A Reinvestigation of Gay Sorting

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December 7, 2020

ABSTRACT

Gay enclaves or "gayborhoods" have demonstrated a propensity to revitalize dilapidated urban districts. This "marriage" between gays and gentrification motivates research concerning their locational trends, an interest further piqued by the systematic disappearance of gayborhoods (Ghaziani, 2014). This paper utilizes the American Community Survey (ACS) to investigate gay and lesbian sorting in 25 US cities from 2012-2018. Evidence suggests that amenability and gay sorting possess no discernable relationship at the city level. I posit that this result is perhaps indicative of loosening constraints to child-rearing for same-sex couples. While neither city gay friendliness nor state marriage equality significantly affect gay sorting, I present some evidence that the former *does* encourage homosexual family building.

I. INTRODUCTION

M.V. Lee Badgett, a pioneer in the economic study of gays and lesbians, acknowledges that economics fails to sufficiently attend to sexuality and sexual orientation (1995). Regardless, homosexual households provide unique insight to economists insofar as they face family-building constraints different than those of heterosexuals.

The past decade has witnessed substantial advances in the fight for LGBT equality. 2015 saw the national legalization of same-sex marriage by the US Supreme Court. As of 2016, gay couples can legally adopt children in all 50 US states (Reilly, 2016). And as recently as June 2020, the US Supreme Court extended Title VII workplace protections to LGBT individuals (Liptak, 2020). This monumental albeit nascent progress warrants a reinvestigation of stylized facts concerning gay Americans, including their sorting behavior.

Becker (1981) explores resource allocation, coupling, and child rearing as related to family units, but fails to meaningfully address the inherently different dynamics of homosexual households. It was Sanders et al. (2007) to detail the impetus of the differential sorting behaviors exhibited by gays, lesbians, and heterosexuals. The pronounced opportunity cost of child rearing for same-sex coupled pairs encourages adult consumption at the expense of family building (Sanders et al., 2007). This lends itself to a smaller minimum lifetime demand for housing relative to heterosexuals, a characteristic that manifests itself through sorting patterns: homosexuals, namely gay males, disproportionately reside in amenity-rich, expensive regions (Black et al., 2002). I will further detail this theoretical foundation in Section III.

Indeed, gay and lesbian individuals face drastically different constraints in regards to child rearing. While the opportunity costs of adoption are likely similar for both gay males and females, lesbians face far less imposing biological restrictions to child bearing, a difference

reflected by prices. According to the American Pregnancy Association, donor semination can cost anywhere from $300 to $4,000 USD. Meanwhile, West Cost Surrogacy, a leading reproduction agency in Southern California, suggests that surrogacy prices range from $90,000 to $130,000 USD. The differences imposed by sex result in divergent sorting patterns between gays and lesbians. Black et al. (2002) demonstrate that while gays tend toward amenity-rich urban centers, lesbian sorting is less responsive to adult amenities. Regardless, I find that gay and lesbian sorting (as measured for by the ratio of gay and lesbian coupled individuals to their heterosexual counterparts) have a correlation coefficient of 0.662.

Provided that children play an essential role in this argument, it is only natural to question the remote impact of sexuality; do gay couples behave any differently than heterosexuals without children? In order to ensure sexuality as a source of variation, my analysis of gay sorting bears in mind the prevalence of children in heterosexual households.

II. MOTIVATION

Gay sorting is of particular interest to those who study gentrification, as gayborhoods demonstrate the ability revitalize dilapidated neighborhoods. Knopp (1995) explored the process by which a burgeoning gay cluster established a middle-class community and spurred investment in Marigny, a neighborhood near the French Quarter of New Orleans. Gentrification literature complements anecdotal evidence. Florida (2012) holds that members of the "Creative Class" sort in those neighborhoods they find diverse, tolerant, and politically open. Moreover, the presence of gays and lesbians within a community signals these very attributes, incentivizing the in-migration of working professionals and innovators.

The systematic "de-gaying" of gay enclaves further piques interest in gay sorting. Analysis of the 2000 and 2010 Censuses reveals that sexual segregation has decreased in the US

(Ghaziani, 2014). While sociologists and geographers alike propose a variety of causes, assimilation and a growing sense of cultural sameness are among the most salient of theories (Ghaziani, 2015). This paper does not seek to answer the question "why are American gayborhoods going extinct?" It rather reevaluates gay sorting at the city level: have gay locational trends discernably changed in response to shifting constraints?

III. THEORY

Black et al. (2002) establish the economic foundation over which differential gay sorting is built. Consider an individual's Stone-Geary utility function in some city "i":

$$(1) \quad U_i = A_i (X - \alpha_x)^{1/2}(H - \alpha_H)^{1/2}$$

for which A is some amenity, H is housing consumption, X is non-housing consumption, and α_x and α_H denote a "minimal level" of "acceptable" consumption for their respective subscripts. (Black et al., 2002). Let r_i be the rental price of housing and w_i the wage. Then, an indirect utility function is given by:

$$(2) \quad V_i = A_i r_i^{-1/2} (w_i - \alpha_X - r_i \alpha_H)$$

for some given parameter α_H. Now suppose there exists two cities, denoted by subscripts "p" and "q." Assume that mobility between them has no cost and suppose that for exogenous reasons, city "p" is more amenity rich than city "q," and therefore $A_p > A_q$. Then for some α_H^* in equilibrium:

$$(3) \quad A_p r_p^{-1/2} (w_p - \alpha_X - r_p \alpha_H^*) = A_q r_q^{-1/2} (w_q - \alpha_X - r_q \alpha_H^*)$$

for $w_q > w_p$ and $r_q < r_p$. That is, differential amenity levels among cities must be counteracted by lower wages and/or higher rents in equilibrium, justifying the use of such variables as proxies for amenability.

Black et al. (2002) suggest that constraints, both social and biological, decrease gay men's lifetime demand for housing. This statement is contingent upon the assumption that gays

acknowledge their homosexuality from an early onset. In the presented model, these constraints manifest themselves through a smaller α_H parameter. So long as homosexuals possess a human capital endowment equal to their straight counterparts, they will disproportionately sort into amenity-rich areas to maximize their indirect utility. It should be noted that inherent biological constraints are such that $\alpha_H^{GAY} < \alpha_H^{LESBIAN} < \alpha_H^{HETEROSEXUAL}$.

As homosexuality grows increasingly normalized by mainstream society, the social and legal barriers to gay child rearing lessen. As of 2016, same-sex couples can legally adopt children in all 50 US states (Reilly, 2016). Moreover, the hostile attitudes that once disincentivized family building by sexual minorities have diminished over time. General Social Survey (GSS) data encapsulates this national trend; the percentage of US adults that believe same-sex sexual relations are "always wrong" decreased from 54% in 2000 to 31% in 2018.

In essence, these societal developments beg the question whether α_H has increased for homosexual individuals enough such that their sorting patterns have changed. This warrants an analysis of gay and lesbian sorting alongside other explanatory factors, namely urban amenities and LGBTQ tolerance. To the extent that sexual inclusivity varies among US municipalities, I posit that the family-building constraints facing gay households across the nation could differ considerably.

IV. LIMITATIONS AND RELATED RESEARCH

Prior to detailing this paper's methodology, it is vital to consider the inherent limitations of queer economic research. Because sexuality is not a major concern of data collection agencies, sexual orientation may only be recognized through cohabitating partnerships (Jacobsen & Zeller, 2008). This effectively excludes a significant portion of the gay community. Indeed, the scarcity of data is often enough to dissuade economists from investigating (Klawitter, 1998). To make

matters worse, the small relative size of the gay coupled population makes miscoding errors of particular concern. If 0.5% of heterosexual couples in the decennial US Census were to misreport the sex of their spouse, then the number of identifiable homosexual couples would increase by 285,000 (Kreider & Gurrentz, 2019). Fortunately, the American Community Survey (ACS) provides information on the clarity of spousal links, allowing researchers to ensure the reliability of data. Further, certain stylized trends idiosyncratic to gay and lesbian individuals are exhibited by ACS data. This suggests that the majority of "gay" observations are accurate, a point I will further explore in Section V.

As discussed prior, Black et al. (2002) formalize a model for differential gay sorting in which sexuality is an exogenous source of variation that affects the parameter α_H of the Stone-Geary Utility function[1]. In further analysis of the 46 largest US metropolitan areas, Black et al. (2002) find that neither gay nor lesbian sorting significantly respond to gay friendliness. Meanwhile, greater amenity index scores and larger median house values correspond to more same-sex coupled individuals in a given metropolitan area, ceteris paribus. While this relationship holds for gays and lesbians alike, it is especially true for the former; Black et al. (2002) find that the impact of median house value is nearly three times larger in magnitude when considering gay males as opposed to females. In accordance with the presented model, such results suggest that "the location decisions of gay individuals are the result of a predictable economic process" (Black et al., 2002).[2] I propose that a city-level, pooled panel variant of Black et al. (2002) may reveal how gay and lesbian sorting have changed in response to shifting constraints. Section VI will present this methodology.

V. DEMOGRAPHIC TRENDS

[1] Please refer to equations (1), (2), and (3) for this theoretical foundation.
[2] Cooke & Rapino (2007) utilize net gay migration patterns to reestablish the directionally positive and statistically significant impact of amenities and urbanicity on gay sorting.

I employ the ACS's sex of spouse variable to identify people in both married and non-married same-sex cohabitating relationships. These individuals will serve as proxies for all gays and lesbians. While imperfect, this proxy is reasonable; evidence suggests both single and coupled gays have similar years of schooling and exhibit similar race and age compositions (Sanders et al., 2007). Because sexuality – gay, straight, or otherwise – may only be recognized via household cohabitation, I exclude all non-couples from my analysis.

The US Census Bureau casts doubt on its ability to accurately identity the US gay coupled population, citing its small relative size and the associated risk posed by miscoding errors. Regardless, simple analysis of such persons in ACS from 2005-2018 reveals steady characteristics consistent with those of past research. Take, for instance, the claim that gays and lesbians are far more likely to live outside their state of birth, relative to heterosexuals (Sanders et al., 2007). Figure A1 tells the same story: gays are consistently more likely than childless straights to reside outside their state of birth. I use ACS data to reestablish a number of other stylized facts, namely that gays (1) disproportionately reside in urban areas, (2) are highly educated, and (3) are younger on average than the general population. Figures 2, 3, and 4 of the appendix verify these consistencies. Furthermore, despite the concerns of the US Census Bureau, gay coupled individuals convey vastly consistent demographic attributes.[3] This ameliorates fears of improper identification and may permit an analysis of directional changes in gay sorting.

The presence of children in gay households, or rather the lack thereof, is a salient element of differential sorting. While economic theory predicts an increase in the number of parenting homosexuals as sociopolitical barriers weaken, quick analysis of this matter in ACS reveals quite the opposite: gay coupled individuals are decreasingly likely to have children. Figure 6 in the

[3] ACS data *does* challenge the claim made in related literatures that gays are disproportionately white relative to heterosexuals. For this, please refer to Figure A5.

appendix conveys this trend. While unexpected, Black et al. (2000) offer a reasonable explanation: modern gays are less likely than their older counterparts to engage in heterosexual relationships. Regardless, child-rearing *prospects* for gay and lesbian individuals have undoubtably improved over time, a claim supported by adoption trends. The 2010 US Census revealed an increase in the number of gay coupled households with adopted children, relative to the previous decennial census (Tavernise, 2011). As such, the economic argument holds; gays may increasingly engage in family-building activities at the expense of adult consumption. I expect this to manifest itself through sorting trends. Specifically, I suspect that gay coupled individuals may decreasingly tend toward regions rich in adult amenities. The next section provides the data and methodology through which I explore this hypothesis.

VI. DATA AND METHODOLOGY

My analysis utilizes 100% of ACS data from 2012-2018. Metropolitan areas are expansive, possessing significant endogenous variation across housing costs and municipal policies. As such, my investigation concerns the 25 largest US cities available at the city level of disaggregation in ACS, excluding Washington, DC.[4] 2012 is the earliest year for which my LGBTQ tolerance metric exists and therefore the first year of interest in my analysis.[5] I will return to this proxy measure this shortly.

I begin my analysis by identifying the causal factors of incremental changes in gay sorting. As a pooled panel analog to Black et al. (2002), I employ similar dependent variables. I define the gay ratio as the ratio of gay coupled individuals to heterosexual coupled individuals. I define the lesbian ratio analogously. Aggregating these measures yields the total gay ratio. I will

[4] Washington, DC does not have a tolerance metric available, and is thus excluded from my data.
[5] Meanwhile, 2018 is the latest year for which IPUMS has individual-level ACS data. Perhaps serendipitously, 2012-2018 were witness to monumental change for the US gay community, making them useful years to investigate the questions posed.

use these metrics to proxy for gay representativeness at the city-level.[6] I likewise employ analogous explanatory factors to those of Black et al. (2002), namely median house values and a tolerance proxy. While useful in cross sectional analysis, amenity indices rarely measure changes in urban amenability from one year to the next. As such, I do not explicitly measure regional amenities beyond how median house values and fixed effects encapsulate them.

I do not employ direct attitudinal measures in my analysis of gay sorting. The GSS, for instance, aggregates data by census region and limits access to the city level. In order to exploit variations in gay friendliness across cities, I utilize the Human Rights Campaign's (HRC) Municipal Equality Index (MEI). According to the HRC, the MEI "examines how inclusive municipal laws, policies, and services are of [the] LGBTQ people who live and work there." The HRC scores cities on a scale from 0 to 100, with higher scores indicating greater LGBTQ inclusivity. It should be noted that the MEI is not intended for use in econometric contexts. For one thing, the index has changed its categories of analysis over time. Prior to 2015, for instance, the MEI reserved a considerable section of total score to gay relationship recognition. The national legalization of same-sex marriage in 2015 subsequently nullified this variable. As such, the MEI features increasingly robust standards to complement the nation's growing acceptance of homosexuality. This, in addition to yearly "bonus points," has required that I normalize MEI scores by yearly mean and standard deviation,[7] permitting comparison among cities within individual years.[8] Because the MEI concerns itself with the LGBT inclusivity of policy, I posit that the yearly-normalized index proxies for the family-building constraints faced by gays and

[6] Because I seek to measure "how gay" cities are overtime, the same gay concentration metric used in Black et al. (2002), defined as %Gay in metropolitan area / %Gay in US, is simply less convenient.
[7] I normalize the MEI using the yearly mean and standard deviation of the 25 US cities included in my analysis. This is largely because the HRC reports the yearly overall averages and standard deviations for data that accounts for "bonus points" rather than raw MEI scores.
[8] While city-year fixed effects somewhat defeat the need to normalize this variable, I assert that the lack of consistency in HRC's measurement technique warrants standardization.

lesbians. As such, MEI scores may more so predict the prevalence of children in same-sex coupled households than the prevalence of such households themselves. Supplementary analysis will explore this notion.

At the state level, I utilize a dummy variable for the presence of marriage equality to proxy for state tolerance; a value of one indicates the legalization of same-sex marriage by or within the given year. While this variable loses its explanatory power post-2015, its inclusion allows for the exploitation of cities' *relative* tolerance from 2012-2014. I also include an interaction term between yearly-normalized MEI score and marriage equality. I suspect states that have not yet legalized gay marriage (i.e. relatively "intolerant" states) may have cities with larger gay and lesbian ratios, holding all else constant. This is not because that city is particularly liberal among municipalities, but rather because it is *relatively* more tolerant than surrounding regions.

The central regression is as follows:

$$(4) \quad \text{Gay ratio}_{it} = \beta_0 + \beta_1 \log(H_{it}) + \beta_2 MAR_{jt} + \beta_3 MEI_{ijt} + \beta_4 (MEI \times MAR)_{ijt} + \gamma_i + \delta_t + \varepsilon_{it}$$

where δ_t and γ_i are vectors of year and city fixed effects, H is median house value, MAR is an indicator variable for marriage equality, and MEI x MAR is the state-city tolerance interaction term. Log median house values and yearly normalized MEI vary by city and over time, denoted by the indices i and t, respectively. The presence of marriage equality varies over state j and time t. I conduct this central regression for the gay, lesbian, and total gay ratios. I multiply these ratios by 10,000 to more easily quantify the impact of explanatory variables.

Children and child-rearing prospects comprise a significant element of this paper's economic foundation. Consequently, I run two supplementary regressions concerning their prevalence in both gay and heterosexual coupled households, using the same independent variables. I define the child ratio as the number of heterosexuals with children divided by those

without. I define the gay-child ratio analogously for same-sex coupled individuals. These regressions are as follows:

$$(5) \quad \text{Child ratio}_{it} = \beta_0 + \beta_1 \log(H_{it}) + \beta_2 MAR_{jt} + \beta_3 MEI_{ijt} + \beta_4 (MEI \times MAR)_{ijt} + \gamma_i + \delta_t + \varepsilon_{it}$$

$$(6) \quad \text{Gay-child ratio}_{it} = \beta_0 + \beta_1 \log(H_{it}) + \beta_2 MAR_{jt} + \beta_3 MEI_{ijt} + \beta_4 (MEI \times MAR)_{ijt} + \gamma_i + \delta_t + \varepsilon_{it}$$

While (5) functions as a specification check, (6) seeks to explore the relationship between municipal tolerance and child-rearing in gay households. I multiply both the child ratio and gay-child ratio by 10 to better quantify coefficient estimates.

VII. PRELIMINARY RESULTS

While log median house values impact the gay ratio in a manner consistent with economic theory, this relationship notably lacks statistical significance. A one-percentage increase in median house value predicts an increase in the gay ratio by 8.972, approximately 9 more gay coupled individuals per 10,000 heterosexuals. The same percentage change in house values decreases the number of lesbian coupled individuals by nearly 27 per 10,000 heterosexuals. Such results support the notion that $\alpha_H^{GAY} < \alpha_H^{LESBIAN}$. Regardless, these initial findings differ from those of Black et al. (2002) in two notable ways. Firstly, while gay sorting positively responds to my amenity proxy, the lack of statistical significance may suggest a weakened relationship between urban amenities and the prevalence of gay males. The claim that gay males have decreasingly prioritized adult consumption, however, requires further evidence. Perhaps more saliently, lesbian sorting responds both differently and insignificantly to log median house values. This may support that diminishing constraints to child-rearing more so manifest themselves through the sorting of lesbian households, while only marginally affecting that of gay men, who face a greater biological burden.

As is the case with Black et al. (2002), I find that my tolerance proxies fail to significantly impact gay and lesbian sorting. Interestingly, a one-unit increase in yearly-

normalized MEI score predicts a decrease in the total gay ratio by 22.29 units, about 22 fewer same-sex coupled individuals per 10,000 heterosexuals. A one-unit increase in the tolerance interaction term, however, predicts an increase in the total gay ratio. While statistically insignificant, this may suggest that cities surrounded by relatively intolerant regions encourage gay in-sorting. The marriage equality variable likewise offers an interesting finding, although insignificant. On average, cities in states with marriage equality prior to 2015 saw more coupled gays and fewer coupled lesbians.

I run a simple specification check by analyzing the child ratio's response to the same dependent variables. A one-percentage increase in median house value increases the child ratio by an average of 0.0526, about 1 additional parenting heterosexual per 200 childless heterosexuals.[9] While this relationship is statistically insignificant, it is worth comparing the directional impact of house values on the child ratio to that of the gay ratio. Subverting the expectation of economic theory, the coefficient in question is positive in both cases. Such a result conveys the limitations of proxying for urban amenities with house values. While pricier homes may indicate the presence of the adult amenities attractive to gay males, they may also reflect amenities attractive to families, such as public schools and local daycares. It is with this generality that I associate the shared positive impact of median house values on both the gay and child ratios. Indeed, without further controls, log of median house values' coefficient proves difficult to interpret.

In my supplementary analysis, I find that the presence of children in gay households significantly responds to MEI score. A one-unit increase in the yearly-normalized index predicts a 0.479 increase in the gay child ratio, approximately five more parenting gay coupled persons

[9] I obtain this interpretation by first dividing the original coefficient by 10 (the factor I use to more easily quantify coefficient estimates for the child and gay child ratios.) This yields 0.00526, which is approximately equal to 0.005 or the ratio 1:200.

per 100 childless homosexuals.[10] Whereas this relationship is significant at the 5% level, MEI's coefficient estimate is statistically insignificant when considering children in heterosexual households. This differential effect is consistent with economic theory: coupled gays disproportionately rear children in those areas where social and political constraints pose a lesser burden. Of course, I admit the possibility that greater MEI scores correlate to greater family-valued amenities, which may universally encourage the in-sorting of families, regardless of sexuality. Nevertheless, I will demonstrate that this differential impact remains present even when subject to two robustness checks.

To further explore this compelling differential effect, I conduct two heterogeneity tests to consider the prevalence of parenting and childless homosexual coupled persons relative to the number of heterosexuals. I present the following two regressions:

$$(7) \quad \text{Parent-gay ratio}_{it} = \beta_0 + \beta_1 \log(H_{it}) + \beta_2 MAR_{jt} + \beta_3 MEI_{ijt} + \beta_4 (MEI \times MAR)_{ijt} + \gamma_i + \delta_t + \varepsilon_{it}$$

$$(8) \quad \text{Childless-gay ratio}_{it} = \beta_0 + \beta_1 \log(H_{it}) + \beta_2 MAR_{jt} + \beta_3 MEI_{ijt} + \beta_4 (MEI \times MAR)_{ijt} + \gamma_i + \delta_t + \varepsilon_{it}$$

for which I define the parent-gay ratio as the number of gays with children divided by the number of heterosexuals, and the childless-gay ratio analogously. For the sake of interpretability, I multiply both ratios by 10,000.

I find that the presence of marriage equality decreases the number of gay parenting individuals by approximately 11 per 10,000 heterosexuals, ceteris paribus. The greater *relative* tolerance of urban centers in broadly less tolerant states may explain the urbanicity of parenting homosexuals. Moreover, while the yearly normalized MEI fails to significantly impact gay parenting, its coefficient is positive nonetheless; a one-unit increase in the index is associated with about 5 additional parenting gays per 10,000 heterosexuals. At variance with this result, a

[10] I obtain this interpretation by dividing MEI's coefficient estimate by 10 (the factor I use to more easily quantify coefficient estimates for the child and gay child ratios.) The result is 0.0479, which is approximately 0.05 or the ratio 1:100.

one-unit increase in MEI significantly decreases the number of childless gay individuals by approximately 28 per 10,000 heterosexuals. Provided that MEI score proxies for the obstacles to gay family building or the lack thereof, it logically follows that ACS observes more childless gays in cities with lower MEI scores.

Naturally, the small sample size of my study warrants a discussion of robustness. The next section will detail and attempt to remedy issues of both heteroskedasticity and influential outliers.

VIII. ROBUSTNESS CHECKS

ANALYSIS OF HETEROSKEDASTICITY

To verify the robustness of my preliminary results, I conduct a residual analysis for the three primary dependent variables. A quick look at the correlation between the total gay ratio and its error terms reveals a likely case of heteroskedasticity[11]. To confirm this suspicion, I conduct various Bruesh-Pagan Tests. More specifically, I assess the overall validity of regressions taking on the form:

$$(9) \quad u^2_{it} = \lambda_0 + \lambda_1 \log(H_{it}) + \lambda_2 MAR_{jt} + \lambda_3 MEI_{ijt} + \lambda_4 (MEI \times MAR)_{ijt} + \gamma_i + \delta_t + v_{it}$$

for the squared residual terms of each variant of the gay ratio, in addition to the supplementary gay-child ratio and its two heterogeneity tests. Overall, the explanatory power of these models is strong, and in each case I reject the null hypothesis that the respective error terms are homoscedastic.

Data limitations likely contribute to heteroskedasticity. ACS conducts small samples relative to the decennial census. While in and of itself this is unproblematic, two issues arise: (1) only 26 of the 50 largest US cities are available at the city-level of disaggregation from 2012-2018, and (2) gay coupled individuals comprise an extremely small portion of the general

[11] Please refer to figure A7 for the residuals of the total gay ratio plotted against its fitted values.

population. Consequently, I suspect certain city-year combinations experience inordinately high or low gay ratios as a consequence these limitations. The volatility of the gay, lesbian, and total gay ratios manifests itself through heteroscedastic residuals for both my central and supplementary regressions.

Model misspecification likely also contributes to heteroskedasticity. As mentioned previously, the use of median house values to proxy for amenability is quite general. While Black et al. (2002) hold that local amenities are "paid for" by higher rents in equilibrium, "amenities" themselves consist of a wide variety of local attributes, including items toward which childless individuals are indifferent. The challenge comes from the inability isolate "single adult" amenities from "family-valued" amenities, a limitation that diminishes the usefulness of the proxy. Unfortunately, most amenity indices are intended to compare regions at some fixed point in time. As such, beyond median house values and fixed effects, I am unable to measure changes in types of urban amenities from one year to the next. These findings imply that my preliminary regression analyses provide incorrect estimates for standard errors. To remedy this, I conduct the same regressions using standard errors clustered by city.

My central analysis with robust standard errors yields no significant results. Importantly, log median house value remains statistically insignificant. This further strengthens the notion that among sampled US cities, amenability (as proxied for by house values) lacks explanatory power over gay and lesbian sorting. Notably, my robust supplementary analysis also finds MEI to possess a differential effect on gay and heterosexual child rearing. Upon clustering standard errors by city, my heterogeneity tests find that both marriage equality and the yearly-normalized MEI fail to significantly impact the parent-gay and childless-gay ratios. The small sample size of

my study likely limits the extent to which I can investigate the potential heterogenous effect of gay friendliness.

ANALYSIS OF OUTLIERS

While adjusting standard errors remedies heteroskedasticity, specific outlying observations may still bias coefficient estimates. Toward this end, I return to the original regressions and plot observations' leverage against their normalized residuals squared.

The gay ratio suffers from more dispersed error terms than its lesbian counterpart. The gay ratio regression also yields more observations with *both* above average normalized residuals squared and leverage. I offer two potential interpretations for this occurrence: (1) the gay ratio experiences greater volatility than its lesbian counterpart, and/or (2) the specified model better explains the sorting of gay women. Aggregating the gay and lesbian ratios decreases the mean value and dispersion of the normalized residuals squared. Notably, the total gay ratio regression yields the fewest observations with both above average squared error and leverage.

As evidenced by the appendix's leverage plots, my original coefficient estimates for the gay, lesbian, and total gay ratios likely experience bias. Although I do not include its leverage plot in the appendix, the gay-child ratio regression also sees several observations with high residual and leverage. To check the validity of my preliminary analysis, I run unique regressions that exclude influential outliers. More specifically, I eliminate observations with both higher-than-average residual squared and leverage. Analysis of these coefficient estimates will reveal the extent to which bias affects the significance and interpretation of previous coefficients.

Excluding their respective influential outliers, the gay, lesbian, and total-gay ratio regressions yield no significant results. One notable change is that the directional impact of log median house value turns positive; a one-percentage increase in median house value *increases*

the number of same-sex coupled individuals by nearly 11 per 10,000 heterosexuals. It follows that the ten influential outliers of the total gay ratio significantly bias the coefficient estimate in question.

The gay and lesbian ratios continue to reflect the differential constraints of male-male and female-female couples. While a one percentage increase in median house value predicts approximately 8 more gay male coupled individuals per 10,000 heterosexuals, the same variable change decreases the number of lesbian coupled persons by nearly 20 per 10,000 heterosexuals.

Without outliers, marriage equality decreases both the gay and lesbian ratios, ceteris paribus. Even so, the tolerance interaction coefficient remains positive. While statistically insignificant, these findings lend themselves to a possible correlation between gay urbanicity and relatively "intolerant" states.

Upon eliminating outliers, I maintain that both gay and lesbian sorting fail to significantly respond to median house values. Notably, yearly-normalized MEI score continues to significantly impact the prevalence of children in gay coupled households. A one-unit increase in the index corresponds to approximately 0.348 additional parenting gays per 10 childless homosexuals, or equivalently, 3-4 additional parenting gays per 100 childless homosexuals.

The heterogeneity tests yield no significant results upon eliminating outliers. Increases in log median house value continue to predict fewer parenting gays and more childless homosexuals. This, in addition to the significant impact of gay friendliness on the gay-child ratio, suggests that parenting likely alters the sorting preferences of same-sex coupled individuals.

IX. CONCLUSION

It should be noted that the scope of my analysis is markedly different than that of Black et al. (2002). As a pooled panel variant, I do not measure amenities directly via quality-of-life

indices, instead relying solely on median house values. Another key difference is that I do not investigate gay sorting at the metropolitan area level, but rather at the city level. While this is largely done to exploit heterogeneity across municipal policy, this difference in approach likely lends itself to opposing results.

This paper finds evidence to suggest that gay male sorting and urban amenability (as proxied for by median house values) possess a less concrete positive relationship relative to previous analysis. This may marginally support the notion that gay males respond to improving family building prospects by decreasingly sorting into amenity-rich cities. This conceptualization, however, lacks convincing evidence; although statistically insignificant, the directional impact of median house values on gay sorting remains positive. On the other hand, my analysis of lesbian coupled individuals makes a more solid case for this narrative of shifting constraints and responsive sorting. While Black et al. (2002) hold that lesbians sort into amenity-rich metropolitan areas, my analysis fails to support the existence of such a relationship at the city level. In fact, the coefficient of log median house value is both statistically insignificant and negative when considering lesbian coupled individuals. While my small sample size may prevent statistically significant findings, the negative effect of this amenity proxy suggests that lesbians either (1) no longer tend toward amenity-rich regions and/or (2) do not tend toward *cities* rich in amenities. Both possibilities are consistent with economic theory, as child rearing prospects have vastly improved for lesbian families since the early 2000s. While this is also true for gay males, the inherent biological restrictions of sex are such that child bearing poses a greater cost to male-male couples, regardless of their legal ability. I suspect this may lend itself to divergent sorting trends.

While I assert that municipal tolerance fails to significantly impact gay and lesbian sorting, I find that it *does* has a differential effect on gay and heterosexual child rearing. Yearly-normalized MEI score fails to impact the prevalence of children in heterosexual households, while bearing a positive and significant effect on gay child rearing.

Two useful extensions would complement this body of research. Firstly, an analysis of gay sorting at the metropolitan area level is necessary to fully retest the findings of Black et al. (2002). This could remedy the issues of heteroskedasticity and outliers encountered by my study, as ACS makes available the metropolitan area level of disaggregation for all US metros from 2012-2018. For this design, I posit that the yearly-normalized MEI score of a metropolitan area's principal city is a reasonable proxy for regional gay friendliness. Secondly, analysis of the 2020 US Census will greatly enhance our understanding of today's gay and lesbian locational tendencies. The all-encompassing nature of the decennial Census mitigates the issues caused by small sample sizes. Moreover, a cross sectional approach permits the exploitation of urban amenity indices, which may better proxy for the adult amenities of interest in an economic investigation of gay sorting.

References

Badgett, M. V. L. (1995). Gender, Sexuality, and Sexual Orientation: All in the Feminist Family? *Feminist Economics,* 1(1), 121–139.

Becker, Gary S. A Treatise on the Family. Cambridge, Mass: Harvard University Press, 1981.

Black, D., Gates, G., Sanders, S., & Taylor, L. (2002). Why Do Gay Men Live in San Francisco? *Journal of Urban Economics*, *51*(1), 54–76. doi: 10.1006/juec.2001.2237

Black, D., Gates, G., Sanders, S., & Taylor, L. (2000). Demographics of the Gay and Lesbian Population in the United States: Evidence from Available Systematic Data Sources. *Demography* , *32*(2), 139–154.

Black, Dan, A., Seth G. Sanders, and Lowell J. Taylor. 2007. "The Economics of Lesbian and Gay Families." *Journal of Economic Perspectives*, 21 (2): 53-70.

Cooke, T. J., & Rapino, M. (2007). The Migration of Partnered Gays and Lesbians between 1995 and 2000. *The Professional Geographer*, *59*(3), 285–297. doi: 10.1111/j.1467-9272.2007.00613.x

Donor Insemination. (2019, October 16). Retrieved from https://americanpregnancy.org/getting-pregnant/donor-insemination/

Florida, Richard L. (2012). The Rise of the Creative Class, Revisited. New York: Basic Books.

Ghaziani, A. (2015). 'Gay Enclaves Face Prospect of Being Passé: How Assimilation Affects the Spatial Expressions of Sexuality in the United States. *International Journal of Urban and Regional Research*, *39*(4), 756–771. doi: 10.1111/1468-2427.12209

Ghaziani, A. (2014). *There Goes the Gayborhood?* Princeton, NJ: Princeton University Press.

GSS Data Explorer: NORC at the University of Chicago. (n.d.). Retrieved from

https://gssdataexplorer.norc.org/trends/Gender & Marriage?measure=homosex

Human Rights Campaign. (n.d.). HRC's Municipal Equality Index. Retrieved from https://www.hrc.org/mei

Jacobsen, J. P., & Zeller, A. (Eds.). (2008). *Queer Economics: A Reader*. London: Routledge.

Knopp, L. (1990). Gentrification and Gay Neighborhood Formation in New Orleans: A Case Study. *Political Geography*, *9*, 337–352.

Kreider R.M. & Gurrentz B.T.. (2019, April). *Changes to the Household Relationship Data in Current Population Survey.* Paper presented at the Population Association of America annual meeting.US Census Bureau, Austin, Texas.

Liptak, A. (2020, June 15). Civil Rights Law Protects Gay and Transgender Workers, Supreme Court Rules. Retrieved August 26, 2020, from https://www.nytimes.com/2020/06/15/us/gay-transgender-workers-supreme-court.html

Reilly, M. (2016, April 1). Same-Sex Couples Can Now Adopt Children in All 50 States. Retrieved from https://www.huffpost.com/entry/mississippi-same-sex-adoption_n_56fdb1a3e4b083f5c607567f

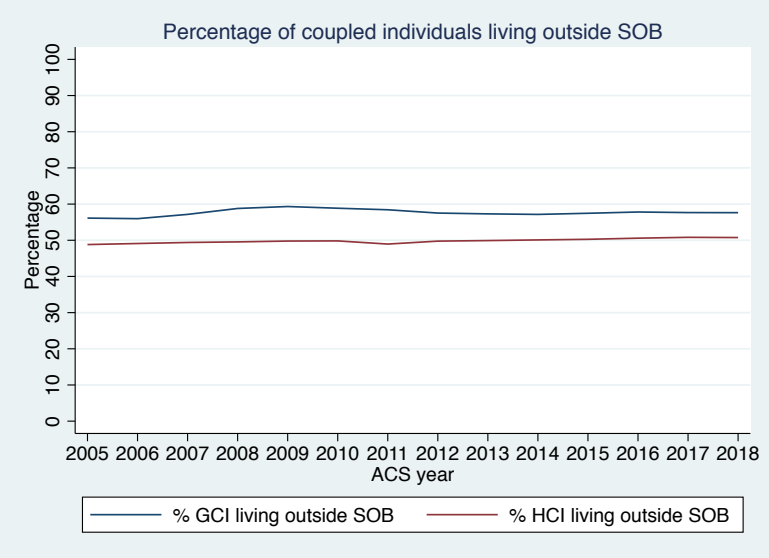
Steven Ruggles, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas and Matthew Sobek. *IPUMS USA: Version 9.0* [dataset]. Minneapolis, MN: IPUMS, 2019. https://doi.org/10.18128/D010.V9.0

Surrogate Mother Costs & Fees: How Much Does Surrogacy Cost? (n.d.). Retrieved from https://www.westcoastsurrogacy.com/surrogate-program-for-intended-parents/surrogate-mother-cost

Tavernise, S. (2011, June 13). Adoptions by Gay Couples Rise, Despite Barriers. Retrieved from https://www.nytimes.com/2011/06/14/us/14adoption.html

APPENDIX

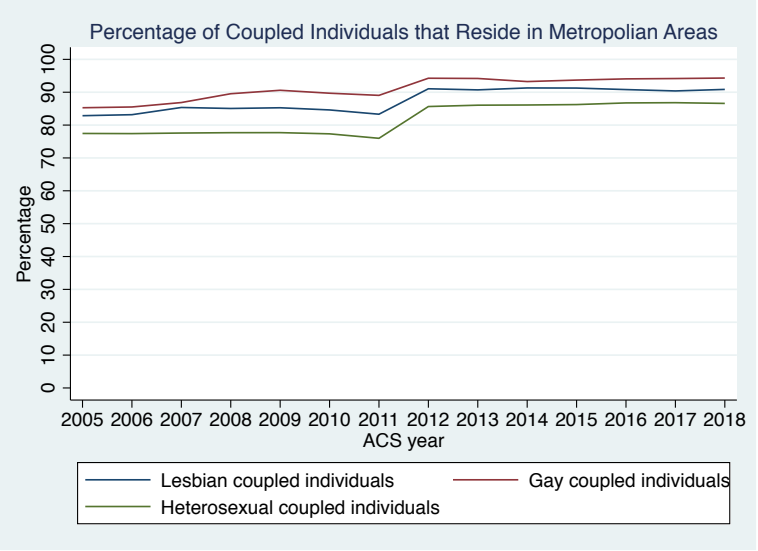
Figure A1: Percentage of gays coupled individuals (GCI) and heterosexual coupled individuals (HCI) living outside their state of birth (SOB) from 2005 to 2018



Source: American Community Survey (ACS)

Note: GCI are consistently more likely than HCI to reside outside their state of birth.

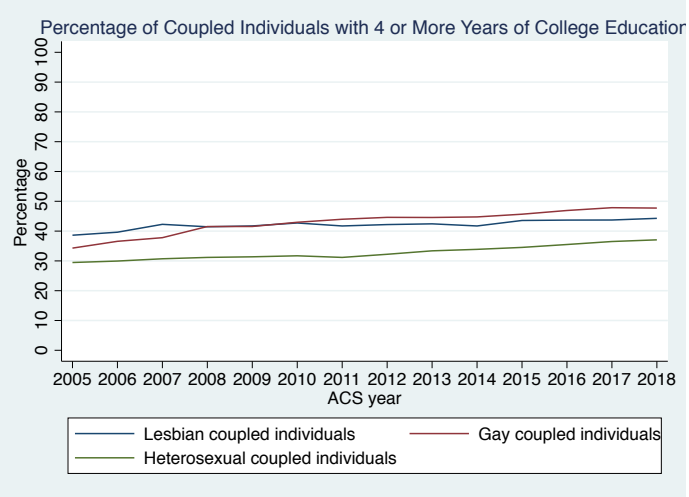
Figure A2: Urbanicity of Coupled Individuals from 2005-2018



Source: American Community Survey

Note: Gay and lesbian coupled individuals are consistently more likely to reside in metropolitan areas than their heterosexual counterparts. The sudden spike experienced by all groups post-2011 is related to the change in the delineations of metropolitan areas.

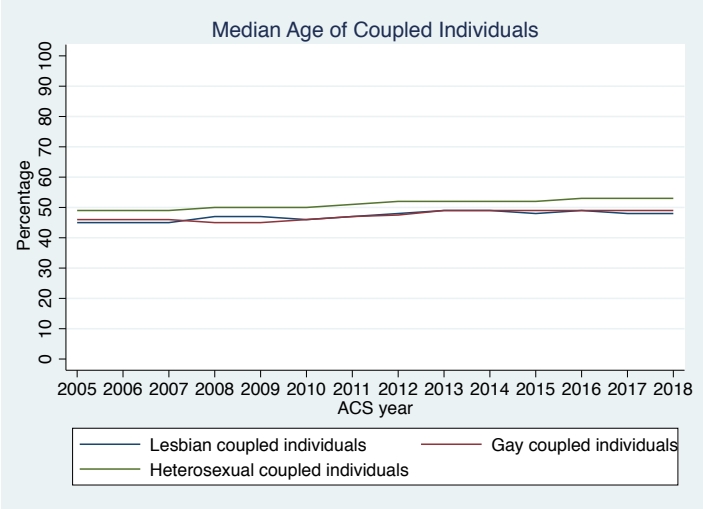
Figure A3: Educational Attainment of Coupled Individuals from 2005-2018



Source: American Community Survey (ACS)

Note: the percentage of gay and lesbian coupled individuals having 4 or more years of college education is consistently larger than that of coupled heterosexuals.

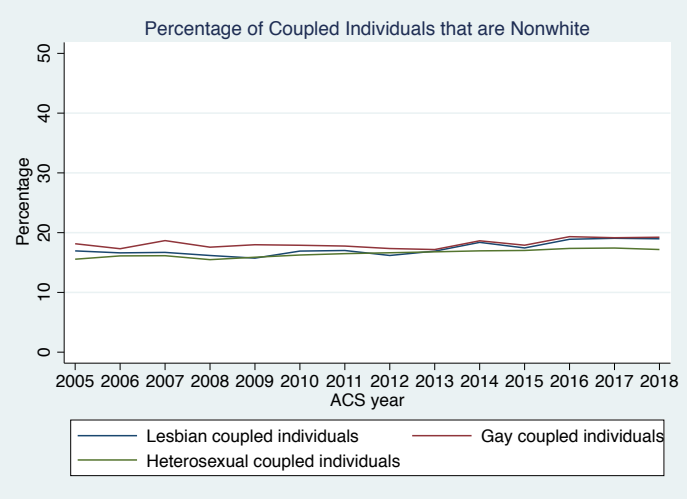
Figure A4: Median Age of Coupled Individuals from 2005-2018



Source: American Community Survey (ACS)

Note: it can be seen that gay and lesbian coupled individuals are consistently and slightly younger than their heterosexual counterparts.

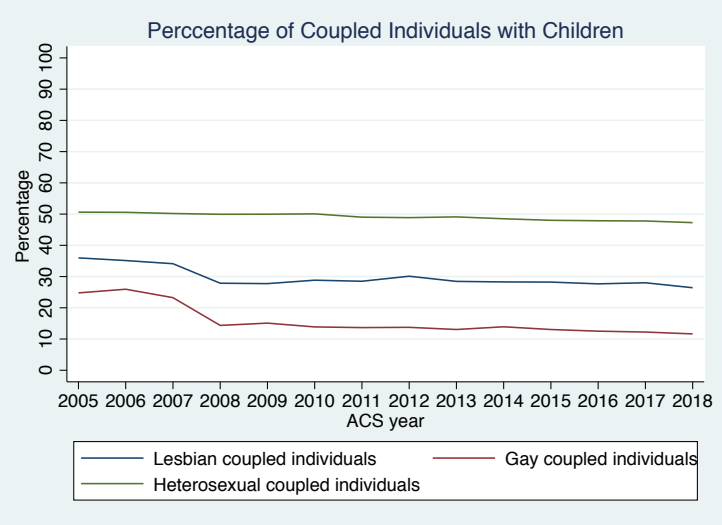
Figure A5: Prevalence of nonwhite Coupled Individuals from 2005-2018



Source: American Community Survey (ACS)

Note: it can be seen that while gay coupled individuals are consistently "more" nonwhite than heterosexuals, the same cannot be said for lesbian coupled individuals. Regardless, there is no massive difference among the three groups of coupled individuals.

Figure A6: Prevalence of children in coupled households from 2005-2018



Source: American Community Survey (ACS)

Note: it can be seen that homosexual coupled individuals, both gay and lesbian, are less likely than partnered heterosexuals to have their "own" children in the household. Moreover, gay and lesbian couples are decreasingly likely to have children, a trend likely related to their decreasing propensity to engage in heterosexual relationships.

Table A1: Summary Statistics

Variable	Mean	St.Dev
Median house values	13.069	1.103
Marriage equality	.749	.435
Equality interaction	.097	.812
Gay ratio	187.098	110.512
Lesbian ratio	147.24	77.394
Total gay ratio	334.338	171.836
Child ratio	9.7568	2.4844
Gay child ratio	1.58	.873
Parent gay ratio	49.07	28.926
Childless gay ratio	285.268	156.687

Note: this table provides the sample mean and standard deviation for applicable variables

Table A2: Variable Source and Construction

Variable	Source	Construction
Median house values	ACS	Log of median house values
Marriage equality		Dummy variable: 1 = city resides in state/time wherein same-sex marriage is legal
Tolerance interaction	ACS / HRC	Marriage Equality x MEI
Gay ratio	ACS	(Gay coupled individuals / Heterosexual coupled individuals) x 10,000
Lesbian ratio	ACS	(Lesbian coupled individuals / Heterosexual coupled individuals) x 10,000
Total gay ratio	ACS	Gay ratio + Lesbian ratio
Child ratio	ACS	(Individuals with children / Individuals without children) x 10
Gay child ratio	ACS	(Homosexual coupled individuals with children / Homosexual coupled individuals without children) x 10
Parent gay ratio	ACS	(Homosexual coupled individuals with children / Heterosexual coupled individuals) x 10,000
Childless gay ratio	ACS	(Homosexual coupled individuals without children / Heterosexual coupled individuals) x 10,000

Note: this table provides the source and construction for applicable variables

Table A3: Preliminary Results

VARIABLES	(1) Gay ratio	(2) Lesbian ratio	(3) Total
Marriage Equality	0.482	-12.15	-11.66
	(15.08)	(11.94)	(20.11)
Yearly normalized MEI score	-9.695	-12.60	-22.29
	(12.92)	(10.22)	(17.22)
Tolerance interaction	6.527	7.877	14.40
	(8.984)	(7.109)	(11.98)
Log median house value	8.972	-26.78	-17.81
	(34.87)	(27.59)	(46.49)
Constant	-21.41	385.5	364.1
	(388.5)	(307.5)	(518.1)
Observations	175	175	175
R-squared	0.859	0.820	0.896

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

Note: this table presents the results of the regressions given by equation (4)

Table A4: Preliminary Specification Check

VARIABLES	Child ratio
Marriage equality	0.1786
	(0.1905)
Yearly normalized MEI score	0.2147
	(0.1631)
Tolerance interaction	-0.0743
	(0.1134)
Log median house value	0.0526
	(0.4403)
Constant	10.28**
	(4.906)
Observations	175
R-squared	0.955

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

Note: this table provides the results for the specification check given by equation (5)

Table A5: Preliminary Supplement

VARIABLES	Gay child ratio
Marriage equality	-0.307
	(0.225)
Yearly normalized MEI score	0.479**
	(0.192)
Tolerance interaction	0.000151
	(0.134)
Log median house value	0.00325
	(0.519)
Constant	3.189
	(5.785)
Observations	175
R-squared	0.498

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

Note: this table provides the results for supplemental regression given by equation (6)

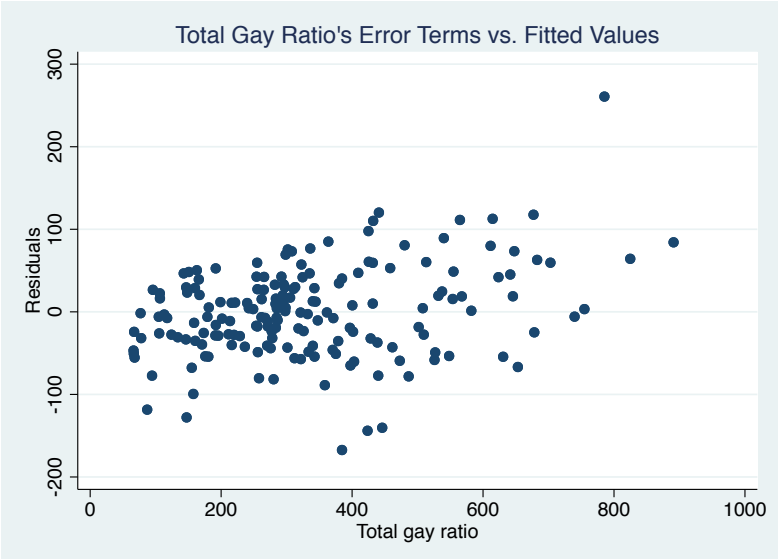
Table A6: Heterogeneity Test for Supplement

VARIABLES	(1) Parent gay ratio	(2) Childless gay ratio
Marriage equality	-11.36*	-0.306
	(6.806)	(18.70)
Yearly normalized MEI score	5.493	-27.78*
	(5.827)	(16.01)
Tolerance interaction	-0.655	15.06
	(4.053)	(11.14)
Log median house value	-10.46	-7.354
	(15.73)	(43.22)
Constant	181.3	182.8
	(175.3)	(481.7)
Observations	175	175
R-squared	0.580	0.892

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

Note: this table provides the results for the heterogeneity tests for the supplemental regression given by equations (7) and (8). The "Parent gay ratio" is the ratio of gays with children to heterosexuals. The "Childless gay ratio" is analogously defined for gays without children.

Figure A7: Residuals Plotted Against Fitted Values for the Total Gay Ratio



Note: this graph plots residuals against fitted values for the total gay ratio

Table A7: Primary Results with Clustered Standard Errors

VARIABLES	(1) Gay ratio	(2) Lesbian ratio	(3) Total
Marriage equality	0.482	-12.15	-11.66
	(16.46)	(18.01)	(25.69)
Yearly normalized MEI score	-9.695	-12.60	-22.29
	(14.83)	(8.830)	(17.81)
Tolerance interaction	6.527	7.877	14.40
	(8.543)	(5.304)	(11.82)
Log median house value	8.972	-26.78	-17.81
	(43.64)	(25.15)	(49.42)
Constant	-21.41	385.5	364.1
	(486.1)	(281.3)	(553.0)
Observations	175	175	175
R-squared	0.859	0.820	0.896

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

Note: this table presents the "robust" results of this paper's central regressions, given by equation (4). Standard errors are clustered by city, with 25 clusters total

Table A8: Supplement with Clustered Standard Errors

VARIABLES	Gay child ratio
Marriage equality	-0.307
	(0.251)
Yearly normalized MEI score	0.479**
	(0.221)
Tolerance interaction	0.000151
	(0.147)
Log median house value	0.00325
	(0.517)
Constant	3.189
	(5.783)
Observations	175
R-squared	0.498

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

Note: this table provides the results for supplemental regression given by equation (6). Standard errors are clustered by city, with 25 clusters total.

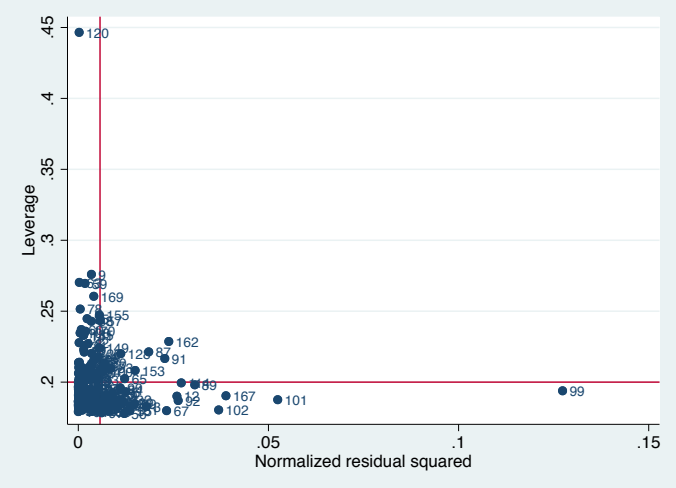
Table A9: Heterogeneity Test for Supplement with Clustered Standard Errors

VARIABLES	(1) Parent gay ratio	(2) Childless gay ratio
Marriage equality	-11.36	-0.306
	(9.189)	(20.95)
Yearly normalized MEI score	5.493	-27.78
	(4.362)	(17.69)
Tolerance interaction	-0.655	15.06
	(3.574)	(10.29)
Log median house value	-10.46	-7.354
	(17.23)	(49.19)
Constant	181.3	182.8
	(193.8)	(548.1)
Observations	175	175
R-squared	0.580	0.892

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

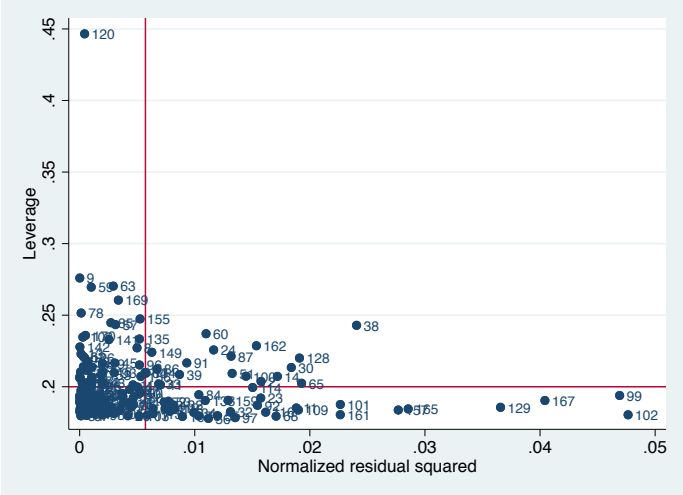
Note: this table provides the results for the heterogeneity tests for the supplemental regression given by equation (6). The "Parenting gay ratio" is the ratio of gays with children to heterosexuals. The "Childless gay ratio" is analogously defined for gays without children. Standard errors are clustered by city, with 25 clusters total.

Figure A8: Outlier Analysis for Total Gay Ratio



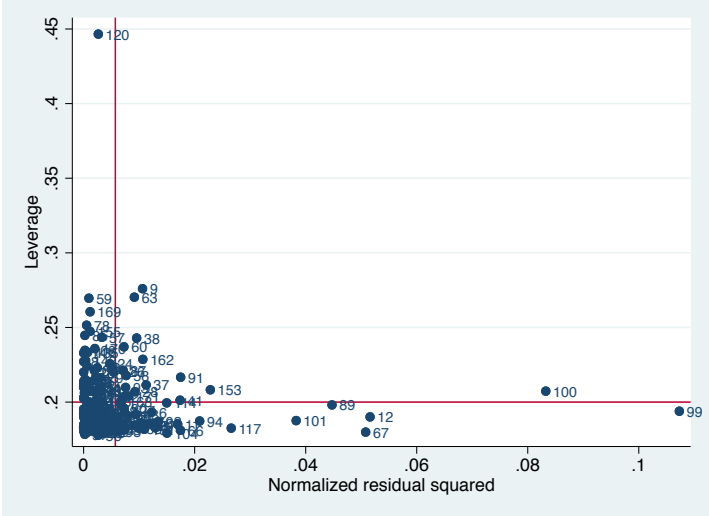
Note: this plot graphs leverage vs. normalized residual squared for the total gay ratio. The vertical red line represents the average normalized squared residual. The horizontal red line represents the average leverage.

Figure A9: Outlier Analysis for Gay Ratio



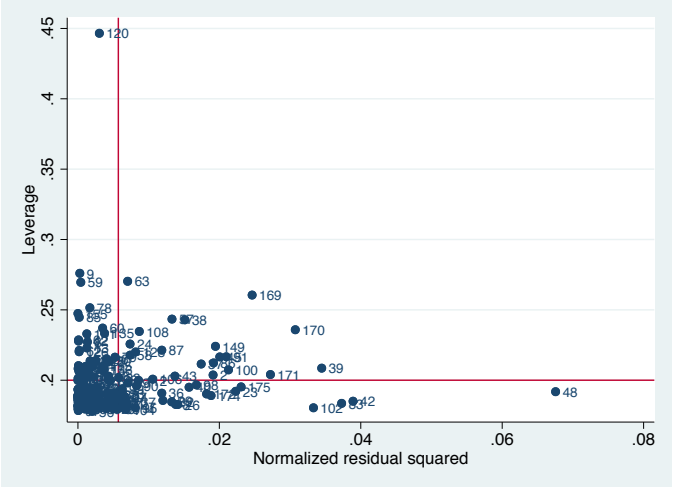
Note: this plot graphs leverage vs. normalized residual squared for the gay ratio. The vertical red line represents the average normalized squared residual. The horizontal red line represents the average leverage.

Figure A10: Outlier Analysis for Lesbian Ratio



Note: this plot graphs leverage vs. normalized residual squared for the lesbian ratio. The vertical red line represents the average normalized squared residual. The horizontal red line represents the average leverage.

Figure A11: Outlier Analysis for the Gay-child Ratio



Note: this plot graphs leverage vs. normalized residual squared for the gay-child ratio regressed on log median house values and all other dependent variables. The vertical red line represents the average normalized squared residual. The horizontal red line represents the average leverage.

Table A10: Primary Results Excluding Influential Outliers

VARIABLES	(1) Gay ratio	(2) Lesbian ratio	(3) Total
Marriage equality	-12.34	-14.97	-28.90
	(17.05)	(12.30)	(21.51)
Yearly normalized MEI score	-8.707	-10.11	-12.12
	(12.89)	(10.83)	(17.28)
Tolerance interaction	13.46	7.514	16.30
	(8.969)	(6.914)	(11.68)
Log median house value	7.930	-19.83	10.98
	(34.61)	(27.40)	(45.75)
Constant	81.31	306.0	24.55
	(566.0)	(304.9)	(510.3)
Observations	156	159	165
R-squared	0.890	0.852	0.908

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

Note: this table provides the results of the central regressions excluding those observations whose normalized residual squared and leverage are above average

Table A11: Supplementary Results Excluding Influential Outliers

VARIABLES	(1) Gay-child ratio	(2) Parent-gay ratio	(3) Childless-gay ratio
Marriage equality	-0.179	-5.017	-19.95
	(0.215)	(7.401)	(20.27)
Yearly normalized MEI score	0.348*	7.047	-13.65
	(0.195)	(5.689)	(16.61)
Tolerance interaction	-0.0377	-0.0797	7.008
	(0.143)	(3.897)	(11.45)
Log median house value	0.243	-4.524	15.41
	(0.466)	(14.88)	(42.53)
Constant	-2.920	93.00	-91.62
	(7.627)	(239.3)	(474.3)
Observations	157	157	160
R-squared	0.494	0.644	0.910

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

Note: this table provides the results of the supplementary regressions excluding those observations whose normalized residual squared and leverage are above average