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3 **Homestead Exemptions, Heterogeneous Assessment, and Property**  
4 **Tax Progressivity**  
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8 Homestead exemptions and caps to valuation growth are two policies ostensibly intended  
9 to reduce the property tax burden of lower-income homeowners. Because assessment  
10 rates tend to be lower for higher-priced homes, the opposing effects of exemptions and  
11 regressive assessments can result in either a regressive or progressive property tax.

12 While most view the property tax as regressive, this will depend on the relative sizes of  
13 these opposing effects. Using 2018 data on all single-family homes in Florida, we  
14 find that in the majority of counties the homestead exemption dominates regressive  
15 assessment, resulting in a progressive tax. We also explore how progressivity of the  
16 property tax would be affected by modifying current features of the property tax,  
17 including the homestead exemption take-up rate among eligible homeowners, the cap on  
18 growth in assessments, and regressive assessments.

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## 31 **I. Introduction**

32 State and local governments raised over \$525 billion from property taxes in 2017, more  
33 than their combined revenue raised from both individual and corporate income taxes and nearly  
34 as much as their revenue raised from sales taxes (Census, 2017). Although there is substantial  
35 variation in property tax reliance across the United States, property tax revenue contributes  
36 around 20 percent of total state and local government revenue on average. A natural question  
37 concerning any source of tax revenue, let alone one as ubiquitous as property taxation, is who  
38 bears the burden of the tax. Just as an accurate picture of who pays income tax requires more  
39 than a list of marginal tax rates, understanding who pays property taxes requires more than a list  
40 of county millage rates. Property assessment practices and exemption policies are central to  
41 understanding how property taxation affects households along the income distribution. In this  
42 paper we empirically decompose how various elasticities and policies influence the overall  
43 progressivity of the property tax as it applies to homeowners residing in single-family homes.

44 Prior research on property taxation is varied in both scope and method, even within the  
45 area of tax incidence. As summarized in Zodrow (2001), Fullerton & Metcalf (2002), and Oates  
46 & Fischel (2016), economists have been debating the theoretical incidence of the property tax  
47 since the turn of the 20<sup>th</sup> century.<sup>1</sup> Efforts to provide empirical evidence on the incidence of  
48 property taxes are similarly diverse, with each study varying in methodology, setting, and data.  
49 The work most relevant to our purposes, which we review in more detail in the next section,  
50 focuses on how various policies affect the estimated progressivity or regressivity of the property

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<sup>1</sup> In essence, the debate has been about whether the property tax is a regressive excise tax that disproportionately falls on lower-income households who spend a larger portion of their budgets on housing (“old view”), if the property tax should be considered a progressive tax on capital income that accrues largely to higher-income households (“new view”), or if property taxes are instead fees for benefits and amenities that go to Tiebout-sorting homeowners and is therefore neither progressive nor regressive (“benefits view”). In Section III, we consider the applicability of each of these views to our setting.

51 tax. In particular, the homestead exemption, which effectively reduces the taxable value of  
52 property used as a primary residence, is a common policy (currently offered in some form in 48  
53 states) designed to make the tax statutorily progressive. Tax relief programs intended to limit  
54 increases in property tax bills caused by rising home values, such as caps on assessed value  
55 growth, can shift the burden of property taxation in ways that reduce equity and have clear  
56 implications for tax progressivity (Bowman, 2006).<sup>2</sup> Also of central importance to this study is  
57 the assessment literature's common finding that assessment rates tend be lower for higher-priced  
58 homes.<sup>3</sup> Recent evidence on the City of Philadelphia, Pennsylvania from McMillen & Singh  
59 (2020a) suggests that the homestead exemption may not be sufficient to overcome regressivity in  
60 assessments, rendering the property tax a regressive tax, which could contribute to the general  
61 negative opinion of the tax (Cabral & Hoxby, 2015).<sup>4</sup>

62 Our contributions to the literature are threefold. First, we provide estimates of the  
63 progressivity of the property tax in the 67 county jurisdictions that cover the entire state of  
64 Florida, one of the most populated states in the United States. In addition to the large  
65 metropolitan areas that have been the focus of much prior work, our data make it possible to  
66 study property tax progressivity in less dense and even rural areas. Second, our methodology  
67 takes advantage of the detailed data by decomposing the various factors that contribute to tax  
68 progressivity. For example, we are able to directly compare the relative influences of assessment  
69 practices and homestead exemptions on progressivity. Such comparisons generate tangible

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<sup>2</sup> For detailed descriptions of the features of each state's property tax, see Lincoln Institute of Land Policy (2017).

<sup>3</sup> Hodge et al. (2017) cite seven studies that provide evidence on the vertical equity of property tax assessments and add their own results to this literature. Their findings are consistent with prior evidence showing that assessment ratios decline with sale price.

<sup>4</sup> The potential for homestead exemptions to offset problematic property assessment practices was a topic of discussion as early as Thomas (1935).

70 policy implications for modifying property tax progressivity. Third, and finally, our transparent  
71 framework can easily be reproduced in other settings and with other assumptions

72 It is theoretically possible to ascertain how property taxation varies over the income  
73 distribution by estimating the elasticity of property taxes (T) to permanent income (Y), or  $E_{TY}$ .  
74 Data limitations typically prevent the feasibility of this direct approach, however, sometimes due  
75 to common survey data weaknesses or due to the requirement of additional assumptions. Instead,  
76 we indirectly calculate property tax progressivity by separately estimating related elasticities  
77 whose product yields  $E_{TY}$ . These elasticities show how  $E_{TY}$  is affected by the responsiveness of  
78 assessed value to market value, property taxes to assessed value, and market value to a proxy for  
79 permanent household income, thus allowing us to uncover the sources underlying the  
80 progressivity of the tax. We use property tax records from Florida to estimate the elasticities  
81 necessary to back out  $E_{TY}$  and explore various factors that contribute to the overall regressivity  
82 or progressivity of property taxation.<sup>5</sup> Our large sample across a wide variety of jurisdictions  
83 enables us to more generally address the issue of whether homestead exemptions and growth  
84 caps are sufficient to overcome regressivity in assessments.

85 Our analysis reveals that property taxation is slightly progressive in Florida: 72 percent of  
86 counties have an  $E_{TY} > 1$  and the statewide average is 1.09. Our calculations show that  
87 assessment practices, which disproportionately favor higher-priced houses, introduce a powerful  
88 regressive element into  $E_{TY}$ , consistent with the findings in previous work. However, in contrast  
89 to McMillen & Singh (2020a), we find that in the majority of counties the homestead exemption,  
90 by providing a constant exemption amount for all homeowners that is larger in percentage terms

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<sup>5</sup> While homeowners also reside in condominiums and mobile homes, single-family homes are by far where most homeowners reside, accounting for 80 percent of owner-occupied housing in Florida, according to the 2018 American Community Survey.

91 for low-priced houses, more than offsets the regressive assessment influence, resulting in a  
92 property tax that is progressive overall. We also find that assessment growth caps, which have  
93 the potential to increase or decrease progressivity depending on assessment practices and local  
94 market conditions, increase progressivity in the state. After establishing the current level of  
95 progressivity, we explore how our measures of progressivity would change under a number of  
96 alternative policies by generating counterfactual tax liabilities. Relative to the baseline average  
97  $E_{TY}$ , progressivity increases by 10 percent under full take-up of the homestead exemption,  
98 increases by 22 percent under proportional assessment, is unaffected if the \$10,000 cap on the  
99 state and local tax (SALT) deduction were repealed, and decreases by 46 percent in the absence  
100 of all state and local property tax relief programs. With a better understanding of how these  
101 different aspects of property taxation influence the overall progressivity of the tax, policymakers  
102 may be able to more effectively balance revenue and equity concerns.

## 103 **II. Literature Review**

104 Our literature review focuses on the empirical studies most relevant to our study. It is not  
105 exhaustive; in particular, a promising direction for future research is to analyze how policies in  
106 other settings affect property tax progressivity, including circuit-breaker programs (Bowman,  
107 2006) and policies intended to inform and protect homeowners from higher taxes following  
108 reassessment (Cornia & Walters, 2006).

109 Plummer (2003) uses property tax records for single-family homes in Dallas County,  
110 Texas, where homestead exemption amounts vary across jurisdictions within the county.  
111 Plummer estimates Suits indices that indicate that county and school taxes are proportional to

112 slightly progressive, whereas city taxes are moderately regressive.<sup>6</sup> She also finds that  
113 exemptions for residents over the age of 65, another common property tax exemption, increases  
114 progressivity. Our results are broadly consistent with her findings. It is worth noting that  
115 Plummer uses the assessed value as a proxy for permanent income. Housing consumption may or  
116 may not be good indicator of permanent income. There is also a concern that the assessor’s  
117 estimate of market value captures much of variance in housing consumption.

118           Beal-Hodges, Borg, & Stranahan (2016) use 2010 data on individual owner-occupied  
119 properties in Florida to regress the ratio of taxes paid to income on income and neighborhood  
120 demographic variables. They use the median income of the block group that contains the home  
121 as a proxy for a homeowner’s income and find that the property tax is regressive. Apart from  
122 possible attenuation bias resulting from their measure of the homeowner’s income, because  
123 median income appears as the dominator of their dependent variable and is their main regressor,  
124 their conclusion that the property tax on owner-occupied housing is regressive may be affected  
125 by spurious correlation.<sup>7</sup> Given that we use updated data from the same setting as Beal-Hodges et  
126 al. (2016), we attribute our contrasting conclusion to different methodological approaches.

127           McMillen & Singh (2020a) obtain the incomes for a sample of homeowners by matching  
128 characteristics of the loan found in both the CoreLogic and Home Mortgage Disclosure Act  
129 (HMDA) data bases, where the former contains tax data and the latter the current income of  
130 recent mortgage holders. They restrict their analysis to four cities (Baltimore, Cleveland, Denver

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<sup>6</sup> The Suits index compares the cumulative percentage of the tax burden and the cumulative percentage of total income. A value less (more) than one indicates a regressive (progressive) tax. Describing this approach, Plummer writes that “differences between a property’s assessed value and its actual market value should not bias S unless assessed-to-actual market value varies systematically with value.” This assumption may not be realistic according to studies documenting that assessment practices differ across the distribution (e.g., McMillen & Weber, 2008).

<sup>7</sup> Moore (2008) also uses Florida data to study how property tax equity is affected by the homestead exemption and assessment growth caps. The aggregation of older data (1995-2004) into coastal and inland groups combined with methodology focused on different outcomes (e.g., coefficient of dispersion) may explain why he concludes that the policies in question reduce equity. Replicating his study with current data is left for future research.

131 and Philadelphia) spanning the years 2014 to 2017. They use three versions of taxes paid: the  
132 statutory tax rate times the assessed value, the statutory rate times the sales price, and the taxes  
133 reported in the CoreLogic data. The results for all four cities and all three measures of the taxes  
134 paid reveal that the property tax is a regressive tax. Most relevant to our study is that in  
135 Philadelphia, the only city in their paper with a homestead exemption, the tax is as regressive as  
136 in the other three cities. The authors acknowledge that the use of permanent rather than current  
137 income may yield different findings. Our conclusions may differ from those in McMillen &  
138 Singh (2020a) due to a combination of data and methodological differences. Where they focus  
139 on four large cities, our sample covers the entire state of Florida. The property tax is a local tax  
140 and what may be true in one jurisdiction may not be true in another. Furthermore, their sample is  
141 restricted to mortgage holders that can be found in the HMDA data base. It is not clear that this is  
142 a representative sample across the income distribution. Finally, our work differs from theirs in  
143 that we do not assume that all homeowners eligible for the homestead exemption take it.

144 A related area of study with clear implications for property tax progressivity pertains to  
145 regressivity in assessment practices, where less expensive homes are over-assessed in  
146 comparison to more expensive homes. Much of this literature is methodologically focused,  
147 essentially debating the best way to estimate assessment regressivity. We review this debate in  
148 Appendix A as it applies to our chosen methodology. What can be considered as a stylized fact  
149 from these studies, most recently in a systematic national study by Berry (2021), is that  
150 assessment regressivity is a pervasive phenomenon. Possible explanations for this pattern could  
151 be the higher frequency of successful assessment appeals by owners of higher-priced properties  
152 (McMillen & Weber, 2010), the lack of comparable sales for use in the assessment process  
153 (McMillen & Weber, 2008), or other limitations in the data and methods used by assessors

154 (Berry, 2021). Holding everything else constant, assessment regressivity will reduce property tax  
155 progressivity.

### 156 **III. Background**

157           There is considerable variation in both property taxation and property tax exemptions  
158 across the United States, yet throughout the country the property tax comprises a substantial  
159 percentage of own source revenue by state and local governments. Our data come from Florida, a  
160 state that falls very close to the median in terms of reliance on the property tax for government  
161 revenue (Census, 2017). That Florida is fairly representative in this dimension combined with the  
162 fact that it is the fourth most populated state make it an attractive setting in which to study the  
163 property tax.

164           Counties, municipalities, and school districts can levy property taxes in Florida. Both  
165 county and municipal governments collect property taxes in Florida, but the administration of the  
166 tax is at the county level. The overwhelming majority of property taxation is raised for county  
167 governments. For example, the average millage rate for county government operations is 0.699  
168 percent while the average millage rate for municipalities is 0.146 percent.<sup>8</sup> There is sizeable  
169 variation in millage rates across the state, the largest county millage rates being nearly four times  
170 as large as the lowest county millage rates, but rates are fairly constant within a county given the  
171 relatively small rates levied by municipalities and the fact that school districts are synonymous  
172 with counties in Florida. On average, only 16 percent of the total millage rate is due to sub-  
173 county levies.

174           Because the property tax is an ad valorem tax, it is necessary for each county tax assessor  
175 to determine the taxable value of the property in order to estimate how much a homeowner owes

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<sup>8</sup> We present summary statistics of Florida's millage rates in Appendix Table 1.



176 in property taxes. In Florida, assessors evaluate properties annually in order to provide an  
177 estimate of what each home would sell for on January 1 of the tax roll year. This estimate,  
178 labeled the “just value,” is in part influenced by recent sales of comparable properties, however  
179 each county has their own assessment methods and policies.<sup>9</sup> In Florida, the “assessed value”  
180 commonly referred to in the literature has a separate meaning, though it can be equivalent to the  
181 just value in the absence of assessment limitations. Concerns that large price increases in  
182 comparable properties could burden existing homeowners with increasing property tax  
183 payments, despite no tangible increases in liquid wealth, helped motivate the passage of the  
184 “Save Our Homes” (SOH) policy in 1995 that caps the growth in assessed value at 3 percent or  
185 the change in Consumer Price Index, whichever is smaller.<sup>10</sup> Applying the SOH cap to the  
186 previous year’s assessed value, establishes the current assessed value of a house.

187         The next step is to apply property tax exemptions to the current assessed value, thereby  
188 generating the “taxable value” of a home. Florida’s property tax homestead exemption originated  
189 in response to the Great Depression, when many property owners found themselves unable to  
190 pay their property taxes and feared losing their homes. While there have been multiple changes  
191 and expansions since its inception, the policy has remained constant during our period of  
192 analysis.<sup>11</sup> A \$25,000 exemption is applied to the first \$50,000 of a homeowner’s assessed value  
193 if the property is the homeowner’s permanent residence and the property is owned on January 1  
194 of the tax year. This exemption applies to all taxes, including school district taxes. If the

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<sup>9</sup> Title XIV, Chapter 193 covers assessment practices in Florida. In addition to the standard assessments, Section 11 lists eight factors (location, size, condition, etc.) that appraisers should use in generating a just valuation. How much weight is placed on these factors is left up to the discretion of the appraisers.

<sup>10</sup> The SOH limitation is not unlike the more famous and extensively studied California policy Proposition 13 (see, for example, Rosen, 1982).

<sup>11</sup> Voters approved a \$5,000 Homestead Exemption as an Amendment to the Florida Constitution in 1934. The Florida Legislature increased the exemption to \$10,000 during the 1960s. Subsequent voter referendums raised the exemption to \$25,000 in 1980 and then again in 2008 to a maximum possible amount of \$50,000. Roughly 85 to 99 percent of homeowners, depending on the county, receive the maximum amount.

195 property's assessed value is at least \$50,000, an additional exemption of up to \$25,000 is applied  
196 to the assessed value between \$50,000 and \$75,000. This additional exemption is not applied to  
197 school district taxes. The homestead exemption does not come automatically, rather eligible  
198 homeowners must apply for the exemption, which involves providing documentation that they  
199 use the property as their primary residence. A homeowner continues to receive the benefit unless  
200 they notify the assessor of a change in status. Depending on millage rates, Ihlanfeldt  
201 (forthcoming) shows that the homestead exemption will save the homeowner between \$800 and  
202 \$1200 in annual property taxes. Receiving the homestead exemption automatically grants the  
203 homeowner the SOH assessment limitation. The SOH limitation is not available to homeowners  
204 without the homestead exemption. Other exemptions granted to specific groups of homeowners,  
205 including the disabled, veterans, and low-income senior residents, can be claimed simultaneously  
206 and similarly reduce the taxable value of a home, sometimes to zero, though they apply to only 4  
207 percent of homeowners. Finally, multiplying the taxable value by the millage rate determines the  
208 homeowner's tax liability.

209         Each part of the process by which property tax liability is calculated has the potential to  
210 affect the progressivity of the property tax. Because our combined millage rates are relatively flat  
211 within a county, their effect on overall progressivity is limited. As previously noted, prior work  
212 documents how assessment practices generally lead to more regressive property taxation,  
213 whereby higher-priced homes receive lower effective rates (Hodge et al., 2017; Berry, 2021).  
214 The role played by the SOH cap in affecting the incidence of the tax depends on the relative  
215 growth in prices across different parts of the real estate market. If higher-priced (lower-priced)  
216 homes appreciate at a faster pace than lower-priced (higher-priced) homes, SOH could lead to  
217 less (more) progressive property taxation. Assessment exemptions such as the homestead

218 exemption should lead to more progressive property taxation because they make up a larger  
219 percentage of the value of lower-value properties.<sup>12</sup> And, of course, the relationship between  
220 income and housing consumption is central to any measure of property tax progressivity. If  
221 lower income homeowners spend relatively more of their income on housing than higher income  
222 homeowners then a property tax will tend to be more regressive. Although we consider how each  
223 of these elements affects progressivity, it is important acknowledge that our study does not  
224 account for other behavioral responses to property taxation that may be important in a general  
225 equilibrium model, such as location and house size decisions.

## 226 **IV. Methodology**

227 A researcher with data linking property taxes (T) to permanent income (Y) could directly  
228 estimate the elasticity  $E_{TY}$  to quantify how the burden of property taxation changes as income  
229 increases. Property taxation is progressive if  $E_{TY}$  is greater than one, regressive if  $E_{TY}$  is less than  
230 one, and proportional if  $E_{TY} = 1$ . Data limitations prevent this direct approach, however, so we  
231 employ a modified version of the framework presented in Ihlanfeldt (1982). The original  
232 framework described how a researcher with separate estimates of how the market price of a  
233 house (H) relates to permanent income and how property taxes relate to house price can  
234 determine how property taxes relate to permanent income. Specifically, multiplying  $E_{HY}$  and  $E_{TH}$   
235 yields the desired parameter,  $E_{TY}$ .

236 In this paper, we expand upon the original framework in order to investigate the various  
237 factors that influence measures of property tax progressivity. We estimate multiple elasticities,  
238 the product of which quantifies the regressivity or progressivity of the property tax:

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<sup>12</sup> The incidence of property taxes in the non-residential and rental markets are important but outside the scope of this paper. See England (2016) for a survey of the research on the latter.

239 
$$E_{TY} = E_{HY} \times E_{JH} \times E_{TJ} \tag{1}$$

240 The elasticity of a house’s market price to permanent income ( $E_{HY}$ ) describes how housing  
 241 consumption changes with income. To be clear, the relevant income measure is permanent  
 242 income, which is more related to housing consumption than current income and allows a better  
 243 assessment of the burden of the tax.<sup>13</sup> Property taxes are related to a house’s market price, but tax  
 244 assessors can have a meaningful impact on the how a house is valued for tax purposes. As  
 245 described in the previous section, the first assessment by the county is labeled the just value ( $J$ ).  
 246  $E_{JH}$  measures how an assessor’s just value relates to the house price. If  $E_{JH} < 1$  then just values  
 247 do not rise proportionally with housing prices and assessment is categorized as regressive.  
 248 Finally,  $E_{TJ}$  captures the relationship between property taxes and the just value. It is important to  
 249 note that exemption eligibility and take-up are potentially correlated with the house price. By  
 250 using the just value of a home before exemptions, we isolate the assessor influence on the just  
 251 value in  $E_{JH}$  and the importance of exemptions and limitations in  $E_{TJ}$ . By simple algebraic  
 252 manipulation, it is clear that the product of these three elasticities yields  $E_{TY}$ .

253 Using our detailed tax roll data on individual properties ( $i$ ), we perform separate  
 254 regressions for each county in order to generate 67 separate estimates of both  $E_{JH}$  and  $E_{TJ}$ :

255 
$$\ln(JV_{i,t}) = \alpha + E_{JH} \ln(H_{i,t}) + \tau_t + \epsilon_{i,t} \tag{2}$$

256 
$$\ln(T_i) = \alpha + E_{TJ} \ln(JV_i) + \epsilon_i \tag{3}$$

257 Our log-log specifications will yield unbiased elasticity estimates under the standard OLS  
 258 assumptions. We include year fixed effects ( $\tau$ ) when estimating  $E_{JH}$  because the sample includes  
 259 pooled sales data over multiple years. Our decision to estimate county-level elasticities is due to

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<sup>13</sup> See Mayo (1981) for a discussion of how different income measures can affect estimates of  $E_{HY}$ .

260 the fact that the tax is administered at the county level. Comparing estimates across the state  
261 permits us to explore patterns related to the estimates and understand to what extent local policy  
262 decisions can influence progressivity. We do not have data on individual homeowner income  
263 necessary for an analogous estimation of  $E_{HY}$ . Instead, we rely on median house expenditures  
264 and income reported at the block group level in the American Community Survey (ACS); we  
265 provide a full description of this process in Appendix B. We pool the ACS data to produce a  
266 statewide estimate of  $E_{HY}$  using a log-log specification with county fixed effects.<sup>14</sup>

267 To summarize, data limitations serve as the initial motivation for this indirect estimation  
268 of  $E_{TY}$ , yet this approach offers the opportunity to decompose and modify the various  
269 components of  $E_{TY}$  in order to better understand how characteristics of the tax affect its  
270 progressivity or regressivity (for example, homestead exemptions relative to assessment  
271 practices).

272 A potential complication surrounding our approach to estimating the progressivity of the  
273 property tax on single-family homeowners is that there has long been disagreement on how to  
274 view the property tax. There are three distinct views of the property tax that have a bearing on  
275 estimating the incidence of the tax, generally labeled as the benefits view, the old view, and the  
276 new (or capital tax) view. The benefits view considers the tax a fee for the receipt of public  
277 services. Under this view estimating the incidence of the property tax is meaningless.<sup>15</sup>  
278 Homebuyers shop across jurisdictions to find their optimal public services/tax package (Tiebout,  
279 1956) and, with perfect zoning, free riders are kept out of the jurisdiction (Hamilton, 1975).

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<sup>14</sup> The statewide estimates of  $E_{TJ}$  and  $E_{JH}$  are similar to the means we present below. The decision to pool the block group data is due to the reduced number of observations and the stability of  $E_{HY}$  estimates across various specifications.

<sup>15</sup> As a reviewer noted, the benefit view does not imply the property tax has no incidence, rather it implies that the incidence of the tax is identical to the incidence of the benefits received.

280 Jurisdictional characteristics in Florida are inconsistent with this view. Counties and school  
281 districts are synonymous and there are only 67 of them within the state. Moreover, counties and  
282 not cities are the primary providers of non-school related public services. Within counties, on  
283 average, 50 percent of the population resides within the unincorporated area. Hence, shopping  
284 across communities in the Tiebout-sorting sense is extremely limited, especially within counties,  
285 which are the focus of our analysis.

286 According to the old view theory of property tax incidence (Netzer, 1973), the property  
287 tax on housing improvements acts completely as an excise tax on housing consumption. The  
288 current homeowner, therefore, bears the full burden of this tax in his capacity as a consumer  
289 of housing services. Under this view analyzing the incidence of the tax is meaningful and our  
290  $E_{TY}$  estimation is a reasonable approach.

291 Under the new view the tax levied on owner-occupied housing capital consists of two  
292 components – the national average rate of taxation ( $t_n$ ) on capital and an excise tax effect ( $t_e$ ),  
293 equal to the difference between the average tax rate within the local homeownership market and  
294 the national average rate (Mieszkowski, 1972). In his role as a capitalist, the homeowner pays  $t_n$ .  
295 If  $t_e$  is greater than (less than)  $t_n$  capital will exit (enter) the local metropolitan  
296 homeownership market until the net rate of return on capital is equalized across  
297 metropolitan areas and alternative capital employments. These capital movements imply that  
298 local area deviations from the national average rate of taxation will be shifted forward to  
299 homeowners as part of the price of housing services or backward to immobile factors  
300 employed in the production of housing. Our  $E_{TY}$  estimates assume an absence of backward  
301 shifting. How reasonable is this assumption? Labor and materials are mobile, and therefore bear  
302 little of the tax burden, especially in the long run. Because land is immobile landowners will bear

303 a portion of the tax. The issue for our  $E_{TY}$  estimates is the size of this portion. Ihlanfeldt (1982)  
304 shows that this portion is small if the demand for housing is price inelastic, the elasticity of  
305 substitution between land and the other inputs employed in the production of housing is close to  
306 one, and land costs are a relatively small portion of total construction costs. Evidence lends  
307 support to inelastic demand (Albouy et al., 2016, Pollinsky & Ellwood, 1979) and a unitary  
308 substitution elasticity (Ahlfeldt & McMillen, 2014; Thorsnes, 1997). Using our data on the land  
309 cost and the price of new homes, we computed the percentage land cost for every county in our  
310 sample and found the average to be 19 percent. With inelastic demand, the elasticity of  
311 substitution must be small if tax induced changes in the local demand for housing are going to  
312 have an important impact on the price of land. Given that land costs are a small portion of  
313 construction costs, a dramatic decline in the price of land must occur if landowners are to bear a  
314 significant portion of the tax. The evidence therefore suggests that the lion's share of the new  
315 view excise tax effect is shifted forward to homeowners. Hence, under either the old or new  
316 view, we have confidence in our estimation strategy.

## 317 **V. Data**

318 Our data come from the Florida Department of Revenue (FDOR), who provide the 2018  
319 property tax rolls for all 67 counties. Each county has autonomy over the administration of the  
320 property tax, with annual review provided by the FDOR. These tax rolls include a host of  
321 information, including specific property tax exemptions granted, the just value, the assessed  
322 value, and property tax liability. In addition to observing which owners actually received the  
323 homestead exemption, we leverage the address information in order to identify owners who

324 failed to claim this benefit despite being eligible.<sup>16</sup> If the physical address of the home and the  
325 homeowner’s mailing address match and there is no homestead exemption on the property, then  
326 we consider the homeowner a non-claimant.<sup>17</sup> We are unable to identify non-claimants of other  
327 property tax exemptions although we do analyze how these other exemptions compare to the  
328 homestead exemption in affecting tax progressivity. The most common are complete or partial  
329 exemptions for disabled residents (veteran or otherwise) and various county and municipality tax  
330 exemptions for low-income senior residents. For our analysis, we focus on owner-occupied,  
331 single-family homes in tax year 2018. Once flagged as owner-occupied in 2018, we retrieve all  
332 of the relevant tax information dating back to 2008. This enables us to determine the number of  
333 years over this period the current homeowner had occupied the home, which we then use  
334 calculate counterfactual housing values in the absence of various exemptions and limitations that  
335 can compound over time. We use data on the percentage of itemizers in a county (IRS, 2018) to  
336 account for federal deductibility and the SALT cap.<sup>18</sup>

337 We present summary statistics of our data in Table 1. We include county-specific  
338 information in Appendix Table 2. Our sample includes over 3.5 million houses in Florida. There  
339 is substantial variation in housing values, millage rates, and property tax amounts, in part  
340 reflecting the diversity of real estate in the state. The average just value is around \$256,000.

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<sup>16</sup> According to Florida Statute 196.031, this exemption is available to “[a] person who, on January 1st, has the legal title or beneficial title to real property in [Florida] and who in good faith makes the property his or her permanent residence or the permanent residence of another or others legally or naturally dependent upon him or her.”

<sup>17</sup> It is possible that homeowners who have a mailing address that matches the home address are ineligible for the homestead exemption because the home is not their primary residence. For example, the home could be a second home or a rental. Although we cannot determine if a home is a rental or second home, the results are unaffected when we drop any observation where the homestead exemption is not claimed and the owner’s name is affiliated with another property within the state.

<sup>18</sup> We assume that household income is  $JV/2.5$ , based on common realtor guidance on how much a prospective homeowner can afford to pay for a home, in order to map an observation to an income group in the IRS data and assign a federal marginal income tax rate (MTR). The modified taxable value is  $(1 - \rho)TV + \rho TV(1 - MTR)$  where  $\rho$  is the percentage of itemizers in a county-income group in 2018. We limit the amount TV can decrease to account for the SALT cap.



341 Accounting for the SOH cap produces an average assessed value of \$193,000. The average  
342 taxable value is \$146,000, demonstrating the combined impact of exemptions and the SOH cap.  
343 The average millage rate is 0.015 and the average property tax liability is \$2,151. The average  
344 number of properties per county is 52,753. As outlined above, estimating  $E_{JH}$  requires sales data  
345 that is more limited: the average number of sales between 2013-2018 per county is 22,624.  
346 Between 8 and 9 percent of eligible homeowners do not claim the homestead exemption. Senior  
347 exemptions, either at the county or municipality level, and disabled exemptions are claimed by  
348 4.1 percent and 1.1 percent of the homeowners in the sample, respectively. As with the  
349 homestead exemption, these additional exemptions are not automatic but must be applied for  
350 with the requisite supporting documents, meaning there may be many homeowners eligible for  
351 these exemptions who do not take them.<sup>19</sup>

## 352 **VI. Analysis**

353 We report our elasticity estimates in Section VI.A. In Section VI.B we analyze these  
354 estimates from a number of perspectives: VI.B.I explores how our estimates relate to other  
355 county characteristics, VI.B.II considers how the homestead exemption affects the progressivity  
356 of property taxation, VI.B.III isolates the importance of assessment practices on the regressivity  
357 of property taxation, and VI.B.IV examines how modifying other policies (senior exemptions,  
358 SOH, SALT cap) would affect property tax progressivity.

### 359 **VI.A. Baseline Elasticity Estimates**

360 The first elasticity we estimate is  $E_{TJ}$ , the elasticity of property taxes to the just value.  
361 Regressing the log of property taxes on the log of the just value for each county produces 67

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<sup>19</sup> For example, applicants for the senior citizen exemption must provide proof of residency and income information (e.g., IRS 1040, W-2) along with the Form DR-501SC.

362 different estimates of  $E_{TJ}$ , the summary of which we present in Table 2.<sup>20</sup> Under current policy  
363 with incomplete take-up of the homestead exemption, the average increase in property taxes is  
364 1.77 percent for a 1 percent increase in the just value of a home. Despite variation across  
365 counties,  $E_{TJ}$  is always greater than 1, reflecting that, at least in this dimension, property taxation  
366 in Florida favors homeowners with lower value properties.

367 The next component of Equation 1 we estimate is  $E_{JH}$ , the elasticity of the just value to the  
368 house's market (sale) price. Once again using a log-log specification, we estimate separate  $E_{JH}$   
369 elasticities for each Florida county.<sup>21</sup> To estimate  $E_{JH}$  we restrict our sample to properties that were  
370 recently sold. For these regressions, we use arm's length sales between 2013-2018 that occurred  
371 in the year preceding the assessor's January 1 estimate of just value.<sup>22</sup> The average  $E_{JH}$  is 0.83,  
372 indicating that for every 1 percent increase in the market value of a home the assessor's just value  
373 estimate increases by about 0.8 percent. As previously mentioned, this pattern of assessment  
374 practices can have important implications for the tax burden of homeowners across the income  
375 distribution. It is worth noting that  $E_{JH}$  is never above 1, suggesting that current assessment  
376 practices consistently favor higher priced homes.

377 The final step in measuring the regressivity or progressivity of property taxation is  
378 merely multiplying these elasticities together as defined in Equation 1. For the remainder of the  
379 paper we will use  $E_{HY} = 0.75$ , based on our investigation in Appendix B, as our estimate of the

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<sup>20</sup> See Appendix Table 2 and Appendix Figure 2 for county-level estimates and Appendix Figure 1 for the distribution of  $E_{TJ}$  estimates.

<sup>21</sup> There has been some debate over which method of estimating  $E_{JH}$  produces the least biased results (DeCesare & Ruddock, 1998; McMillen & Singh, 2020a; 2020b), which we review in Appendix A.

<sup>22</sup> Arm's length sales are those identified as "qualified" by the FDOR and exclude a wide range of transactions where the reported sales price may be an unreliable estimate of the true market value of the property. In addition to including year fixed effects, we also trimmed our sales to check if our  $E_{TJ}$  estimates are affected by statistical outliers. The results are unaffected when we exclude the top and bottom 1 percent of sale prices from our regression samples.

380 elasticity of housing consumption with respect to permanent income. Although our estimate of  
381  $E_{HY}$  is stable across numerous specifications and is comparable to prior work (Albouy, Ehrlich,  
382 & Liu, 2016), it is important to keep in mind that using different values of  $E_{HY}$  will shift the  
383 overall  $E_{TY}$  values accordingly. Referring again to Table 2,  $E_{TY}$  under current policy and benefit  
384 take-up indicates that the property tax is slightly progressive on average (1.09). There is  
385 substantial variation in this elasticity across counties with estimates ranging from around 0.61 up  
386 to 1.57. However, 72 percent of counties currently have progressive property taxation, which we  
387 show in Figure 1.

## 388 **VI.B. Factors related to the elasticity estimates**

389 With our baseline elasticity estimates in hand, we turn now to identifying what factors  
390 underlie these estimates and how modifying the existing menu of property tax policies could  
391 affect our estimates.

## 392 **V.B.I. County Characteristics Correlations**

393 In Table 3, we show how our elasticity estimates relate to county variables from the  
394 2018 American Community Survey. The first column shows that higher income, more populated,  
395 and more educated counties are associated with higher  $E_{JH}$ . A higher tax base per capita and less  
396 established residents, defined as the fraction of residents who moved into their current residence  
397 before the year 2000, also corresponds with a higher  $E_{JH}$ . Our preferred interpretation of these  
398 correlations is that places with higher economic activity have less regressive assessment  
399 practices. A robust real estate market, resulting from both a larger population and more mobile  
400 residents, would arguably make it easier to collect appropriate comparable sales to use when  
401 generating the just value of a house. Remarkably, the same variables are correlated in the

402 opposite way with our  $E_{TJ}$  estimates. If older residents living in less economically vibrant areas  
403 are more likely to qualify for various exemptions or have accrued substantial SOH benefits, this  
404 could explain why those locations have a subdued connection between just value and taxable  
405 value. The number of observations per county in our sample is positively correlated with a higher  
406  $E_{JH}$  but uncorrelated with  $E_{TJ}$ , further supporting the hypothesis related to few comparable sales,  
407 a concern with precedent in the literature. The fact that the correlations of  $E_{JH}$  and  $E_{TJ}$  are in the  
408 opposite directions manifests itself in the third column, which shows there are no significant  
409 patterns when we consider our final measure of progressivity. Despite these plausible  
410 explanations, we hesitate to put too much weight on this correlational exercise though we  
411 recognize the potential for future work to shed light on this question.

## 412 **VI.B.II. Homestead Exemption**

413         Given the non-trivial percentage of homeowners who fail to apply for the homestead  
414 exemption (8 percent), it is important to consider how incomplete benefit take-up affects the  
415 progressivity of property taxation. Failure to claim this benefit not only leads to taxable values  
416 that are potentially \$50,000 higher than they could be in the short-run, but the SOH cap on  
417 assessed value growth that is coupled with the homestead exemption means that even larger  
418 differences in potential versus actual taxable values emerge over time. The second panel of Table  
419 2 shows that the average  $E_{TJ}$  increases from 1.77 to 1.96 when we assume complete benefit take-  
420 up.<sup>23</sup> When combined with the same  $E_{JH}$  and  $E_{HY}$  used in the first panel, this change boosts the  
421 average  $E_{TY}$  from 1.09 to 1.20. Complete take-up of the homestead exemption therefore has the  
422 potential to increase property tax progressivity on average by 10 percent. As illustrated in Figure

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<sup>23</sup> This involved applying the homestead exemption to the assessed values of eligible homeowners, where the growth in assessed value under the cap was based on the number of years the homeowner resided in the home.

423 1, 11 of the 19 counties where the property tax is currently regressive would become progressive  
424 if every homeowner eligible for the exemption claimed it.

425 Another way to measure how the homestead exemption affects progressivity is to  
426 simulate its removal. Without the homestead exemption, the taxable value equals the assessed  
427 value minus other exemptions. Panel C shows that ending this homestead exemption policy  
428 would decrease the mean  $E_{TY}$  from the baseline of 1.09 down to 0.60. One way of quantifying  
429 the importance of the homestead exemption in making Florida's property tax system progressive  
430 on average is that, without this exemption, progressivity would be reduced by 45 percent. From a  
431 binary perspective, Figure 1 shows that eliminating the homestead exemption would lead to  
432 regressive property taxation in every county in the state.

### 433 **VI.B.III. Assessment Significance**

434 To isolate the importance of assessment practices on the regressivity of property taxation  
435 we assume proportional assessment by setting  $E_{JH} = 1$  in Panel D of Table 2, holding the  
436 exemption take-up at actual values. In other words, assessors will increase the just value of a  
437 house by 1 percent for every 1 percent increase in the house's market (sale) price, thereby  
438 eliminating any regressive influence of  $E_{JH}$  on  $E_{TY}$ . The average  $E_{TY}$  increases from the baseline  
439 1.09 to 1.33, representing a 22 percent increase in tax progressivity, and 16 of the 19 currently  
440 regressive counties would become progressive. Figure 2 illustrates the distribution of county  $E_{TY}$   
441 estimates under various combinations of exemption policies and assessment practices. It is clear  
442 that while proportional assessment would increase progressivity, it would not be sufficient to  
443 achieve progressive property taxation. Absent homestead exemptions, Equation (1) shows that  
444 property taxation will be regressive as long as  $E_{HY} < 1$ , even if proportional assessment is  
445 feasible. Therefore, while proportional assessment helps to avoid making property taxation more

446 regressive and would increase progressivity more than full take-up of the homestead exemption,  
447 the homestead exemption is the primary driver of property tax progressivity.<sup>24</sup>

#### 448 **VI.B.IV. Alternative Policies’ Impact on Progressivity**

449 The remaining panels of Table 2 explore how modifying other policies would affect  
450 property tax progressivity. Except for the final panel of Table 2, where all exemptions and the  
451 SOH cap are eliminated, we consider each change in isolation, without changing any of the other  
452 factors affecting the tax liability.

453 The SOH cap on assessed value growth that homeowners in Florida automatically receive  
454 if they are granted a homestead exemption is another policy that affects property tax  
455 progressivity. This cap will differentially affect homeowners along the income distribution if  
456 there is heterogeneous growth in the value of houses. For each homeowner we constructed the  
457 counterfactual of not having the SOH cap by predicting the current assessed value without SOH  
458 over the number of years the homeowner occupied the home.<sup>25</sup> Panel E of Table 2 indicates that  
459 the SOH cap meaningfully contributes to property tax progressivity in Florida. Removing the cap  
460 would reduce average tax progressivity by 27 percent and there would be 61 counties with a  
461 regressive property tax instead of the current 19.<sup>26</sup> It is important to recall that the value of the  
462 SOH cap grows over time, making housing tenure a key feature in the value of this tax benefit.  
463 Property taxation may appear more progressive in a static sense if compounded SOH benefits

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<sup>24</sup> See Appendix Figure 3 for county-level comparisons of the impact of full take-up versus proportional assessment.

<sup>25</sup> The data allowed a maximum duration of stay of ten years. For homeowners under the SOH cap for longer than 10 years, our estimate of what their property taxes would be 2018 without the cap contains some measurement error. The potential for bias in our counterfactual depends on whether the errors are correlated with just value. Although we have no reason to suspect a correlation, we cannot rule it out. Therefore, this counterfactual should be interpreted with the appropriate caution.

<sup>26</sup> Our results suggest that less expensive homes appreciated more rapidly than more expensive homes over the 2008-2018 time period. Davidson (2019) reports that “since the U.S. housing recovery began in 2012, affordable homes in modest neighborhoods have notched the sharpest price increases while luxury houses in wealthy neighborhoods have had the smallest percentage gains.” This suggests that the Florida experience may have mirrored what was happening at the national level.

464 accrue to elderly residents with lower incomes in retirement, but these homeowners may  
465 nevertheless have high permanent incomes. Thus, a better understanding of the impact of the  
466 SOH cap on progressivity requires additional research, perhaps taking a life-cycle approach.<sup>27</sup>

467 Florida's reputation as a welcoming state for retirees motivates the consideration in Panel  
468 F: how important are low-income senior resident exemptions to overall property tax  
469 progressivity? Relative to the baseline, eliminating all county and municipality senior  
470 exemptions would reduce progressivity by about 10 percent. These exemptions do not  
471 dramatically affect statewide averages, likely because they are only available in a subset of  
472 jurisdictions and come with additional eligibility requirements. Nonetheless, senior exemptions  
473 appear to have a non-trivial impact on property tax progressivity. Without these exemptions there  
474 would be 21 more counties, more than double the current number, with regressive tax incidence.

475 The Tax Cuts and Jobs Act (TCJA) of 2018, among many other changes, imposed a  
476 \$10,000 limit on the SALT deduction. Panel G relaxes this cap with minimal impact on our  
477 estimates: the average  $E_{TY}$  decreases by less than 1 percent and Figure 1 shows that 1 additional  
478 county became classified as regressive. We should point out, however, that the results of this  
479 particular exercise may be more sensitive to the state under investigation. Florida's reliance on  
480 property taxes and sales taxes, with no state income tax, limit the importance of the cap.  
481 Performing similar analyses in a state with progressive income taxation may yield markedly  
482 different results.

483 The final panel in Table 2 shows that eliminating all of the aforementioned state and local  
484 tax breaks (exemptions and the cap on assessment growth) would render the Florida property tax  
485 on single-family homes a regressive tax throughout the state. It is noteworthy that the decrease in

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<sup>27</sup> The SOH cap may also have efficiency and mobility implications (Shan, 2010; Ihlanfeldt, 2011).

486 progressivity of nearly 46 percent from eliminating all tax advantages is only slightly larger than  
487 the decrease due to the elimination of the homestead exemption alone. To reiterate, the  
488 homestead exemption is the primary driver of property tax progressivity in Florida.

## 489 **VII. Discussion and Conclusion**

490 In this paper we explore how various tax exemptions and assessment patterns impact the  
491 progressivity of property taxation. By decomposing the elasticity of property taxation to  
492 household income into related elasticities that we can estimate with data from the Florida  
493 Department of Revenue (FDOR), we show not only that property taxation in Florida is on  
494 average (and for the majority of counties) progressive but also that property tax exemptions are  
495 by and large the main reason for this conclusion. Assessment practices that benefit homeowners  
496 with more expensive houses, possibly due to appeals processes or lack of comparable sales, are  
497 the primary reason why property taxation is not more progressive.

498 The competing influences of assessment-driven regressivity and exemption-driven  
499 progressivity provide policymakers with multidimensional options for modifying overall  
500 property tax progressivity. Of course, while it is possible to change various aspects of the  
501 property tax system in order to manipulate progressivity, revenue considerations cannot be  
502 ignored. On the one hand, moving assessments in a more proportional direction would not only  
503 increase progressivity but also increase property tax revenue. The feasibility of modifying  
504 assessment practices in this way may run into practical difficulties due to limited comparable  
505 sales of higher-priced houses. Furthermore, it is entirely possible that resistance by wealthier  
506 homeowners would make this effort politically untenable. In fact, these homeowners may  
507 respond to higher taxes by voting with their feet, choosing to move to lower tax jurisdictions,  
508 which could possibly attenuate the increase in revenue. Even a broadening of the base approach,



509 whereby more proportional assessment is combined with lower tax rates, may not be enough to  
510 overcome the potential public choice challenges.

511           Instead, introducing or expanding tax exemptions that undo the regressivity of assessment  
512 practices may be the more feasible approach. In particular, our results show that the complete  
513 take-up of the homestead exemption among eligible homeowners, on average, would increase  
514 property tax progressivity by nearly 10 percent, with over half of the counties in Florida where  
515 the property tax is currently regressive becoming progressive. This leans in favor of greater  
516 effort on the part of county assessors or the FDOR to publicize the existence of the exemption.  
517 Each county tax assessor maintains a web page advertising the existence of the exemption and  
518 instructions for filing an application. In a majority of Florida’s counties residents can submit  
519 applications online. Ihlanfeldt (forthcoming) shows there is considerable variance in efforts to  
520 publicize the exemption. Only 26.3 percent of the counties advertise community outreach on  
521 their web site, such as office staff meetings with church and community groups. He also shows  
522 that greater effort is correlated with a higher take-up rate of the exemption among eligible  
523 homeowners.

524           Even with complete take-up, determining the “correct” homestead exemption amount  
525 given a certain level of regressivity in assessment practices is a practical problem facing  
526 policymakers. We should also highlight the fact that estimates of the elasticity of housing to  
527 income are commonly below 1, mirroring our own estimate, suggesting that exemptions may be  
528 necessary to reduce regressivity of the property tax even in the presence of proportional  
529 assessment.

530           While the homestead exemption in Florida has almost universal support, the assessment  
531 cap that accompanies the homestead exemption has its detractors. The concern is that the cap

532 creates an unfair system of taxation in which first time home buyers, new residents, seasonal  
533 residents, and businesses are burdened with more than their fair share of taxes. In the continuing  
534 debate over this issue, our results suggest that the importance of the cap in contributing to the  
535 progressivity of the property tax should not be overlooked. If Florida never instituted the SOH  
536 cap, even with the homestead exemption in place, the property tax would be regressive in over  
537 90 percent of Florida's counties.

538 We close with two final thoughts. First, the policy implications of our analysis are  
539 heavily dependent on the component elasticities. Additional research is necessary to understand  
540 the relative importance of tax relief programs and assessment practices, not to mention the  
541 elasticity of housing demand to income, to property tax progressivity outside of Florida. Second,  
542 the focus of this paper is state and local property taxation, but federal policy can also affect the  
543 progressivity of the property tax, most recently when the TJCA capped the SALT deduction.  
544 Although our estimates do not show that repealing the cap would significantly reduce  
545 progressivity in Florida, this may not be true in states with progressive state income taxation, nor  
546 is the cap the only lever by which federal policy may influence this issue. Keeping in mind the  
547 difficult balance of revenue requirements, heterogeneous preferences of residents, and other parts  
548 of the tax system, the analysis presented in this paper may be useful for policymakers interested  
549 in affecting the progressivity of property taxation.

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**Table 1: Summary Statistics**

	Mean	Median	Q1	Q3
<i>Statewide statistics (N = 3,534,471)</i>				
Just value (\$1000s)	\$256 (\$415)	\$192	\$134	\$282
Assessed value (\$1000s)	\$193 (\$325)	\$141	\$91.4	\$216
Taxable value (\$1000s)	\$146 (\$319)	\$91.6	\$39.2	\$169
Millage rate	0.015 (0.004)	0.014	0.012	0.018
Property tax amount (\$1000s)	\$2.15 (\$5.0)	\$1.28	\$0.55	\$2.46
Fraction not claiming homestead exemption	0.085			
Fraction claiming senior exemption	0.041			
Fraction claiming disabled exemption	0.011			
<i>County averages (N = 67)</i>				
Just value (\$1000s)	\$191 (\$112)	\$162	\$119	\$228
Assessed value (\$1000s)	\$155 (\$83)	\$134	\$99.3	\$176
Taxable value (\$1000s)	\$110 (\$80.4)	\$86.4	\$56.8	\$129
Millage rate	0.015 (0.003)	0.016	0.014	0.017
Property tax amount (\$1000s)	\$1.54 (\$0.93)	\$1.20	\$0.92	\$1.95
Number of properties	52,753 (74,105)	24,636	2,891	66,651
Number of sales between 2013-2018	22,624 (31,044)	12,575	918	34,325
Fraction not claiming homestead exemption	0.081			
Fraction claiming senior exemption	0.051			
Fraction claiming disabled exemption	0.015			
<i>Notes: Data from the Florida Department of Revenue. Restricted to owner-occupied, single-family homes in tax year 2018. All properties in the sample are eligible for the homestead exemption. Standard deviations in parentheses. Q1 and Q3 refer to the 25<sup>th</sup> percentile and 75<sup>th</sup> percentile, respectively. Just value is the county assessor's estimate of the house's current market price. Assessed value adjusts for assessment growth caps. Taxable value adjusts for exemptions and assessment growth caps. Millage rates are the combined county and municipality rates. The property tax is the product of the millage rate and the taxable value. County and municipality governments offer senior and disabled exemptions.</i>				

**Table 2: Elasticity Estimates**

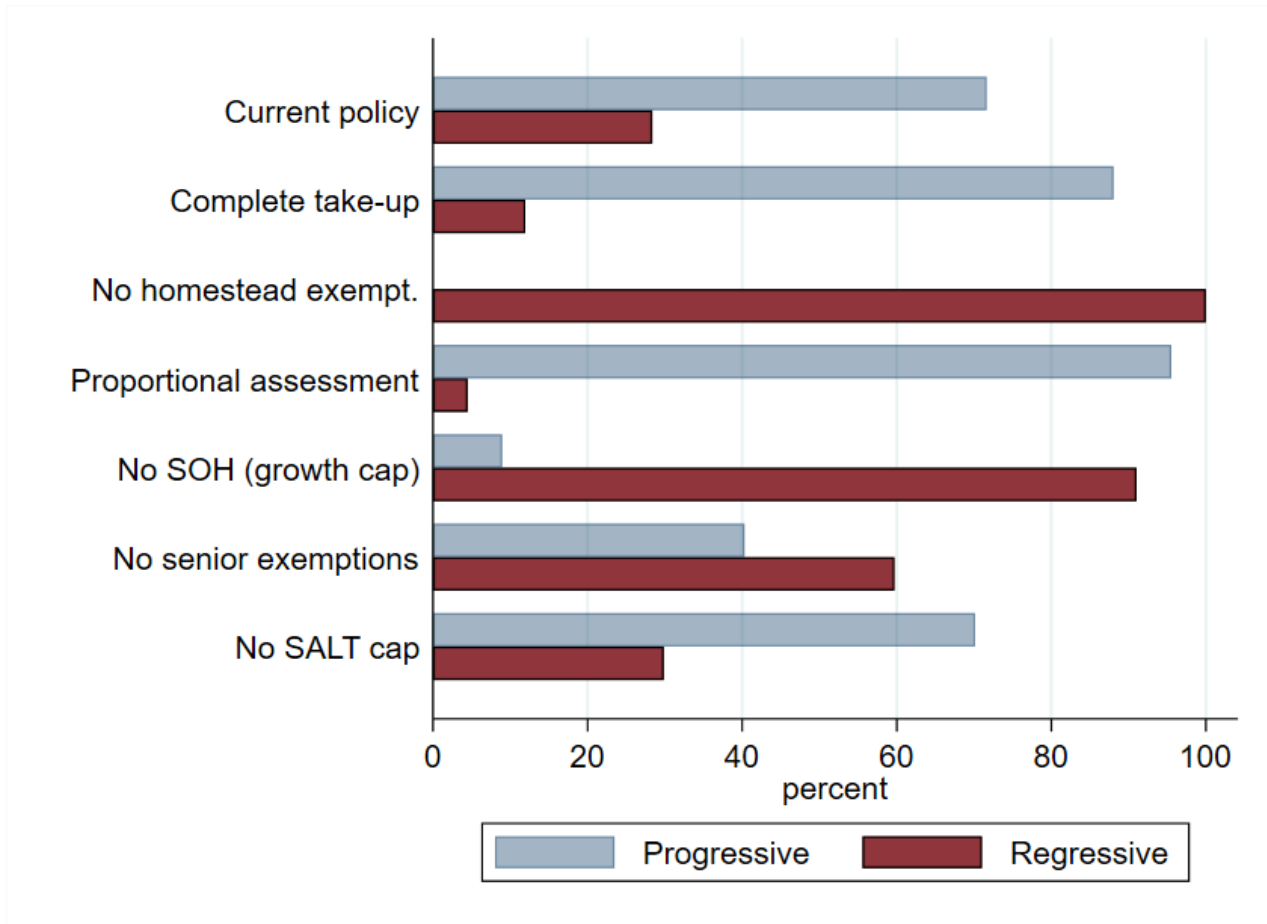
	(1) Mean	(2) St. Dev.	(3) Median	(4) Min	(5) Max	(6) Change from baseline
<b>A. Current policy</b>						
$E_{TJ}$	1.77	0.28	1.79	1.11	2.49	-
$E_{JH}$	0.83	0.13	0.85	0.34	0.99	-
$E_{TY}$	1.09	0.18	1.06	0.61	1.57	-
<b>B. Complete take-up of homestead exemption</b>						
$E_{TJ}$	1.96	0.37	1.91	1.11	2.78	+11%
$E_{TY}$	1.20	0.21	1.18	0.70	1.75	+10%
<b>C. No homestead exemption</b>						
$E_{TJ}$	0.96	0.08	0.96	0.76	1.18	-46%
$E_{TY}$	0.60	0.12	0.61	0.20	0.81	-45%
<b>D. Proportional assessment</b>						
$E_{JH}$	1.00	0	1.00	1.00	1.00	+20%
$E_{TY}$	1.33	0.21	1.34	0.83	1.87	+22%
<b>E. No SOH (growth cap)</b>						
$E_{TJ}$	1.32	0.22	1.26	0.98	1.93	-25%
$E_{TY}$	0.81	0.13	0.80	0.45	1.20	-27%
<b>F. No senior exemptions</b>						
$E_{TJ}$	1.59	0.28	1.56	1.11	2.42	-10%
$E_{TY}$	0.98	0.17	0.95	0.58	1.44	-10%
<b>G. No SALT cap</b>						
$E_{TJ}$	1.77	0.28	1.79	1.09	2.49	-0%
$E_{TY}$	1.09	0.18	1.06	0.61	1.57	-0%
<b>H. No state or local tax breaks</b>						
$E_{TJ}$	0.94	0.04	0.95	0.80	1.02	-47%
$E_{TY}$	0.59	0.09	0.60	0.25	0.73	-46%

*Notes:*  $E_{HY} = 0.75$  for all estimates. There is an average of 52753 observations per county used to estimate  $E_{TJ}$  and 22624 observations per county used to estimate  $E_{JH}$ .  $E_{JH}$  is the same for each counterfactual with the exception of proportional assessment, in which case it is set to unity. Data for all 67 counties are from the Florida Department of Revenue for years 2018 with sales prices dating back to 2013. Complete take-up assigns the homestead exemption to homeowners identified as eligible non-claimants. Panels C and F remove the homestead and senior exemptions, respectively. Panel D assumes proportional assessment ( $E_{JH} = 1$ ). Panel E removes the total accrued benefit of the SOH growth cap between 2008-2018. Panel H removes all exemptions and the accrued SOH benefit. Panel G removes the SALT cap of \$10,000. Column 6 shows how the mean of an elasticity changes from its respective mean in Panel A.

**Table 3: County characteristic correlations**

	(1) $E_{JH}$	(2) $E_{TJ}$	(3) $E_{TY}$
Median Income	0.48*	-0.55*	-0.11
Population	0.42*	-0.21	0.19
% College degree	0.61*	-0.67*	-0.09
% Black	-0.17	0.12	-0.03
% Hispanic	0.30	-0.10	0.20
Tax base per capita	0.55*	-0.60*	-0.12
% under age 18	-0.06	0.22	0.18
% over age 65	0.15	-0.21	-0.05
% owner	-0.37	0.29	-0.04
% established residents	-0.50*	0.48*	0.01
Number of properties (sample N)	0.46*	-0.26	0.17
Notes: Correlations between estimated elasticities and county characteristics from the 5-year estimates of the 2018 American Community Survey, with the exception of the property tax base per capita, which was based on the FDOR county property tax rolls. $E_{JH}$ is the elasticity of the just value to the house (market) price. $E_{TJ}$ is the elasticity of the property taxes to the just value. $E_{TY}$ is the elasticity of property taxes to household (permanent) income. * indicate Bonferroni-adjusted statistical significance at a level of at least 5 percent.			

**Figure 1: Percentage of regressive counties under different policies**

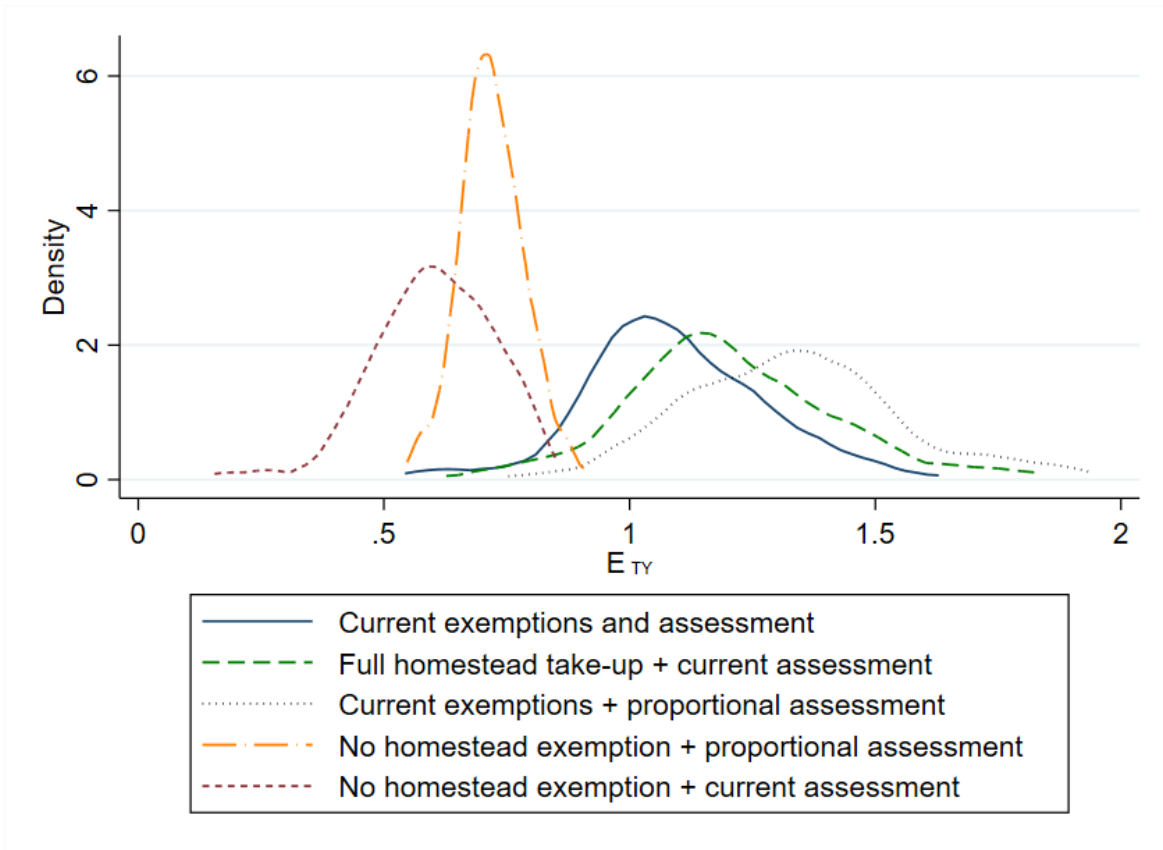


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658 Notes: The percentage of counties with elasticities of property taxation to household income that  
 659 are progressive ( $E_{TY} \geq 1$ ) or regressive ( $E_{TY} < 1$ ) under various counterfactual policies. Current  
 660 policy accounts for the SALT deduction of \$10,000 and includes incomplete take-up of the  
 661 homestead exemption, additional exemptions at the local level (e.g., senior, disabled), SOH  
 662 benefits accruing between 2008-2018, and the presence of regressive assessment practices.  
 663 Complete take-up assumes that all eligible homeowners benefit from the exemption. Removing  
 664 the homestead exemption increases the taxable value of homes by up to \$50,000. Proportional  
 665 assessment assumes  $E_{JH} = 1$ . Removing the SOH growth cap eliminates the aforementioned  
 666 benefits. The removal of the SALT cap assumes unlimited deduction of state and local property  
 667 taxes from federal income taxes.



**Figure 2: Assessment, exemptions, and the distribution of elasticities**



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670 Notes: Epanechnikov kernel densities of the 67 county-level estimates of the elasticity of  
 671 property taxation to household income ( $E_{TY}$ ) under various counterfactual policies. Current  
 672 policy reflects regressive assessment practices ( $E_{JH} < 1$ ) and incomplete take-up of the  
 673 homestead exemption. Around 8 percent of eligible homeowners currently do not apply for the  
 674 homestead exemption in Florida. Complete take-up assumes that all eligible homeowners benefit  
 675 from the exemption and increases the progressivity of property taxation across the state.  
 676 Proportional assessment assumes  $E_{JH} = 1$ . Removing the homestead exemption increases the  
 677 taxable value of homes by up to \$50,000 and results in higher tax liability.

678 **Appendix Material**

679 **Appendix Table 1 – Florida Terminology and Policies**

<u>Millage Rate</u>	<u>Mean</u>	<u>St. Dev.</u>	<u>Max</u>	<u>Min</u>
County government (operating)	6.99	2.11	10	2.7
School board (operating)	6.31	0.67	7.3	3.36
Independent school districts	0.54	0.79	4.24	0.04
Municipality	1.46	1.14	5.89	0.03
Total	16.5	2.75	22.8	9.00

<u>Property value</u>	<u>Description</u>
Just Value	Value of property estimated by county assessor; the assessor’s estimate of the home’s market price.
Assessed value	Value of property after growth caps are applied to the just value. See Save Our Homes below.
Taxable Value	Value of property once the homestead exemption (and any other eligible exemptions) are applied to the assessed value. Multiplying this by the millage rate generates the homeowner’s tax liability.

<u>Policies</u>	<u>Description</u>
Homestead Exemption	After verifying that the property is used as a homeowner’s primary residence, the first \$25,000 of assessed value is exempt from all property taxes. An additional \$25,000 exemption applies to the assessed value between \$50,000 and \$75,000 but only applies to non-school property taxes.
Save Our Homes	Policy that caps the annual increase in the assessed value of a homestead at 3 percent or the change in the Consumer Price Index (CPI), whichever is smaller. The effects can compound over time and the value can be transferred when moving to a new homestead.
Other exemptions	Offered by various jurisdictions to disabled, veterans, low-income, or elderly residents. The application of these exemptions is similar to the homestead exemption but can range from modest amounts up to full exemption from all property taxes.

Notes: Millage rates are statewide averages provided by the Florida Department of Revenue (FDOR). Millage rates are one one-thousandth of a dollar. Additional information is hosted on the FDOR website.

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**Appendix Table 2 – County statistics and elasticity estimates**

	Obs.	Just value	Taxable value	Millage rate	Tax amount	$E_{TJ}$	$E_{JH}$	$E_{TY}$
Alachua	38,447	\$188	\$111	0.019	\$2.06	1.58	0.91	1.08
Baker	3,019	\$142	\$75.7	0.016	\$1.20	2.11	0.72	1.14
Bay	32,603	\$162	\$100	0.012	\$1.21	1.72	0.87	1.12
Bradford	3,512	\$107	\$56.4	0.017	\$0.92	1.88	0.73	1.02
Brevard	66,651	\$193	\$77.9	0.016	\$1.11	1.66	0.92	1.15
Broward	295,528	\$349	\$194	0.019	\$3.58	1.62	0.99	1.20
Calhoun	1,427	\$79.8	\$35.6	0.017	\$0.59	2.49	0.84	1.57
Charlotte	47,179	\$207	\$110	0.013	\$1.51	1.97	0.88	1.31
Citrus	36,667	\$143	\$73.9	0.015	\$1.09	1.56	0.86	1.00
Clay	42,461	\$190	\$104	0.012	\$1.26	1.64	0.84	1.03
Collier	55,876	\$567	\$391	0.009	\$3.66	1.26	0.99	0.94
Columbia	8,075	\$122	\$67.6	0.017	\$1.11	1.96	0.80	1.18
Dade	300,596	\$376	\$199	0.015	\$3.12	1.65	0.96	1.19
DeSoto	3,301	\$129	\$59.9	0.018	\$0.99	1.68	0.76	0.96
Dixie	838	\$70.2	\$26.1	0.018	\$0.45	2.42	0.79	1.43
Duval	183,557	\$188	\$108	0.007	\$0.75	1.64	0.96	1.19
Escambia	63,842	\$145	\$80.6	0.014	\$1.13	1.33	0.91	0.91
Flagler	90,106	\$162	\$90.8	0.017	\$1.52	1.88	0.82	1.16
Franklin	1,280	\$202	\$129	0.015	\$1.75	1.79	0.89	1.19
Gadsden	6,481	\$96.2	\$53.6	0.017	\$0.90	1.85	0.67	0.93
Gilchrist	1,125	\$125	\$65.8	0.018	\$1.17	1.79	0.64	0.87
Glades	643	\$116	\$65.3	0.016	\$1.03	1.59	0.69	0.82
Gulf	2,475	\$174	\$97.9	0.016	\$1.45	1.76	0.92	1.22
Hamilton	874	\$80.8	\$38.0	0.019	\$0.70	2.00	0.94	1.41
Hardee	2,022	\$99.9	\$44.3	0.018	\$0.77	2.16	0.76	1.23
Hendry	1,564	\$124	\$54.0	0.022	\$1.20	1.85	0.92	1.27
Hernando	45,003	\$138	\$64.0	0.014	\$0.93	1.93	0.89	1.28
Highlands	19,973	\$119	\$56.7	0.015	\$0.88	1.85	0.78	1.08
Hillsborough	238,464	\$228	\$122	0.015	\$1.86	1.77	0.92	1.22
Holmes	1,961	\$75.8	\$30.5	0.016	\$0.48	1.82	0.48	0.66
Indian River	34,910	\$297	\$178	0.012	\$2.05	1.50	0.85	0.95
Jackson	6,053	\$90.5	\$48.4	0.015	\$0.70	1.93	0.75	1.08
Jefferson	1,520	\$120	\$62.9	0.017	\$1.00	1.79	0.70	0.94
Lafayette	494	\$102	\$51.2	0.017	\$0.86	2.20	0.84	1.39
Lake	69,506	\$187	\$108	0.015	\$1.54	1.65	0.85	1.05
Lee	128,510	\$243	\$141	0.014	\$1.90	1.90	0.94	1.34
Leon	49,201	\$201	\$127	0.017	\$2.13	1.47	0.92	1.02
Levy	3,981	\$125	\$57.5	0.017	\$0.96	1.93	0.75	1.08
Liberty	530	\$100	\$38.4	0.017	\$0.64	2.39	0.34	0.61
Madison	1,651	\$77.9	\$36.6	0.019	\$0.67	1.87	0.67	0.95
Manatee	62,647	\$261	\$162	0.015	\$2.40	1.46	0.91	0.99
Marion	73,953	\$139	\$74.4	0.012	\$0.92	1.57	0.90	1.06
Martin	24,636	\$421	\$288	0.015	\$4.28	1.43	0.94	1.00
Monroe	3,790	\$646	\$412	0.007	\$3.03	1.11	0.98	0.81
Nassau	20,571	\$406	\$324	0.015	\$4.71	1.40	0.83	0.88
Okaloosa	40,311	\$208	\$128	0.012	\$1.52	1.42	0.93	0.98
Okeechobee	4,720	\$132	\$56.8	0.016	\$0.92	1.88	0.83	1.16
Orange	209,144	\$252	\$148	0.014	\$2.05	1.85	0.91	1.27
Osceola	55,627	\$177	\$95.7	0.015	\$1.42	1.83	0.95	1.30
Palm Beach	267,585	\$385	\$243	0.016	\$3.86	1.45	0.96	1.04

Pasco	107,442	\$181	\$101	0.015	\$1.46	1.57	0.85	1.00
Pinellas	185,227	\$249	\$129	0.017	\$2.17	1.57	0.97	1.14
Polk	113,412	\$156	\$75.4	0.016	\$1.17	2.11	0.66	1.05
Putnam	8,196	\$130	\$62.2	0.017	\$1.03	1.80	0.73	0.98
Saint Johns	49,701	\$320	\$219	0.013	\$2.80	1.44	0.95	1.03
Saint Lucie	26,955	\$188	\$91.0	0.022	\$2.02	2.35	0.83	1.47
Santa Rosa	37,438	\$176	\$105	0.013	\$1.34	1.63	0.77	0.95
Sarasota	91,273	\$295	\$182	0.013	\$2.33	1.42	0.98	1.04
Seminole	92,234	\$242	\$143	0.013	\$1.85	1.78	0.86	1.14
Sumter	23,809	\$205	\$125	0.011	\$1.36	1.65	0.88	1.09
Suwannee	3,574	\$109	\$56.9	0.018	\$0.97	1.86	0.73	1.01
Taylor	2,623	\$82.8	\$40.8	0.017	\$0.69	1.97	0.82	1.21
Union	767	\$90.3	\$43.1	0.017	\$0.75	2.21	0.64	1.06
Volusia	117,687	\$187	\$86.4	0.018	\$1.48	1.89	0.95	1.34
Wakulla	4,696	\$141	\$74.5	0.014	\$1.08	2.02	0.65	0.98
Walton	11,656	\$307	\$216	0.009	\$1.95	1.48	0.94	1.05
Washington	2,891	\$86.5	\$42.8	0.017	\$0.69	1.94	0.68	0.99

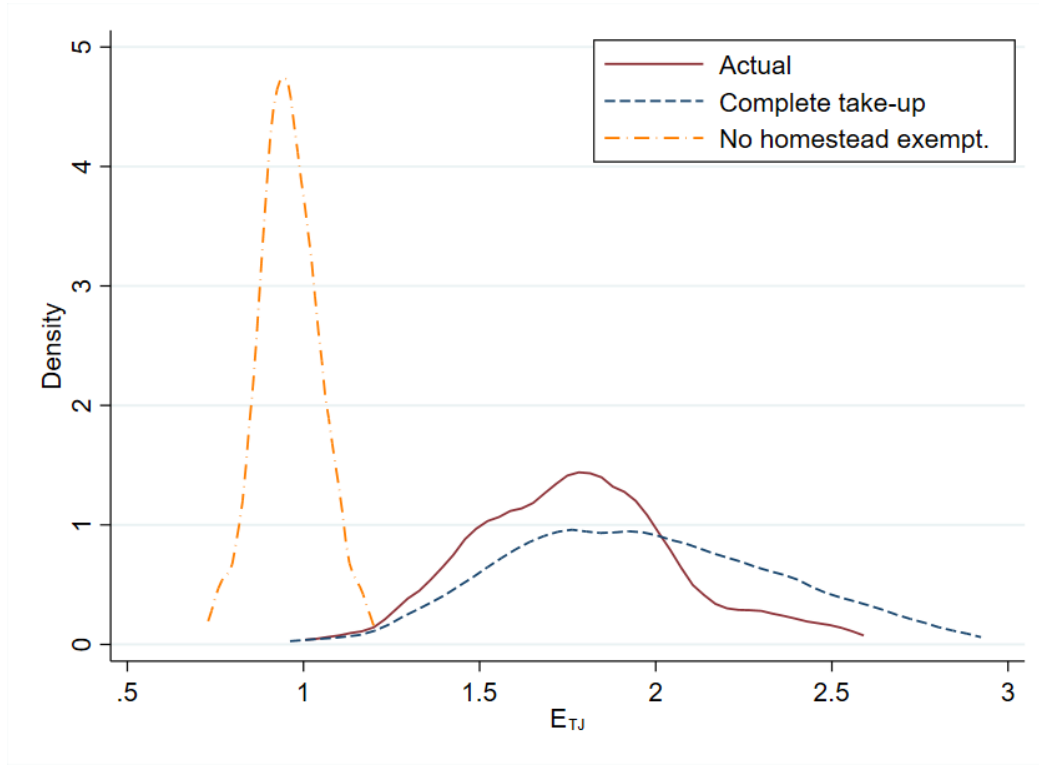
Notes: Data for all 67 counties are from the Florida Department of Revenue for years 2018. Sales prices dating back to 2013 required for estimation of  $E_{JH}$ . All amounts are in \$1000s. Just value is the county assessor's estimate of the house's current market price. Taxable value adjusts for exemptions and assessment growth caps. Millage rates are the combined county and municipality rates. The property tax amount is the product of the millage rate and the taxable value. After estimating  $E_{JH}$  and  $E_{TJ}$ , we use  $E_{HY} = 0.75$  and Equation 1 to generate  $E_{TY}$ .

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### Appendix Figure 1: The distribution of $E_{TJ}$ and the homestead exemption



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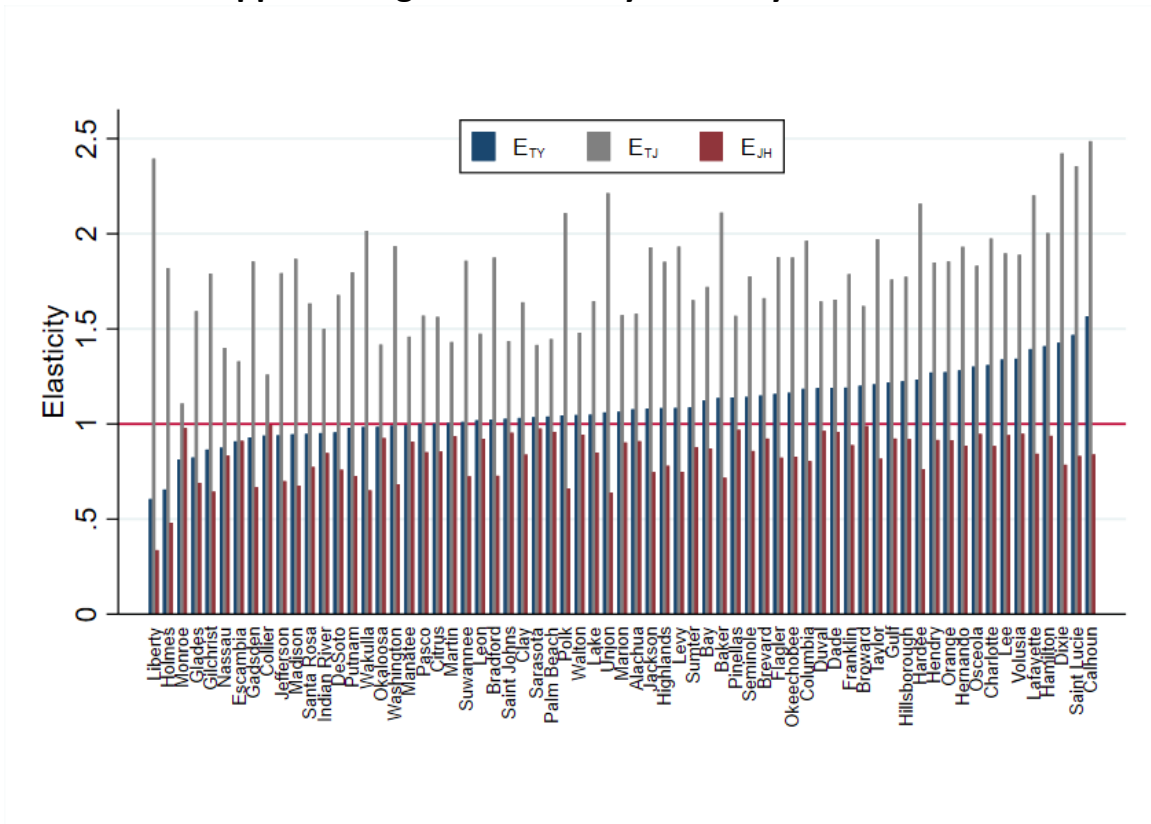
687 Notes: Epanechnikov kernel densities of the 67 county-level estimates of the elasticity of  
688 property taxation to just value ( $E_{TJ}$ ) under various counterfactual policies. Actual  
689 estimates include 8 percent of eligible homeowners who currently do not apply for the  
690 homestead exemption in Florida. Complete take-up assumes that all eligible homeowners  
691 benefit from the exemption. Removing the homestead exemption increases the taxable  
692 value of homes by up to \$50,000.

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Appendix Figure 2 – County elasticity estimates



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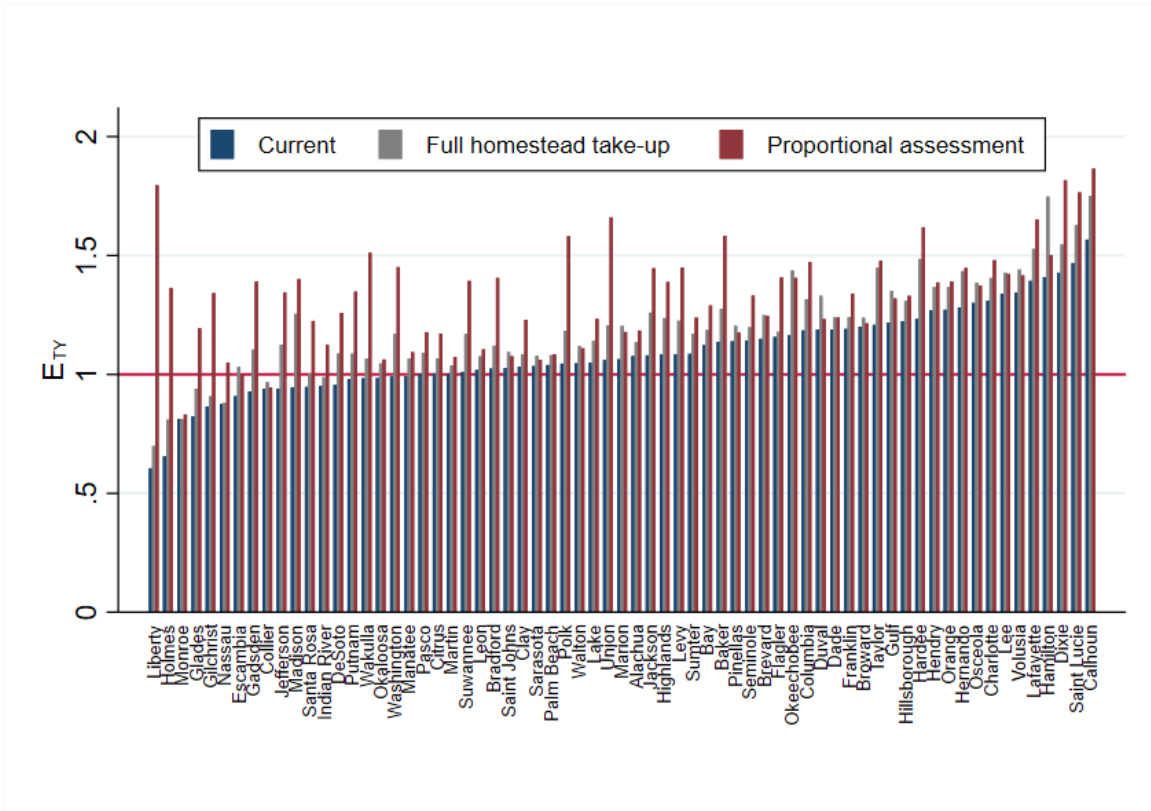
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Notes: County-level estimates of the elasticity of property taxation to just value ( $E_{TJ}$ ), the elasticity of just value to house (market) price ( $E_{JH}$ ), and the elasticity of property taxation to income ( $E_{TY}$ ).

Appendix Figure 3 – County counterfactual elasticities



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Notes: County-level estimates of the elasticity of property taxation to income ( $E_{TY}$ ) under various two counterfactual policies. Current estimates include 8 percent of eligible homeowners who currently do not apply for the homestead exemption in Florida. Full take-up assumes that all eligible homeowners benefit from the exemption. Proportional assessment imposes an  $E_{JH} = 1$ .

711 **Appendix A: Estimating  $E_{JH}$**

712 Our method for estimating the elasticity of just value to market value ( $E_{JH}$ ), which is a common  
713 measure of assessment regressivity, is to regress the log of a household’s just value on the log of  
714 the sale price, using samples of arm’s length sales that occurred in the year preceding the  
715 assessor’s January 1 estimate of just value.<sup>28</sup> This bivariate approach, while simple, has been part  
716 of an ongoing debate about the best way to measure assessment regressivity. Among the issues  
717 have been the use of sales price as a measure of market value, whether sales price should be the  
718 dependent rather than the independent variable, and the appropriate functional form of the  
719 model. Carter (2016) critiques the various methods and concludes that no one can claim  
720 superiority over the others. He also identifies our approach as the most popular, which De Cesare  
721 (1998) has labeled the traditional approach. Recently, McMillen & Singh (2020b) argue that the  
722 traditional approach of regressing the log of assessed value on the log of the sales price will  
723 produce estimates biased towards finding regressive assessment practices. As is always the case  
724 in research, this conclusion is based on various assumptions, the most relevant for our purposes  
725 being the way in which assessors determine assessed value. The authors point out that the bias  
726 becomes an issue if assessors regress sales prices on house and neighborhood characteristics in  
727 order to get a predicted price that they in turn use as the assessed value of the home.<sup>29</sup> The  
728 importance of this concern is clearly dependent on how assessments are performed in a given  
729 jurisdiction.

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<sup>28</sup> In order to better relate to the existing literature, we will refer to assessed value rather than just value for the remainder of this appendix. As discussed in Section III, the two terms are not interchangeable within Florida.

<sup>29</sup> As stated on page 7 of McMillen & Singh (2020b), “...the validity of using regressions to evaluate assessments is dubious at best when regressions are also used to calculate the assessed values because there is a clear tendency toward an artificial finding of regressivity.” We are grateful to Ruchi Singh for her correspondence on this issue.



730 Florida statutes require that each assessment be based on at least one of the three standard  
731 assessment methods: comparative sales, replacement value, and the income approach. It is  
732 possible that assessors use some type of hedonic regression method in their selection of  
733 comparison sales, although this is obviously not the same as using hedonics to generate an  
734 assessed value. Even if a Florida assessor used hedonic regressions to generate an assessed value,  
735 the assessed value in our data that we use in our regressions would be a weighted-average of the  
736 assessment methods used in the jurisdiction.

737 Despite our doubts that the aforementioned bias is a large concern in our setting, we  
738 performed an additional test in order to explore the likelihood that assessors are actually  
739 employing the method that would generate the bias. We predicted assessed values by regressing  
740 the log sale price on the age of the house, the log lot size, the log interior square footage, dummy  
741 variables for property quality as recorded by an assessor, jurisdiction fixed effects, and year-by-  
742 month fixed effects. If assessors use this method to generate their assessed values, then our  
743 predicted values should be relatively close to what is actually recorded in the data. We define  
744 errors to be a percent difference between the predicted and the recorded values:

745  $\frac{|predicted - recorded|}{recorded} \times 100$ . The errors across Florida counties are sizeable. The average  
746 difference between what is recorded in the tax data and what would be predicted using a hedonic  
747 regression is nearly 32% of the recorded value of the house. A few outlying counties do not  
748 appear to be causing these aggregate differences as the median error is 19%. To that point, the  
749 minimum average error and minimum median error across all of Florida's counties are 15% and  
750 9.5%, respectively.

751 In addition to the McMillen & Singh critique of the traditional approach not being  
752 applicable to our estimates of  $E_{JH}$ , our estimates are based on best practices. We use "good sales"

753 and “good timing”, where the former refers to our use of only arms-length transactions and the  
754 latter the sale date immediately preceding the date of assessment. As noted by Hodge et al.  
755 (2017), it is advisable to have the sale date precede the date of assessment to avoid the possible  
756 endogeneity of the assessed value.

757

## 758 **Appendix B: Estimating $E_{HY}$**

759 To estimate  $E_{HY}$ , the elasticity of housing consumption to permanent income, we regress  
760 homeowners’ median housing expenditure of the block group on the median income of the block  
761 group. These variables are from the 5-year estimates of the 2018 ACS and we transform them  
762 both into logs. We use all block groups in Florida, with the limitation identified below. Included  
763 in all models are metropolitan area fixed effects and a measure of the average quality of single-  
764 family housing within the block group. Median income is a proxy for permanent income, based  
765 upon the assumption that the transitory components of current incomes cancel out from  
766 aggregation, resulting in a correlation with only the permanent and not the transitory component  
767 of current income. Homeowner housing costs are the sum of payments for mortgages, deeds of  
768 trust, contracts to purchase, or similar debts on the property (including payments for the first  
769 mortgage, second mortgages, home equity loans, and other junior mortgages); real estate taxes;  
770 fire, hazard, and flood insurance on the property; utilities (electricity, gas, and water and sewer);  
771 and fuels (oil, coal, kerosene, wood, etc.). Lee (1968) notes that census tracts and block groups  
772 are defined in part based on the quality of housing. As a result, median housing consumption  
773 tends to be higher (lower) than that of permanent housing consumption at a high (low) level of  
774 permanent housing consumption, resulting in an upward bias in the estimated permanent income  
775 elasticity. To guard against this bias, we include the mean quality score of homes in the block

776 group. The score ranges from 1 (poor) to 5 (excellent) and is determined by a physical inspection  
777 of the home by a staff member of the property tax assessor's office. In addition to the quality  
778 measure and the metro area dummy variables (rural counties are grouped together as the  
779 reference group), we estimated our models with and without the covariates mean family size,  
780 median age of adults, and the percentages of the population who are non-Hispanic blacks and  
781 Hispanics. We limit block groups to those that are predominately owner-occupied units (greater  
782 than 65 percent). This resulted in a sample size of 6,097 block groups. To gauge the sensitivity of  
783 our estimate, we ran our models for various subsamples: urban and rural areas, and groups based  
784 on the median income of the block group. In the latter case, we divided the block groups into  
785 terciles based on their median income. All of the estimates centered on an  $E_{HY}$  of 0.75, with a  
786 small range around this number, and none of the  $E_{HY}$  estimates obtained from the subsamples is  
787 significantly different than 0.75. For comparison, Albouy, Ehrlich, & Liu (2016) use  $E_{HY}$  values  
788 of 0.83 and 0.66 in their analysis of housing demand.

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