher rates of homeownership would be associated with higher debt levels. This is the opposite direction of what is otherwise predicted by the theory and could bias the results in the opposite direction.

Although a channel endogeneity of the renter share is not readily apparent, there are other ways a problem can arise. If there are complications from public debt capitalizing differentially across owner-occupier and rental properties, omitted variables driving both the tenure decision and public debt determination, or substantial distortions driving differences in renting and owning markets (e.g., rent controls), then there is potential simultaneity given the limited structure imposed leading to biased coefficient estimates on the renter share variable. Furthermore, the claims of causal inference are bolstered by removing possible

channels of endogeneity.

To correct for this issue a control function approach is used for the renter share in a county. Three instruments that are excluded from the net debt regression are used in the control function. The first instrumental variable used is the crime rate per capita. Crime rate per capita is a community characteristic that is correlated with homeownership rates (Tita et al. 2006, Wentland et al. 2014, Dietz & Haurin 2003) and not with public debt. The second is the ratio of the median home price to the median rent price, which is effectively the number of months paying the median rent to buy the median home. This ratio has been shown to be one determinant of home ownership (Carliner 1974). The final instrument is the rural area designation. The enactment of the Housing Act of 1949 created a mechanism for distorting the housing tenure decision for a substantial share of the population.[31] The 1949 act provided the now United States Department of Agriculture Office of Rural Development (USDA) with funding and instructions to provide home buyers in "rural areas" with loan guarantees on zero-down home loans and loans with low interest rates. Comparatively the rates, fees, and down payment requirements are much lower than loans available from the Housing and Urban Development Agency. This policy removes the potentially prohibitive down payment constraint that would prevent some households from buying a home, and relegate them to renting. The rural designation instrumental variable is the 30 year lag of designation as a "rural area."

Designation of rural areas by the USDA is done at the sub-county level, so the urban-rural county designation of "standard metropolitan areas" (the predecessor of the "metropolitan statistical area") by the Bureau of the Budget (predecessor of Office of Management and Budget) in 1949, as well as subsequent metropolitan designations in the 1960 and 1970 Censuses, is used as the instrument. Figure 2 provides a map of the designated counties used in the 1950 Census. The original metro designation as well as the Housing Act designations were tasked by the same congress and should represent the congressional understanding of

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[31]At the time around 36% of the population lived in rural areas compared to 19% in 2010.

Figure 2: Map of Standard Metropolitan Areas from the 1950 Census

Figure 13.—STANDARD METROPOLITAN AREAS: 1950
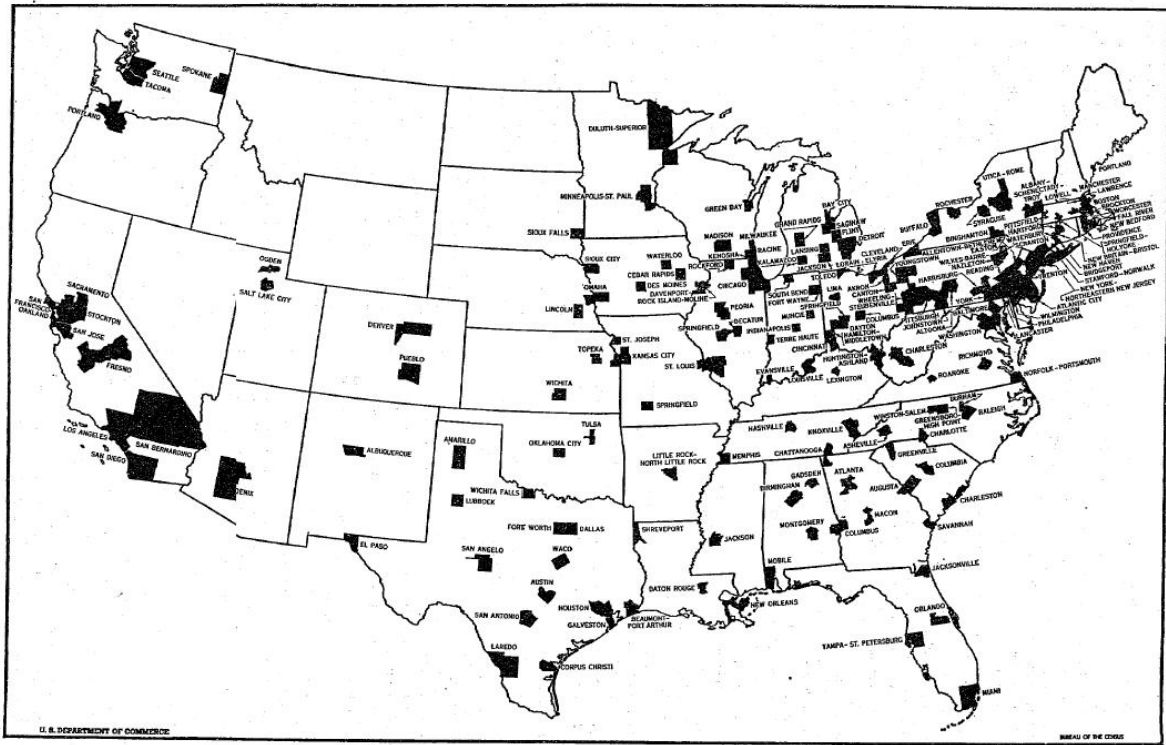
the rural-urban spatial distribution at the time. Subsequent changes to both the Housing Act and defined metro areas track one another generally.

At the time of the enactment of this specifically rural homeownership policy there were, and are to this day, many federal policies in support of homeownership. Specifically, the United States Department of Veterans Affairs (VA) has been a very important agency in helping veterans to afford homeownership. However, this and other policies did not target spatial areas specifically. For example, veterans' utilization of VA programs are not limited to only rural areas. For the USDA program, eligibility was conditional on living within a certain geographic area. Other housing policies that do not explicitly distinguish geographic areas for eligibility would not have widely predictable differential effects across areas.

The policy enacted created differences in how conducive counties are to either renting or home-owning. It is arguable that those differences existed before the policy. If so, then

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they were "pre-existing," which is also a suitable criteria for establishing exogeneity for an instrumental variable, and the designation of the rural areas merely provides this observation formally. Timing is a strong argument for the exogeneity of the instrumental variable since local public debt levels from 1980-2010 did not cause the 1949 designation of rural areas. Additionally, analysis on the city debt data obtained from various statistical compendium of city finances produced by the Census Bureau in 1942, 1946, 1949, and 1953 for the 200 cities with 25,000 to 50,000 inhabitants in 1940 provides support for the exclusion of the rural designation instrumental variable. Of the 200 cities in this range, 97 were located in counties that were designated to be rural. Then using a panel of these cities to regress the net debt per capita on year and an interaction of year and the 1950 rural designation, a differential time trend is not observed since the coefficient on the interaction is insignificant. Furthermore, the Sargan-Hansen test is used to assess whether these are correctly excluded from the second stage estimation. The test statistic fails to reject the null that the instruments are correctly excluded, suggesting that these are valid instruments. This provides evidence of the exclusion restriction. Statistically, the instrumental variable method used controls for any and all potential endogeneity issues as long as it is valid. Empirically these spatial differences persist through time and are significant in predicting renter share. Table 7 reports the first stage results for the instrumental variables.

One aspect of this instrumental variable is that it primarily provides spatial variation in renter share. In order to utilize the instrument in a well specified first stage, a control function approach using between effects is used (Hausman & Taylor 1981). First, the renter share is regressed using the between estimator on the instrumental variable and the other explanatory variables. This regression serves as a control function, so the fitted residuals are generated and used as a new variable to include in the fixed effects regression. Using a control function allows the fitted residuals to pick up the possible endogeneity (Matzkin 2007).

Table 7: First Stage Between Effects Results on Renter Share

Variables	Between Effects
Rural/Urban County Designation	0.0147***
	(0.003)
Crime Rate per capita	6.373***
	(0.521)
Ratio of the Median Home Price to the Median Rent Price	0.079***
	(0.028)
Observations	18,636
Number of Counties	3,106

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The control function is defined as follows (Davidson & MacKinnon 1993):

$$\bar{R}_i = \eta \bar{Z}_i + \tau \bar{X}_i + \bar{v}_i, \tag{4}$$

$$R_{it} = \hat{R}_{it} + \bar{v}_i + \hat{e}_{it}. \tag{5}$$

Where overbar ($^-$) signifies the mean of the variable, a hat ($\hat{}$) designates a predicted value, and Z is a vector of excluded exogenous independent variables,. After estimation of equation 4 using the between estimator, the fitted residual is generated, denoted $\bar{v}_i + \hat{e}_{it}$ as described by equation 5, and included in the second stage, equation 3. In all, the new model estimated using the within estimator is equation 6. The between effects, $\bar{v}_i$, are constant over time within each panel and is absorbed by the fixed effect in the second stage. The independent error, $\hat{e}_{it}$, models the potential endogeneity in the error term, ϵ_{it}, in the second stage. The full specification is modeled:

$$Y_{it} = \beta X_{it} + \gamma R_{it} + \alpha_i + \delta_t + \epsilon_{it} + \bar{v}_i + \hat{e}_{it}. \tag{6}$$

The identification of γ follows from the restrictions $E[\epsilon|e] = E[\epsilon|e, Z, X]$ and $E[e|Z] = 0$ (Matzkin 2007). The null hypothesis on the coefficient of the residuals, $\hat{e}_{it}$, is that the renter share is exogenous. These restrictions satisfy pre-estimation rank and order conditions.

3.9 Results

Prior to estimation, the Phillips-Perron test for unit roots is performed on the dependent variables (Choi 2001). The null hypothesis of this test, that all panels have a unit root, is rejected for each dependent variable. Furthermore, the yearly average level of the dependent variable does not show a trend in the data.

The initial model is regressed using Huber-White standard errors clustered at the panel level, the county. Even though each panel only has six time periods the results are quite strong with the coefficient on renter share showing statistical significance and the expected sign. Other coefficients appear reasonable and are discussed below. After the initial estimation, the Pesaran test checks for the presence of spatial correlation across errors (Pesaran 2004, Hoyos & Sarafidis 2006). This verifies whether the standard error clustering at the county level is appropriate by evaluating whether counties are interdependent. The null under this test is that there is cross sectional independence. This test rejects the null suggesting that the standard errors may have a downward bias. In order to correct for any correlation across counties, two more models are run. First, the model is estimated with standard errors clustered by state, and then the model is estimated using Driscoll-Kraay standard errors (Driscoll & Kraay 1998). Driscoll-Kraay standard errors allow for correlation within and between panels. With only six time periods, Driscoll-Kraay errors may not be not ideal (Hoechle 2007). The most conservative standard errors on the renter share coefficient are those with county clustered standard errors and are reported in the tables. Table 8 reports the results using net debt per household as the dependent variable.

The coefficient on the renter share is statistically significant and positive in every model. The first column in results table 8 reports the estimates when the renter share is treated as exogenous, or without the control function first stage. Column (2) provides estimates when the control function residual is included. Column (3) provides a robustness check to ensure the results are not driven by large cross-county special districts that result in multi-county debts are not uniformly distributed across counties. The sample for these estimates

Table 8: Net Debt per Household

VARIABLES	(1) OLS Fixed Effects	(2) FE & Control Function	(3) FE & CF-Restricted Sample	(4) FE & CF-Not Interpolated
Renter Share	31.368***	28.396***	35.328***	19.108**
	(9.959)	(10.79)	(12.88)	(7.177)
Average Age of Housing Stock	-0.1685**	-0.1638**	-0.1663**	-0.1718***
	(0.080)	(0.077)	(0.082)	(0.059)
Population under 18 per Household	6.8091**	7.1475**	8.9378*	3.3178
	(3.467)	(3.329)	(4.710)	(3.072)
Population Growth	32.963**	32.654**	66.343***	43.627**
	(16.22)	(16.40)	(24.17)	(21.10)
Total Expenditures per Household	1.6957**	1.6965***	1.0287***	1.2459***
	(0.494)	(0.496)	(0.170)	(0.292)
Predicted Residual		3.0363	-6.5277	
		(9.796)	(8.225)	
Observations	18,636	18,636	10,296	12,424
R-squared	0.189	0.189	0.118	0.226
Number of Counties	3,106	3,106	1,716	3,106

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

is trimmed by removing 19 states that have more that 20% of all local borrowing by special districts in at least four of the six observed years.[32] The results are consistent with other estimates suggesting that results are not driven by special districts.

Column (4) is estimated without interpolating the data. This cuts one-third of the observations and uses a different year of fiscal data, 2012. Each decennial census year (1980, 1990, 2000, and 2010) is matched with full population census of government years that end in "2" (1982, 1992, 2002, and 2012). The magnitude of the point estimate across the four models is remarkably steady. Overall, the results consistently reveal that the renter share leads to higher net debt per household.

The effect of renter share is interpretable as a 1 percentage point increase within a county predicts between a $300 increase in net debt per household. The median county-year

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[32]The states removed are AZ, CA, CO, GA, IL, IN, KY, MA, ME, NE, NJ, NC, OR, PA, SC, SD, TX, UT, and WA.

in the data has a net debt per household level of \$1,700 and the average level of net debt per household is \$5,500. This means that a 1 percentage point change in the renter share predicts an 18% change in the median counties net debt level and a 5% change for a county with the average level of net debt. A 1 percentage point increase in renter share is meaningful as it represents a single standard deviation for the 5 year change. The standard deviation of the renter share is 7.5% and seldom occurred in the data.

Only a few of the coefficients on control variables show consistent statistical significance across all models. The main control from the budget constraint, total expenditure per household, is always significant and positive across all models. The average age of housing stock shows a significant negative relationship in models of net debt per household. This is consistent with the fact that home values may be viewed as a constraint on borrowing. The population growth is positive and significant in each model. The population under 18 per household is positive and significant in many models. Perhaps this is suggestive that jurisdictions view debt financed expenditures as investments that pay a return, in terms of the size of the tax base, in future periods. The final variable that is significant and positive across all model is expenditure per household which, given its role within the budget constraint, is completely expected. Other coefficients may be significant in some models though not consistently throughout and are not discussed. Across all models the coefficient on the predicted residual from the control function is insignificant. A significant coefficient would suggest that the renter share is endogenous.

The same procedures related to the first set of results are duplicated for the alternate dependent variable. Thus, the columns of table 9 correspond to the methods and data used previously. The renter share coefficient is again significant across all models with a positive sign, suggesting a robust finding. The consistently significant coefficients for these models are on total expenditure per household, population growth, and population under 18 per household, and each are positive. Lastly, the coefficient on the control function residual is not significant in any of these models.

Table 9: Net Debt to Total Revenue

VARIABLES	(1) OLS Fixed Effects	(2) FE & Control Function	(3) FE & CF-Restricted Sample	(4) FE & CF-Not Interpolated
Renter Share	1.1456***	1.3800**	1.7008**	0.8620***
	(0.409)	(0.588)	(0.739)	(0.314)
Average Age of Housing Stock	-0.0015	-0.0019	-0.0058	-0.0064**
	(0.003)	(0.003)	(0.003)	(0.003)
Population under 18 per Household	0.3638**	0.3371**	0.2800	0.2225**
	(0.164)	(0.169)	(0.222)	(0.108)
Total Expenditures per Household	0.0283***	0.0282***	0.0342***	0.0178***
	(0.004)	(0.004)	(0.008)	(0.003)
Population Growth Rate	3.3215***	3.3458***	4.7620***	2.7396***
	(0.823)	(0.830)	(1.187)	(0.764)
Predicted Residual		-0.2394	-0.1693	
		(0.418)	(0.437)	
Observations	18,636	18,636	10,296	12,424
R-squared	0.074	0.074	0.087	0.084
Number of Counties	3,106	3,106	1,716	3,106

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The various methods, samples, and specifications all report a significant positive relationship between renter share and scaled net debt. This confirms what was expected given the theory and the previous study in Zurich (Stadelmann & Eichenberger 2012). Additionally, this relationship is arguably causal given the theoretical arguments and the empirical approach.

4   Conclusion

The theory in this paper uses the assumptions for Ricardian equivalence for local governments to predict how household preferences related to local public debt will be shaped. Households that own durable property, like a home, within the jurisdiction will treat local public debt as equivalent to current taxes, while households that do not own homes will not view local public debt as equivalent. This stems from the varying ability of households to use exit to avoid the burden of public debt. Since households are heterogeneous in local public debt burden because of their housing tenure, public debt policy should vary with aggregate housing tenure to the extent local preferences are reflected in policy outcomes.

Next, local government policy is a reflection of local household preferences. Local households can use voice in policy making by voting, both for electing representatives and in direct democracy processes. Each likely impacts the communicated preferences and outcomes of public debt. Taking the heterogeneous preferences for public debt with the right of resident households to vote results in a hypothesis; higher proportions of renting households within a jurisdiction leads to higher local public debt levels.

This hypothesis is tested empirically using an instrumental variable approach. The data used is U.S. local data from 1982-2012 from the Census of Governments and the 1980-2010 decennial censuses. The empirical results suggest that the proportion of renting households causes higher levels of public debt. This is robust across multiple models. Thus, the proportion of renters is an important predictor of the level of local public debt.

The results can be taken in a number of ways. First, the set up of the hypothesis is reliant on the institutional structure in place. Namely, the American free market democracy decentralizes a number of policies, allowing for local determination of them. Thus, local preferences are manifest in local policies.

Second, a key avenue for impacting local policies, especially intergenerational redistribution, is through suffrage (Lindert 2004). The extension of suffrage beyond all property owners appears to have a real effect on the fiscal policies. While this adds light to a largely settled historic debate, the sometimes restrictive voting rules employed by special districts that require property ownership may be well-founded.

Third, there are implications for local public debt markets. This study shows one way the aggregate appetite for public debt in a locality can be measured. This informs municipal bond market participants' expectations regarding likely public debt usage as part of the budget. For municipalities that are fiscally distressed or that file for municipal bankruptcy protection, the state control boards and bankruptcy court judges should be aware of the impact of housing composition and the associated burden of initial debt and default resolutions, especially in a declining tax base scenario.

Further research on this issue should try disentangling the political economy mechanism under which renting households preferences are represented. This can be both theoretical and empirically focused. For example, additional empirical research can use data from debt referenda to further evaluate the direct democracy impact of the role of housing composition on debt. While a theoretical focus would likely be to model housing tenure and public debt burdens in a probabilistic voting model.

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Additional Tables and Figures

Table 10: Summary Statistics

VARIABLES	mean	sd	min	max
Net Debt per Household (000s)	5.508	14.33	-48.38	821.6
Net Debt to Total Revenue	0.491	0.614	-5.234	26.52
Renter Share of Households	0.268	0.074	0.102	0.834
Property Tax Share of Revenue	0.247	0.127	0.014	0.954
County Ideology	0.434	0.122	0.067	0.927
State Ideology	0.528	0.184	0.0787	0.908
Median Income (000s)	45.77	11.87	16.88	120.0
% College Graduate	0.149	0.074	0.020	0.678
Unemployment Rate	0.064	0.028	0	0.349
Poverty Rate	0.155	0.070	0	0.599
Households per Square Mile	0.738	3.312	4.85e-04	101.4
% Hispanic	0.055	0.116	0	0.974
% Black	0.087	0.145	0	0.864
% Asian	0.007	0.023	0	0.667
% Other	0.062	0.111	0	0.972
Racial Fractionalization	0.212	0.176	4.79e-04	0.722
Median House Price (000s)	112.0	65.94	8.266	1,291
Local Government Fragmentation	0.313	0.211	0.0273	1
TEL Index	0.154	0.090	0	0.380
Population (000,000s)	0.085	0.302	7.00e-05	9.710
Population Growth Rate (annualized)	0.007	0.014	-0.051	0.138
Population under 18 per Household	0.714	0.156	0.242	2.261
Mean to Median Income Ratio	1.283	0.105	0.981	2.868
Grants Share of Total Revenue	0.419	0.139	0	0.927
Total Expenditure per Household (000s)	10.31	5.245	1.081	157.7
Crime Rate per Capita	0.002	0.003	0	0.045
Average Age of Housing	31.76	8.832	6.708	62.30
5 Year Change in % Renters	0.001	0.011	-0.074	0.099

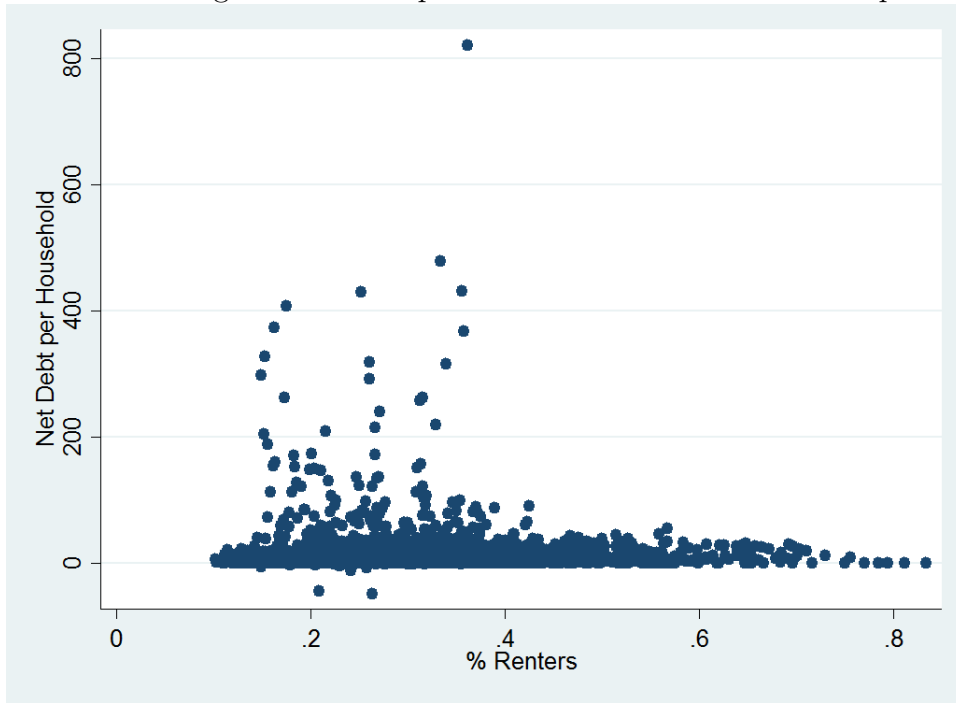Figure 3: Scatterplot- Renter Share and Net Debt per Household

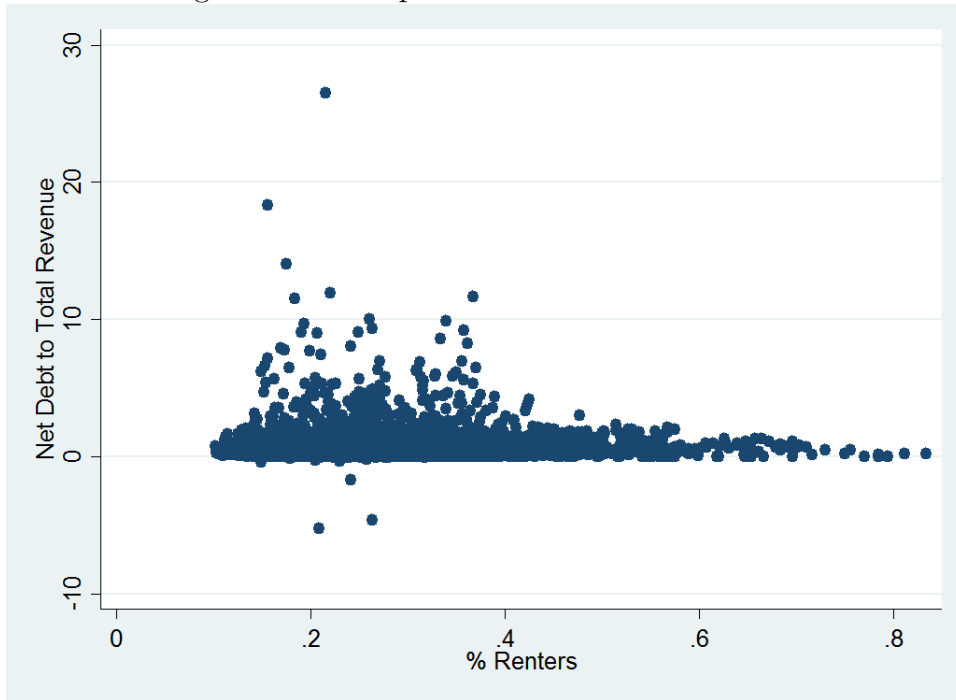Figure 4: Scatterplot- Renter Share and Net Debt to Total Revenue

Figure 5: Kernel Density Estimate of 5 year change of Renter Share

Kernel density estimate

kernel = epanechnikov, bandwidth = 0.0013