Are all same-sex marriage rights created equal? Homophobia and labor market segregation from heterogeneities in same-sex marriage legalization

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Abstract

Homophobia is a driver of labor market segregation of sexual minorities. I find evidence for this causal link by exploiting how same-sex marriage (SSM) was legalized in the U.S.: a staggered roll-out design with heterogeneity in the legalization method – either through the judiciary or the legislature. First, using a homophobic search index based on Google search queries, I find that whether SSM legalization occurred via the legislature or the judiciary had dramatically different effects, ranging from 25 percent lower to 35 percent higher levels of homophobia, respectively. Then, building on Black et al. (2007)'s finding that homosexual men tend to crowd out of industries where most workers are heterosexual men, as they might experience more discrimination, I test whether SSM legalization had an impact on labor market segregation. In line with the heterogeneous effects found in levels of homophobia, I find evidence suggesting that legalization-through-the-judiciary states saw an increase in segregation levels. In contrast, legalization-through-the-legislature states saw a decrease in segregation levels, suggesting a causal link between homophobic sentiment and labor market segregation.

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1 Introduction

Homophobia is a driver of labor market segregation of sexual minorities. Labor market segregation, in turn, potentially slows down economic growth through a misallocation of human capital. If workers do not self-select into industries based on their marginal productivity due to stigma, the allocation of resources in the economy would be less-than-optimal.

Homophobia, in itself, has severe adverse impacts on sexual minorities. Hatzenbuehler et al. (2010) examine the relation between living in states that instituted bans on same-sex marriage (SSM) during the 2004-2005 elections and the prevalence of psychiatric morbidities in lesbian, gay and bisexual (LGB) populations.[1] His findings suggest that living in states where SSM bans were instituted generated an increase in the prevalence of psychiatric morbidities in the LGB populations of: 248.2 percent for general anxiety disorder; 41.2 percent for alcohol use disorder; 36.6 percent for any mood disorder; and 36.3 percent for psychiatric comorbidities.

Further, Hatzenbuehler (2011) has shown that the social environment surrounding lesbian, gay and bisexual youth may contribute to their higher rates of suicide attempts, once controlling for individual risk factors. He estimates that suicide risk for LGB youth is 20 percent higher than their heterosexual counterparts in an unsupportive environment.

How are homophobic attitudes formed? Previous research has shown that changes in same-sex relationships legal status can modify discriminatory attitudes. For instance, Everett et al. (2016) study the effect of civil union legalization (a close substitute to same-sex marriage for some authors) on perceived discrimination, depressive symptoms, and indicators of hazardous drinking for sexual minority women. They find that civil union legislation was associated with lower levels in all these variables.

Moreover, homophobia is associated with negative social, economic and health outcomes in low- and middle-income countries. Lamontagne et al. (2018) construct an index of homophobia at the country level and find that a 10 percent increase in GDP per capita is associated with a 1 percentage point reduction in the mean of their homophobic climate index. My research aims to bridge the gap between the correlational evidence between homophobia and negative economic outcomes and causal evidence.

One potential mechanism for negative causal effects of homophobia in the economy is the misallocation of human capital. Recently, Hsieh et al. (2019) showed that declining obstacles to human capital accumulation and declining labor market discrimination for blacks and women explain 44 percent of U.S. GDP per capita growth between 1960 and 2010. They argue that a decrease in the misallocation of human capital across industries is

[1] In this paper I focus on lesbian, gay and bisexual populations in general, and in gay men in particular. This is due to the fact that the data sources I use focus on these populations, and not to, in any way, invisibilize transsexual or queer populations. Whenever I refer to sexual minorities, I also only refer to LGB populations, if there is an exception I will explicitly state so.

the main mechanism behind this finding. In 1960, white men accounted for 94 percent of doctors and lawyers; by 2010, they made up for just over 60 percent and similar patterns occurred throughout the economy, particularly in high-skill occupations. Since 1960, women and black men both increased their human capital accumulation and increased their participation in high-skill industries, which in turn shifted the skill distribution of many industries to the right. There has not been a formal study, to date, that investigates if a similar mechanism exists for LGB people. This is particularly relevant given that recent polls suggest LGB populations estimates have been highly underestimated and hence their impact in the economy is likely to be higher than previously thought (Jones, 2021).

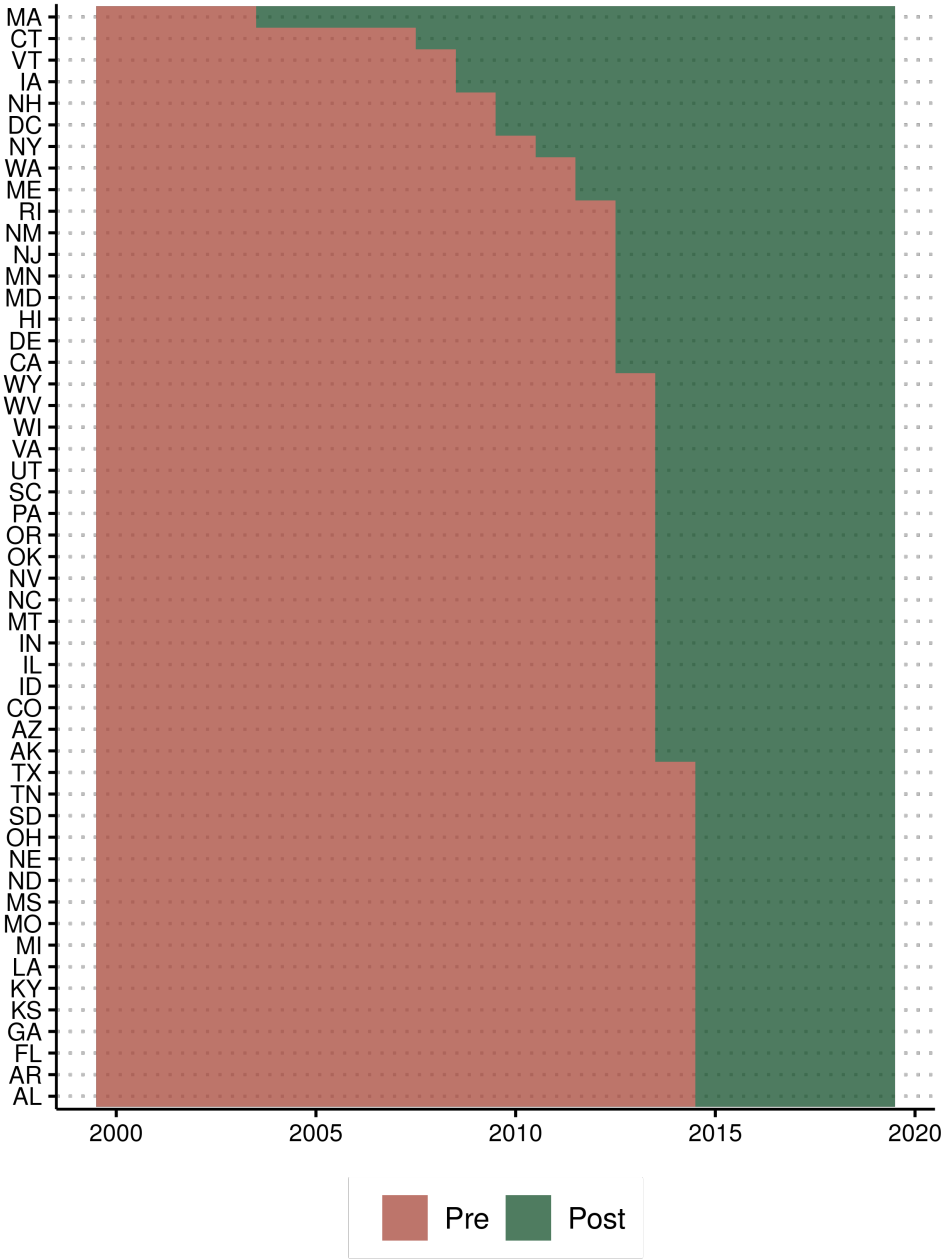


Figure 1: Timing of Same-sex marriage legalization in the U.S.

To test for the effect of homophobia on labor market segregation I exploit two sources of variation in the legalization of same-sex marriage. The first source of variation comes from the fact that SSM in the U.S was legalized in a staggered roll-out manner. Staggered roll-out designs have been considered a more robust approach to a single difference-in-differences (DID) as the typical concern is that contemporaneous trends could confound the treatment effect, violating the main DID identification strategy, the existence of parallel trends (Baker et al., 2021).[2] The first state to legalize SSM was Massachusetts in 2004, when the Massachusetts Supreme Judicial Court ruled in *Goodridge v. Department of Public Health* that it was unconstitutional under the Massachusetts Constitution to allow only opposite-sex couples to marry. From then on, there were many waves of legalization, which ended with the 2015 landmark decision of the Supreme Court of the United States (SCOTUS), *Obergefell v. Hodges*.[3] Figure 1 shows the timing of same-sex marriage legalization at the state level.

The second source of variation comes from the fact that same-sex marriage was legalized either through a court order, the judiciary, or through a legal reform, the legislature. Figure 2 shows the heterogeneity in legalization methods across the U.S. As I will explain further in Section 3, legal scholarship, and in particular constitutional law theory, provides insight into how (and why) the legalization methods can have opposite effects in public opinion. In short, as the judiciary is not legitimized to make political decisions (because they are not democratically elected), when they settle controverted debates through rulings, a backlash occurs. I find empirical evidence of these heterogeneous effects. Legalization-through-the-judiciary states show a sharp and persistent *increase* in levels of homophobia, whilst legalization-through-the-legislature-states show a sharp and persistent *decrease* in levels of homophobia. This is the main source of identifying variation to test for whether homophobia translates into labor market segregation of sexual minorities.

[2]However, it is true that there is nothing in particular about staggered roll-out designs that necessarily mitigate the likelihood of the existence of potential confounders prevalent in every treatment across time. A limitation of the results presented in this paper are then that I do not explicitly test for whether the legalization of same-sex marriage was exogenous in all instances. A potential way forward would be to use congressional records or the courts rulings and opinions to determine which ones are exogenous from public opinion, similar in spirit to Romer and Romer (2010).

[3]Here I am simplifying the history of same-sex marriage legalization as it has not been linear. States did not just go from not contemplating same-sex marriage to legalizing it; there have been cases where states explicitly changed their law to prohibit SSM prior to its legalization. For instance, in 1993 Hawaii State Supreme Court (HSSC) was the first to consider legal challenges to bans on same-sex marriage. However, in 1998 before HSSC considered the final appeal of the case, voters modified the state Constitution to restrict marriage to different-sex couples. In the midst of the debate, many other states followed Hawaii and constituted a constitutional ban on same-sex marriage.

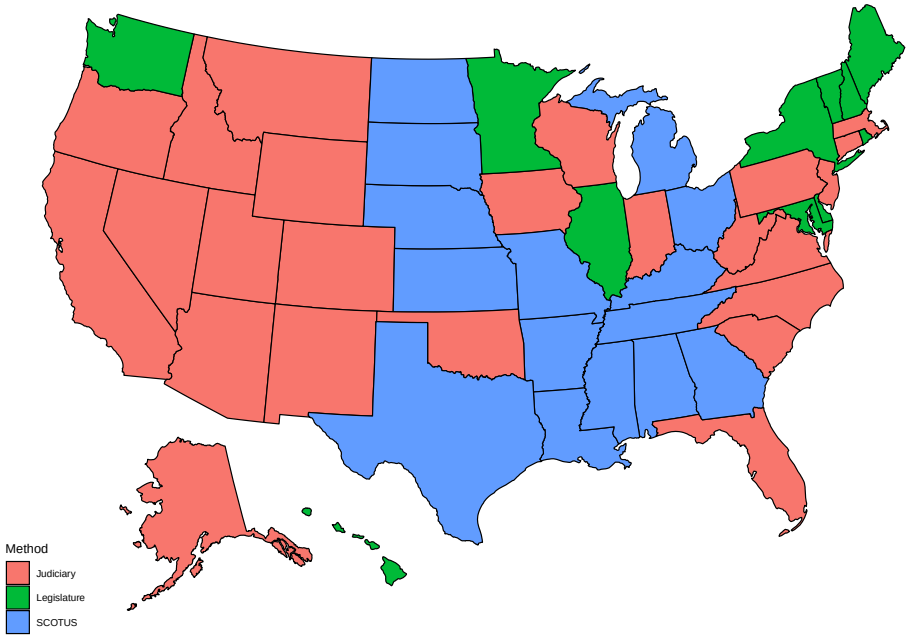


Figure 2: Same-sex marriage legalization methods

There are three main contributions of this paper. First, I show that the legal theory of the *judicial backlash thesis* has empirical support. Second, I construct and validate a veiled measure of homophobia using Google search queries. Third, I find suggestive evidence of labor market segregation of sexual minorities being driven by the levels of homophobia prevalent in society.

In a nutshell, using a stacked difference-in-difference approach, which avoids the pitfalls of the canonical two-way fixed effects (TWFE) in a staggered treatment setting, I find that legalizing same-sex marriage through the judiciary leads to *increased* levels of homophobic attitudes measured through the volume of google searches of the homophobic epithet. Legalization through the legislature generates the opposite pattern: *decreased* homophobic attitudes in the following years of SSM legalization. Based on these results, I test for a differentiated change in labor market segregation of sexual minorities and find patterns consistent with discrimination driving sexual minorities' selection in different occupations and industries. I find that legalization-through-the-judiciary states show an *increase* in labor market segregation, while legalization-through-the-legislature states show a *decrease* in labor market segregation.

The rest of the paper is distributed as follows. Section 2 summarizes the literature of changes in attitudes towards LGB populations, and the literature of labor market discrimination and segregation of sexual minorities. Section 3 provides the background of this study. Section 4 motivates and explains the data sources used. Section 5 discusses the empirical strategy. Section 6 shows the results and discusses them. Finally, Section 7 provides some concluding remarks.

2 Literature Review

2.1 Changes in public opinion

There has been a considerable amount of research on public opinion changes towards LGB issues, mainly in political science and sociology. Kreitzer et al. (2014) are among the first to investigate quantitatively whether major events concerning minority groups change public opinion towards them. The authors study the effect of the 2009 Iowa Supreme Court ruling, *Varnum v. Brien*, which upheld that the state's limitation of marriage rights to opposite-sex couples violated the State Constitution's equal protection clause. Using survey data from the Iowa Social Science Research Center (ISSRC) collected in the spring of 2009 and a re-interview after the court's decision, they find that the signaling of new social norms pressured some respondents to modify their expressed attitudes.

Specifically, respondents whose demographic characteristics would predict support for marriage equality, but previously did not, were more likely to shift their opinions to be consistent with the new state law. The main problem with these findings is that it is impossible to know if the public opinion towards sexual minorities *truly* shifted positively or if it is a function of individuals having to conform to the signaled shift in social norms. This is a problem of whether previously used measures of the social attitudes towards sexual minorities are appropriate given that survey respondents might not have the incentives to respond truthfully. One of my contributions is the construction of a measure of homophobia that eludes this limitation. I expand on this point in Section 4.

A large proportion of the public opinion literature centers on the existence of backlash after challenges to the pre-existing social norms. Bishin et al. (2016) define opinion backlash as "a large, negative, and enduring shift in opinion against a policy or group that occurs in response to some event that threatens the *status quo*". This seems to be the standard definition by now, and throughout this paper I would ascribe to it. Bishin et al. (2016) examine if SCOTUS' *United States v. Windsor* prompted backlash against gays and lesbians mainly using an online survey experiment. Their findings suggest an increase in homonegative opinion which they dismiss as inconsistent with the existence of backlash as "in no case are the effects significant or large." However, the author's results rely on survey data 41 days apart, an inappropriate time frame to test for *enduring* shifts in public opinion.

Flores and Barclay (2016) study the effects of state-level and nation-wide policy changes regarding same-sex marriage between 2012 and 2013. Using data from the American National Election Study (ANES) from 2012 and a re-contact study in 2013, the authors find that residents of states that had same-sex marriage policy introduced had the greatest reduction of anti-gay attitudes. They are the first to analyze alternative mechanisms through which public opinion changes may occur: consensus, legitimacy, po-

larization and backlash. According to them, the underlying mechanism of their findings is that of *consensus*, i.e., policy and judicial acts may simply be the enactment of the majority opinion and bear no subsequent impact on mass attitudes, and/or, that of *legitimacy*, i.e., laws may represent the acceptability of an issue, so judicial and legislative actions may enshrine shifts in public opinion through people's own respect for the rule of law. The main problem with their study, however, is that given its short-term nature it is also not suitable to test for the existence of backlash. It is important to note that Flores and Barclay (2016) do mention that backlash theorists consider court action more likely to prompt adverse reactions, as legislative or direct democratic institutions are inherently responsive to the majority will, which is the theoretical framework I consider; I expand on this point in Section 3.

While most of the literature has focused on the U.S., Abou-Chadi and Finnigan (2019) study the European case. Their findings suggest that marriage has a positive effect, while bans and registered partnerships have a negative effect. Their main similarity to my research is that they consider heterogeneities on attitude changes as a function of different policies. In particular, they focus on the different signals the different policy shifts send to the population.

The problem with prior studies cited before is that they focus on self-reported biases against LGB populations. Ofosu et al. (2019) are the first to analyze changes in implicit biases. Using data from the Implicit Association Test[4] (IAT) they test whether state-by-state same-sex marriage legislation is associated with decreases in anti-gay implicit bias. Surprisingly, they find that moderating this effect was whether states passed legislation locally: although states passing legislation experienced a greater *decrease* in bias following legislation, states that never passed legislation, i.e., where same-sex marriage was legalized through a court order, demonstrated *increased* anti-gay bias following federal legalization. I replicate and expand on this result with my constructed measure of homophobic attitudes based on web search queries.

2.2 Labor market discrimination and segregation

It was not until the late 1990s and early 2000s that economists started to study LGB issues formally. Badgett (2010) is a pioneer work that argues from an economic perspective that same-sex marriage signified a Pareto improvement in society: sexual minorities gain economic rights through same-sex marriage, as well as those related to taxation, state employee benefits, and dissolution, which provide an important and valuable economic benefit, while the rest of society does not experience any loss.

Carpenter and Eppink (2017) are among the first to analyze the potential effects of same-sex marriage in same-sex couples income and labor decisions. Using the Na-

[4] https://implicit.harvard.edu/implicit/aboutus.html

tional Health Interview Survey (NHIS) data from 2013 to 2015, they reproduce a well-documented finding that self-identified lesbians earn significantly more than comparable heterosexual women. Using data from the American Community Survey (ACS) I find that this is the case even without controlling for the myriad of demographic variables Carpenter and Eppink (2017) consider. They also show that self-identified gay men also earn significantly more than comparable heterosexual men, a difference on the order of 10 percent of annual earnings.[5] Finally, the authors find that both homosexual men and women are, on average (and controlling for demographic characteristics), more educated than their heterosexual counterparts. This fact is also present in the ACS data, and is persistent across time (from 2000 to 2019), even without controlling for any demographic characteristics.

Carpenter and Eppink (2017) take into account the improvement in public opinion (measured through survey polls) towards LGB populations in the U.S., and investigate whether it explains the earnings increase of gay men. They argue that although there has likely been a reduction in the extent of labor market discrimination against gay men, it is unlikely to explain the overall patterns observed in the NHIS, as they remain underemployed relative to their heterosexual counterparts. The gap in employment levels between homosexual and heterosexual men sheds skepticism on the apparent overall improvement in public opinion about LGB issues. They mention that there were substantial increases in LGB-related harassment reported to governments and police agencies in the wake of major policy rulings on same-sex marriage.

In a more recent study, Sansone (2019) tests the effect of same-sex marriage legalization on same-sex couples' employment. He finds that same-sex marriage legalization increased the probability that both partners in same-sex couples were working by 2.4 percentage points, which is equivalent to an almost 4 percent increase from his baseline employment levels. Sansone (2019) devotes several efforts to test for the plausibility that a decrease in discrimination against sexual minorities was the main driver in the observed short-run increases in employment. He finds that favorable policies towards sexual minorities increase the probability that both partners in same-sex couples were working, while unfavorable policies diminish it.

What explains the lower employment levels of homosexual men given that they are, on average, more educated? One potential answer is the existence of plain discrimination. A more nuanced explanation, but with the same qualitative effect, is the existence of implicit biases towards sexual minorities which incentivize homosexual men to underemploy themselves. This would be particularly so from industries and occupations where stigma is more prevalent. On this note, according to Plug et al. (2014), LGB workers tend to

[5] In Section 4 I present similar comparisons between heterosexual and homosexual men. The main difference, however, is that I present raw averages, this is, when comparing both groups I am not controlling for any demographic characteristics which Carpenter and Eppink (2017) do. This is the main driver of the differences between their descriptive statistics and mine.

sort into more tolerant occupations. Their methodology consists of comparing twins with different sexual orientations and analyze differences in occupation sorting. The authors find that gays, lesbians and bisexuals were less likely to work in occupations with prejudiced workers, measured through survey responses.[6] The main problem with Plug et al. (2014)'s methodology is its scalability. Ideally, we would like to proxy for stigma towards sexual minorities without needing to resort to survey data.

Black et al. (2007) document how male workers in same-sex couples sorted themselves in occupations with a higher proportion of women than male workers in different-sex couples. Sansone (2019), based on this finding, tests if same-sex marriage legalization induced a shift of homosexual men workers towards historically intolerant occupations, which he considers to be those where the majority of the workers are heterosexual men, or to disclose their sexual orientation if already employed in these sectors. He finds that the probability homosexual men being employed in an occupation with a majority of heterosexual male workers *increased* by 1.4 percentage points after same-sex marriage legalization. Put differently, this finding implies that homosexual men labor segregation *decreased* after SSM. I then expand on this finding by testing more formally whether the legalization of same-sex marriage had an impact in labor market segregation.

3 Background: Heterogeneous effects of legalization methods

The theoretical framework I consider for the differences in the changes in public opinion depending on the legalization method, the *judicial backlash thesis*, is drawn from constitutional law theory. The judicial backlash thesis is the *positive* ramification, as it is an empirically testable hypothesis, of a broader *normative* discussion of the legitimacy of judicial review. While both are of course intertwined, e.g., the empirical finding of the existence of backlash should be factored in the normative discussion, in this paper I solely focus on the positive aspects of the discussion.

Siegel (2017) explains that according to the *judicial backlash thesis*, courts striking down popular legislation to vindicate minority rights are not only ineffective, but counterproductive: "judicial decisions 'shutting down' politics could frustrate democratic majorities in ways that would produce more virulent politics than might have resulted had judges refused to intervene". In other words, as the judiciary is not legitimized to make political decisions (as they are not democratically elected), when they settle controverted debates through rulings, a backlash occurs.

The judicial backlash thesis is not a new idea; it has previously been considered by

[6] Some of the questions in the questionnaire consist of asking respondents whether they agree with statements such as "Homosexuality is a social corruption and can cause the downfall of civilization", and "Homosexuals should be allowed to dance with each other in public places."

empirical researchers, particularly in political science. For instance, Flores and Barclay (2016) mention "Court action, especially the U.S. Supreme Court, is expected to generate the greatest amount of backlash [...], as legislative or direct democratic institutions are inherently responsive to the majority will [...], which would likely not operate counter to majority opinion." However, despite its popularity, it has not been tested properly, in particular, as according to the Bishin et al. (2016) definition of backlash the shift in opinion should be an *enduring* one.

The theoretical discussion of whether courts rulings prompt backlash is not a marginal one relegated to law schools or political science departments. This theoretical discussion was relevant in the landmark SCOTUS case *Obergefell v. Hodges*, which as mentioned earlier, made same-sex marriage the law of the land. Chief Justice Roberts insisted that while SSM had an undeniable normative appeal in terms of equality, he argued that legalizing it through a court order was not the appropriate track. He argued that SCOTUS is not a legislature, and in a democracy only legislatures should promote social change; the role of the courts is only to ensure the appropriate enforcement of society's agreements.

Further, it is a discussion that remains relevant today. The broader discussion of the legitimacy of judicial review was one of the core arguments in *Dobbs v. Jackson Women's Health Organization*, the SCOTUS decision in which the court held that the Constitution of the United States does not confer a right to abortion, overturning *Roe v. Wade.* One quote from that case that summarizes the discussion: "It is time to heed the Constitution and return the issue of abortion to the people's elected representatives. "The permissibility of abortion, and the limitations, upon it, are to be resolved like most important questions in our democracy: by citizens trying to persuade one another and then voting." That is what the Constitution and the rule of law demand."

While I cannot say whether the *judicial backlash thesis* holds in general, this is, in the case of every "important question in a democracy", I can say that there is evidence of the existence of a backlash in the form of an increase in homophobia in the states that legalized same-sex marriage through a court order in the U.S. Further, I find evidence of a decrease in homophobia in the states that legalized same-sex marriage through the legislature. The heterogeneous effect that SSM legalization has on homophobic attitudes allows for the possibility to test whether changes in these homonegative attitudes have an effect on economic outcomes, in particular, on labor market segregation of sexual minorities, either through an increase in discrimination, or through a crowd-out of sexual minorities from intolerant occupations and/or industries.

4 Data

4.1 Homophobic attitudes

Most studies on the impact of same-sex marriage on public opinion rely on survey data. Nonetheless, as Coffman et al. (2017) show, it is likely that these measures underestimate the prevalence of homonegative attitudes. In a series of online experiments they compare population estimates from the standard methodology of asking sensitive questions to measures from a "veiled" methodology. The veiled method increased self-reports of anti-gay sentiment. Particularly, in the workplace, respondents were 67 percent more likely to disapprove of an openly gay manager when asked with a veil, and 71 percent more likely to say it should be legal to discriminate in hiring on the basis of sexual orientation.

Google search queries are a publicly available source of data that could be used as a veiled measurement of public attitudes. A homonegative bias may be socially unacceptable and people are likely to self-censor with unveiled methods. It has proven as a valuable asset for social science research. For instance, Stephens-Davidowitz (2014) used Google searches to estimate the Barack Obama's 2008 election costs from racial animus.

I construct a homophobic search index (HSI) at the state level using the search rate for the words "faggot", "faggots", "fag", "fags", as well as their misspellings, "fagot" and "fagots" for every US state plus D.C. between 2004 and 2019.[7] The search index is normalized to the state and year with the highest search hits, and the rest of the state-year observations are re-scaled from 0 to 100, this way, each state-year observation of the HSI represents the relative popularity across geographies and years. Otherwise, places with the most search volume would always be ranked highest and the HSI would not be comparable. The main complication arises as Google limits the number of geographical areas that can be compared at the same time to five. To elude this limitation, I consider the approach taken by Paul Goldsmith-Pinkham (2020). I obtain data for each state relative to the national level of searches and re-normalize each state by $\frac{maxIndex_s}{maxIndex_{US}}$. I lay out the construction of the HSI in more detail in Appendix A.

It is worth stressing that while Google Search indisputably receives the most daily number of queries than any other search engine in the U.S., its representativeness has not been the same across time. For instance, the U.S. search index for "weather", a fairly common search query, displays an upward trend from 2004 to date. This likely reflects the increase in access to the internet. In order to control for this trend, in every regression where a search index is the dependent variable, I include the search index for "weather" as a control.

[7] The motivation behind considering their misspellings is that they are related to homonegative sentiment. Google shows related queries to every given word. Consistently, "fagot" and "fagots" are related to "god hates fags".

4.2 Labor market segregation

Table 1: Descriptive statistics by behavioral sexual identity

Variable	SS men	DS men	DS women	SS women
Emp. rate	0.75	0.75	0.75	0.75
% aged between 18 and 35	0.18	0.18	0.18	0.18
Avg pre-tax annual income	60,076	62,272	29,918	46,853
% black	0.05	0.06	0.06	0.07
% hispanic	0.11	0.10	0.10	0.10
% with a bachelor's degree or more	0.46	0.33	0.33	0.44
Share who speaks english	1.00	0.99	0.99	1.00
N	141,202	11,390,086	11,390,086	142,188

Notes: SS denotes groups that are in a same-sex marriage or partnership, and DS denotes groups that are in a different-sex marriage or partnership. The data consists of married or partnered individuals in the ACS 1% samples from 2000 to 2019.

The American Community Survey (ACS) is one of the most used data sources to conduct research involving sexual minorities. It is possible to identify behavioral homosexual men and women as the ACS respondents that report being married or cohabiting with a same-sex person as their partner. Table 1 shows summary statistics for the whole time-frame considered, 2000 to 2019, by identity level. As found in previous studies, homosexual men and women are more educated and earn more than their heterosexual counterparts.

The fact that homosexual men, in this sample, tend to be more educated than their heterosexual counterparts suggest that the impact of their labor market segregation could be quite high. Figure 3 shows the relationship between the income average and share of college educated with a bachelor's degree or higher between homosexual men and heterosexual men per industry, respectively. Interestingly, homosexual men earn more on average for industries at the right side of the income distribution; while homosexual men are more educated on average across all industries. Even if homosexual men represent a small fraction of the population, they accumulate a large amount of human capital, which in turn suggests that their misallocation from labor market segregation might have a greater-than-expected impact on the economy as a whole.

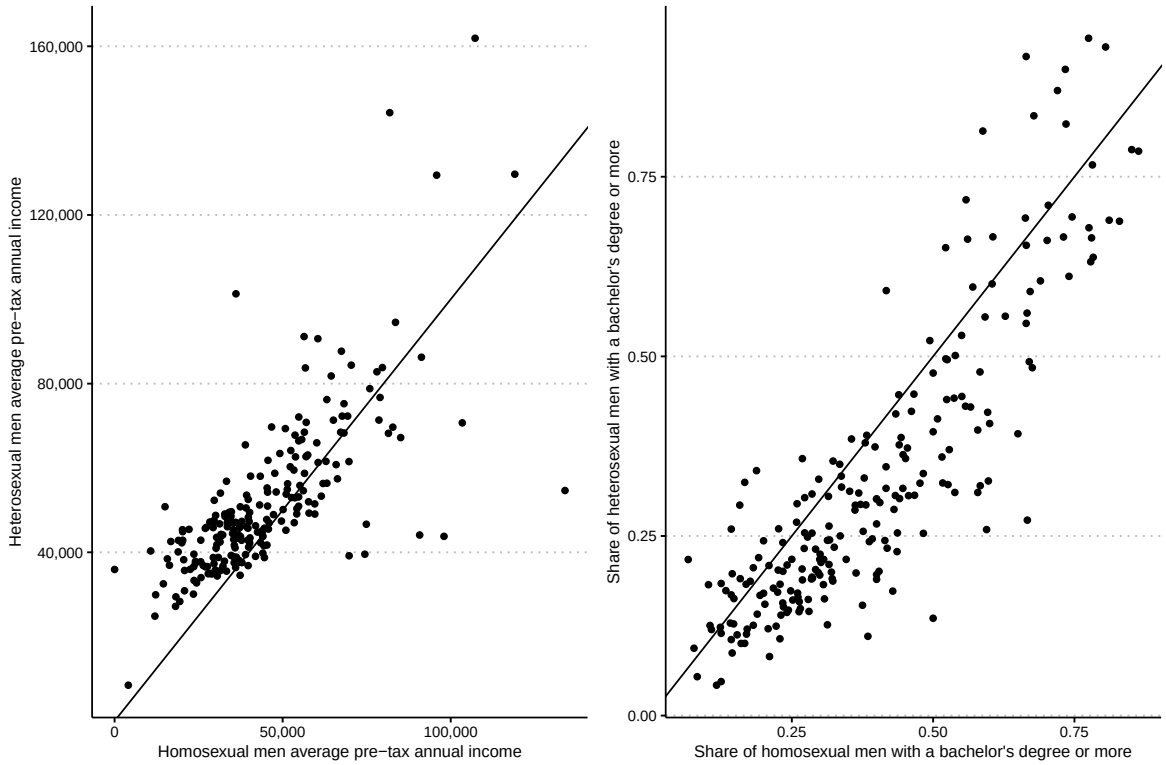


Figure 3: 4-digit NAICS comparisons of average pre-tax annual income (Left) and share with a bachelor's degree or more (Right) between men in same-sex relationships (X-axis) and men in different-sex relationships (Y-axis).

The ACS reproduces a stylized fact in the literature: that homosexual men tend to concentrate in female-dominated industries and occupations. Figure 12 in Appendix B provides a detailed picture of this relationship. While homosexual men tend to crowd-in industries with a higher share of heterosexual-women and crowd-out industries with a higher share of heterosexual-men, homosexual women do not follow a symmetric pattern, and instead behave similar to heterosexual women. This finding suggests that the drivers behind gender labor market segregation have more weight than the drivers behind sexual minority labor market segregation. Given this finding, I will focus on the labor market segregation of homosexual men.

$$D_j = \frac{1}{2} \sum_{i}^{I} \left| \frac{h_{j,i}}{H_j} - \frac{m_{j,i}}{M_j} \right| \tag{1}$$

In order to test for changes in labor market segregation I construct a *dissimilarity index*, expressed synthetically by Equation 1, based on Duncan and Duncan (1955). $\frac{h_{j,i}}{H_j}$ is the share of homosexual men workers from state j in industry/occupation i, using the pool of homosexual workers in state j, H_j, as the denominator, and $\frac{m_{j,i}}{M_j}$ is the share of heterosexual men workers from state j in industry/occupation i, using the pool of homosexual workers in state j, M_j, as the denominator. It represents the share of

homosexual men in state j that would have to move between industries/occupations i in order to be distributed the same way as heterosexual men. Note how the denominator in each case is the pool of each group of workers. Similarly to Hsieh et al. (2019), the implicit assumption behind using this measure is that the skill distribution is the same between both groups, so the fact that the industry/occupation distribution is not the same across groups represents a misallocated economy.

I calculate the dissimilarity index $D_{j,t}$, for both occupations and industries, at the state-year level to formally test if legalization of SSM has segregational effects in the United States. The state with the lowest occupation dissimilarity index average is Florida with 0.23, while the state with the highest occupation dissimilarity index average is Alaska with 0.66. Figure 4 shows the geographic distribution of the occupation dissimilarity index average. In the case of the industry dissimilarity index, the state with the lowest score is California with 0.31 and the state with the highest score is again Alaska with 0.81. Figure 5 shows the geographic distribution of the industry dissimilarity index average.

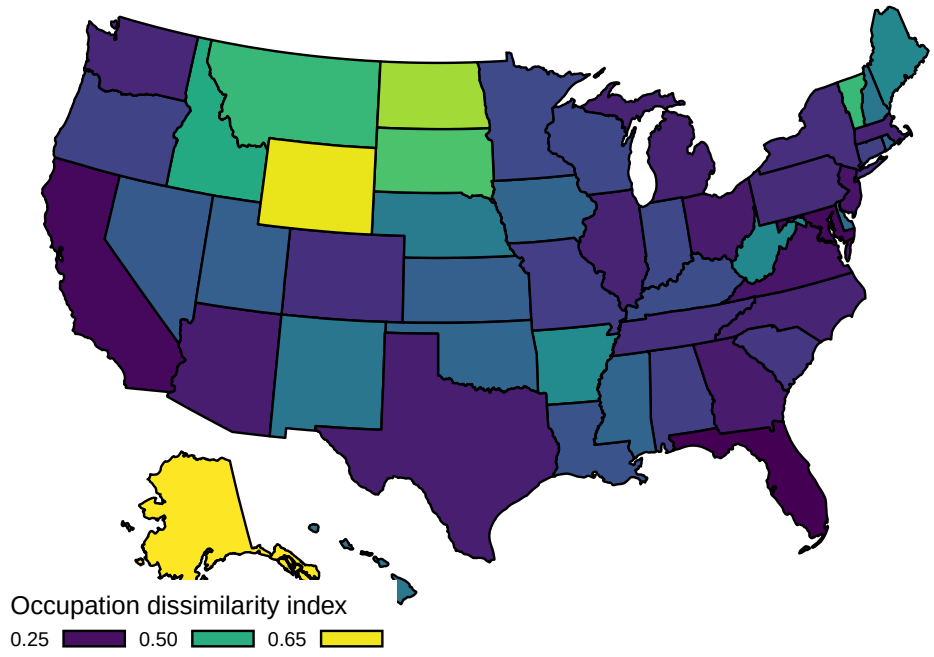


Figure 4: State averages (2000-2019) of the occupation dissimilarity index

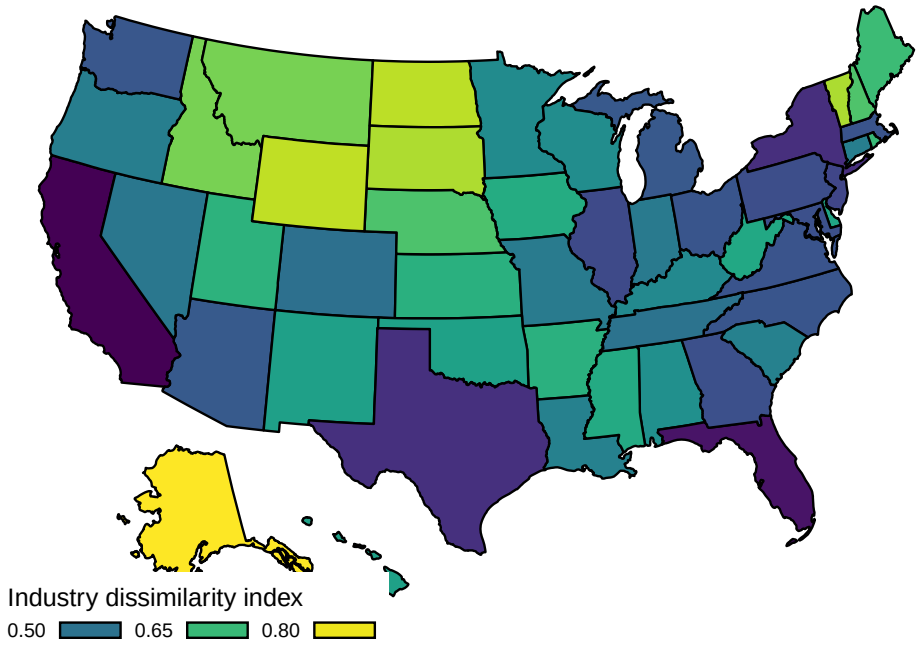


Figure 5: State averages (2000-2019) of the industry dissimilarity index

5 Empirical strategy

Staggered roll-out designs have been considered a more robust approach to a single DID as the typical concern is that contemporaneous trends could confound the treatment effect, violating the main DID identification strategy, the existence of parallel trends. However, recent econometric work shows that the standard DID approach followed in these settings, using a Two-Way Fixed Effects (TWFE), is valid only when treatment effects are homogeneous across groups and time, which, for most applications, is implausible. Goodman-Bacon (2018) explains that the problem with TWFE arises when already-treated units act as controls, as changes in their treatment effects over time get subtracted from the TWFE estimate.

Following Cengiz et al. (2019) and Baker et al. (2021) I create event-specific datasets (one for every "wave" of legalization), including the outcome variable and controls for the treated state and all other states up to when they become treated. Thus, I am only including the untreated observations for the states not in that cohort. This way, I have only "clean controls" for every group. I then stack these event-specific datasets in relative time to calculate the DID event-studies relative to the reference period, which is the treatment year.

After constructing the stacked dataset, I consider event-study models of the form given by 2. An advantage of event-study functional forms is that they help evaluate the credibility of the parallel trends assumption. As Baker et al. (2021) notes, the only

difference in terms of functional form regarding a simple event-study regression is the need to saturate the group and time fixed effects with indicators for each event-specific dataset. An advantage of this approach is that by saturating the fixed effects, in this case with legalization "waves" indicators, the coefficients are not sensitive to choice of time window, which is a common concern in simple event-studies (Baker et al., 2021). I restrict the time window of the event study to $[-5, 1]$ and $[1, 10]$.

$$y_{j,t,G} = \gamma_{j,G} + \tau_{t,G} + \sum_{k \neq 0} \delta_k \mathbb{I}[t - G_j = k] + \varepsilon_{j,t,G} \tag{2}$$

In Model 2, $\gamma_{j,g}$ and $\tau_{t,g}$ are the individual and time saturated fixed effects. $\mathbb{I}[t - G_j = k]$ is an indicator for being k years from the treatment starting for cohort G. G_j simply states that state j was treated with cohort G.

$$log(HSI)_{j,t,G} = \gamma_{j,G} + \tau_{t,G} + \overline{X}'_{j,t,G} + \sum_{k \neq 0} \delta_k \mathbb{I}[t - G_j = k] + \varepsilon_{j,t,G} \tag{3}$$

In particular, Model 3 is the specification I use to test for the effect of same-sex marriage on the homonegative implicit bias. I consider the natural logarithm as the dependent variable as to have a cleaner interpretation of the results. $\overline{X}'_{j,t,G}$ is the set of state-year specific controls shown in Table 1 calculated at the state-year level, plus the constructed search index for "weather".

$$D_{j,t,G} = \gamma_{j,G} + \tau_{t,G} + \overline{X}_{j,t,G} + \sum_{k \neq 0} \delta_k \mathbb{I}[t - G_j = k] + \varepsilon_{j,t,G} \tag{4}$$

Model 4 is the specification I use to test if same-sex marriage had an effect on labor market segregation of homosexual men. $\overline{X}_{j,t,G}$ only includes the set of state-year specific controls shown in Table 1 calculated at the state-year level.

It is worth stressing out that the main problem with the TWFE is the fact that it uses already treated units as controls. Using a stacked regression approach to consider only "clean controls" for every group means that the groups who received the treatment at the latest time, are only considered as controls. Hence, the results of this paper do not refer to states where SSM was legalized in 2015, through the SCOTUS decision of *Obergefell v. Hodges*. See Figure 2.

6 Results

6.1 Changes in public opinion

Figure 6 shows the DID event-studies by legalization method of same-sex marriage of the log of the constructed homophobic search index. The left panel considers as treated units

only states where it was legalized through a court decision. Recalling the Bishin et al. (2016) definition of opinion backlash: "a large, negative, and enduring shift in opinion against a policy or group that occurs in response to some event that threatens the status quo", the plotted coefficients show evidence for it.

The first thing to note from Figure 6 is that the parallel trends assumption seems to hold. The lead point estimates do not follow a clear upward or downward trend, and each coefficient is not statistically different from zero. Assuming this is the case, 9 and 10 years later, this search index is 36.06 and 35 percent higher than the year SSM was legalized, respectively.[8]

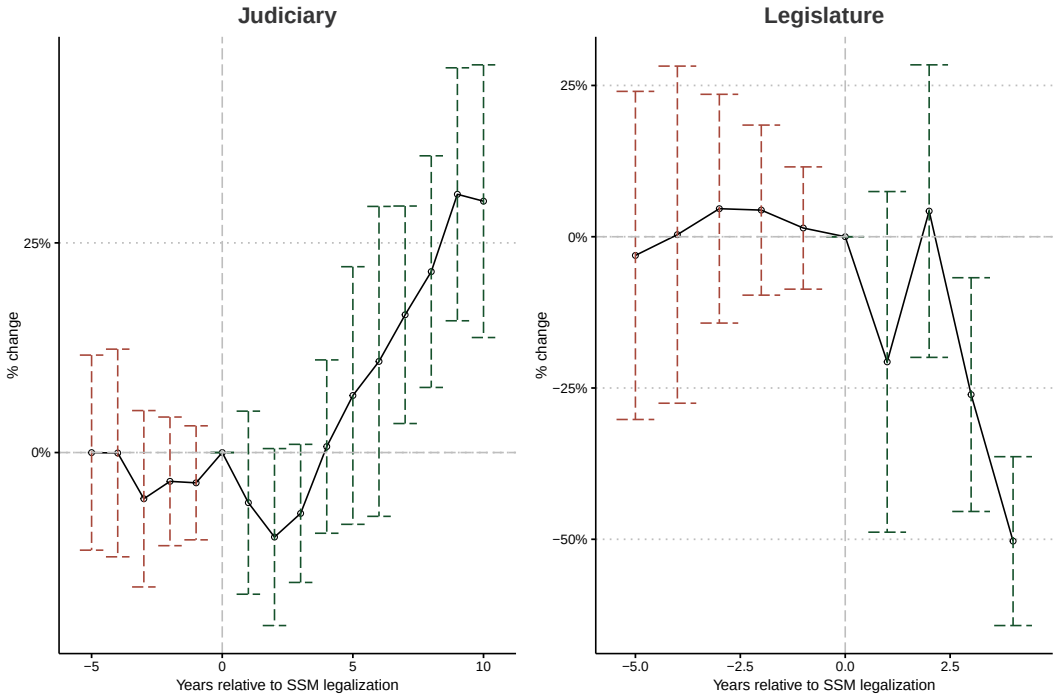


Figure 6: DID event study by legalization method using stacked regressions. $log(HSI)$ as dependent variable.

The opposite is true for the states that legalized SSM through the legislature, but the change seems to happen at a faster rate. Again, assuming that indeed the parallel trends assumption holds, which is plausible in this case too as all the pre-period coefficients are not statistically significant different from zero, the homophobic search index is 14.52 and 25 percent lower on average, 3 and 4 years after SSM legalization, than it would have been had SSM not been legalized through the legislature. The rest of the lag coefficients are collinear with the saturated fixed effects.

[8]Considering a log transformation of a variable as the dependent variable in an Ordinary Least Squares regression yields a coefficient with an interpretation of an approximate percentage change. The correct percentage change is obtained using the formula $\%\Delta y = 100(e^{\beta} - 1)$ where y is the non-transformed dependent variable and β the coefficient of interest. I obtain the percentage change this way for all the results presented non-graphically.

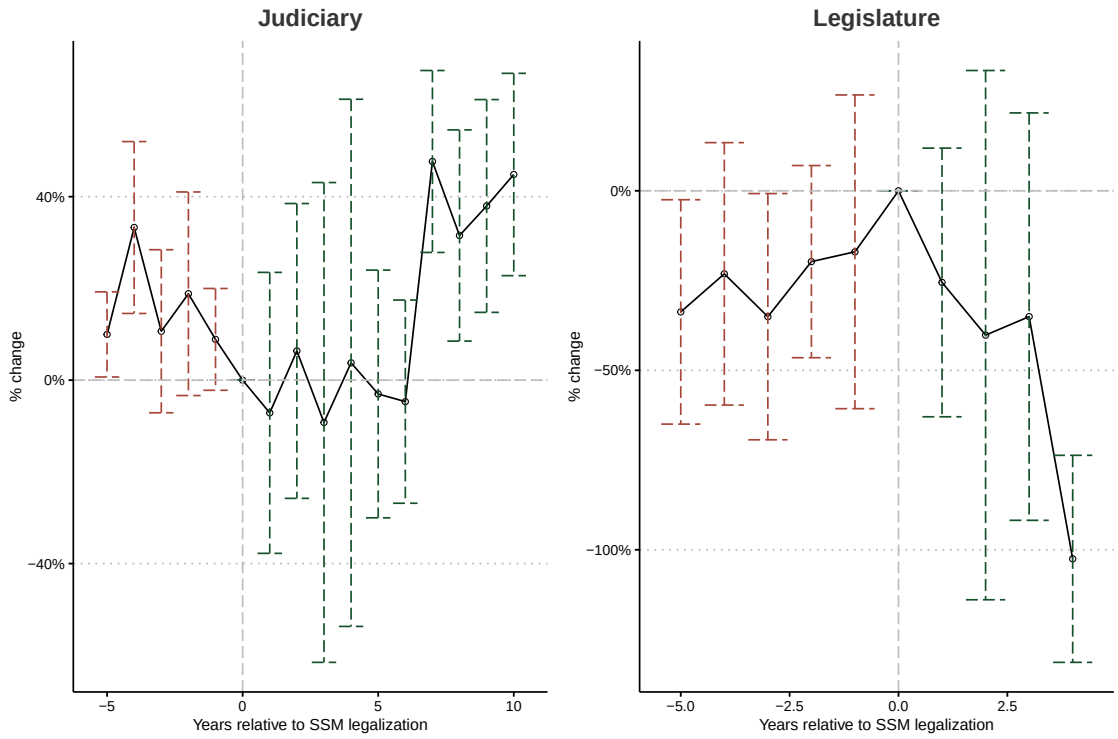
A major advantage of testing changes in homonegative attitudes using the HSI is that I consider this measure for every U.S. state from 2004 to 2019, and thus, the results have more external validity than if I had considered only one state or just one cohort. In contrast, Kreitzer et al. (2014) focus only on Iowa's 2009 SSM legalization. Similarly, Flores and Barclay (2016) focus only on Maine and Washington's SSM legalization via the legislature.[9] As stated before, even prior studies like Bishin et al. (2016) that consider more states, are not suited to test if SSM legalization caused an *enduring* shift in social norms. The authors' results rely on survey data from 41 days, and SSM was not even legalized in any state within the time frame they study.

Ofosu et al. (2019) do test for changes in homonegative attitudes for every state between 2005 and 2016. The authors find qualitatively similar results with data from the Implicit Association Test (IAT): legalization via the judiciary prompts backlash, whereas via the legislature antigay bias decreases. In Figure 13 in Appendix B I plot the event studies considering the IAT implicit bias change rate as the dependent variable, which is the same that Ofosu et al. (2019) use in their analysis. The IAT implicit bias ranges from -0.5 to 0.5, where a negative score indicates a negative bias towards sexual minorities. The results using the IAT implicit bias as the dependent variable are qualitatively similar. One main advantage of using the HSI instead of data from the IAT is that most of the respondents of this test are young women, so the results might not be representative.

One thing we might worry about is that an increase in homophobic bias does not translate in increases of homophobic behavior. However, there are a number of studies who link increases in implicit biases against certain minority groups with increases in discriminatory behavior against them. For example, Glover et al. (2017) analyze if French retail shop managers' bias against South African employees have an impact in employee productivity. The authors find that this is the case, and argue that the mechanism behind is the managers dedicating less management time to employees who they dislike.

Moreover, in order to test if changes in implicit biases against homosexual men translate in changes in discriminatory behavior in the particular case that I study I consider the FBI's hate crimes database, which contains crimes categorized as hate crimes since 1995. In Figure 7 I plot the stacked DID event studies where the dependent variable is the log of the number of categorized hate crimes against the LGB community. The pattern is consistent with the changes in the implicit bias by legalization method. After SSM was legalized, states where this was due to judicial action see an increase in the percentage of hate crimes against the minority group, and states where SSM was legalized through the legislature see a considerable decrease in hate crimes even only four years after the law change.

[9] It is worth noting that their results showing a decrease in homonegative attitudes are in line with the results shown in this paper using the HSI.



Note: Using the public compiled dataset of hate crimes from the FBI. I count the hate crimes at the state-year level that are coded as motivated by an "Anti-gay", "Anti-lesbian", "Anti-bisexual" or "Anti-transexual" bias.

Figure 7: $log(No.\, LGBT\, hate\, crimes)$ DID event studies relative to SSM legalization through the judiciary.

First, looking at the pretrends for both groups it appears that legalization-through-the-judiciary states had increases in hate crimes before SSM legalization, while the opposite is true for legalization-through-the-legislature states. Second, many NGO and even the FBI consider that there is heterogeneous underreporting of hate crimes across states.[10] Nonetheless, I consider that the fact that there is a consistent pattern between the differences in the SSM legalization method and different measures of discrimination, either implicit or explicit, strongly suggest that these results are robust.

Making a weak case for the external validity of these results, let us consider the Colombian case. The Colombian Constitutional Court (CCC) might be, to my knowledge, one of the most active constitutional courts in the world advancing in the recognition of rights of sexual minorities. Andrade-Rivas and Romero (2017) mention that as of 2013, the CCC had issued 70 rulings in favor of freedom of expression and personal development with regard to LGB rights, as well as had both legalized same-sex unions and their right to adopt by 2015. Bocanumenth (2021) reports how even though on paper the country has one of the strongest legal frameworks in Latin America defending the rights of LGB populations (mostly due to judicial decisions), in practice these protections are rarely

[10] https://www.propublica.org/article/why-america-fails-at-gathering-hate-crime-statistics

enforced. This lack of effective protections might reflect Baca et al. (2019)'s findings that out of nine countries in Latin America and the Caribbean, Colombia registered the highest number of killings of LGB people over 2014 – 2019.

6.2 Economic outcomes

In order to analyze the effects of same-sex marriage legalization on economic performance, I start by replicating one of Black et al. (2007) findings, that male workers in same-sex couples concentrate in occupations with a higher share of women relative to men in different-sex couples, and testing for a mediating effect of SSM legalization. Using data from the 2000 Census, that reflects a point in time when SSM was illegal in every U.S. state, and data for the 2016-2019 ACS, that reflects a point in time when SSM was legal in every U.S. state, I estimate the Linear Probability Model expressed by 5 where $\mathbb{I}NAICS_i^{>50\%women}$ is an indicator variable that activates when the NAICS industry where individual i works is conformed majoritarily by women. $\mathbb{I}Gay_i$ is an indicator variable that activates if individual i is in a same-sex couple relationship; and $\mathbb{I}Judiciary_i$ is an indicator that activates if the SSM legalization method in state where individual i lives was through the judiciary.

$$\mathbb{I}NAICS_i^{>50\%women} = \beta_0 + \beta_1 \mathbb{I}Gay_i + \beta_2 \mathbb{I}Gay_i \times \mathbb{I}Judiciary_i + \varepsilon_i \tag{5}$$

Table 2: Increased likelihood of gay men's working in NAICS industries where the majority workers are women.

	Pre	Post
(Intercept)	0.321***	0.346***
	(0.001)	(0.001)
Gay men indicator	0.120***	0.116***
	(0.004)	(0.004)
Judiciary indicator	-0.029***	-0.010***
	(0.001)	(0.001)
Gay men x Judiciary	0.010**	0.018***
	(0.004)	(0.005)
Num.Obs.	2340145	1515498

Post uses the same information, but considers the 2016-2019 ACS.

Pre uses information for men that are reported as in a relationship in the 2000 Census.

Robust standard errors in parentheses.

Table 2 shows the results for the LPM using robust standard errors. According to these results, men in a same-sex couple that lived in a state that legalized SSM through the legislature were 12 percentage points more likely than men in a different-sex couple to work in an industry where the majority of workers are women in 2000, and 11.6 percentage points more likely to work in these industries in 2016-2019 (using industry shares from this period), so their likelihood *decreased* by 0.4 percentage points. This contrasts that, in states where the method of SSM legalization was through the judiciary, their likelihood to work in an industry where women are a majority, relative to men in different-sex couples, *increased* by 2.4 percentage points considering the same time-frame.

The fact that post SSM legalization men in same-sex couples concentrate more in industries where the majority of workers are women in the states that legalized through the judiciary is indicative of a higher degree of discrimination, as research shows that they tend to work in less stigmatizing industries, and the literature seems to point out that all else equal, these industries are the (heterosexual) male-dominated ones. I test this idea in terms of homosexual vs heterosexual male worker segregation using Model 4.

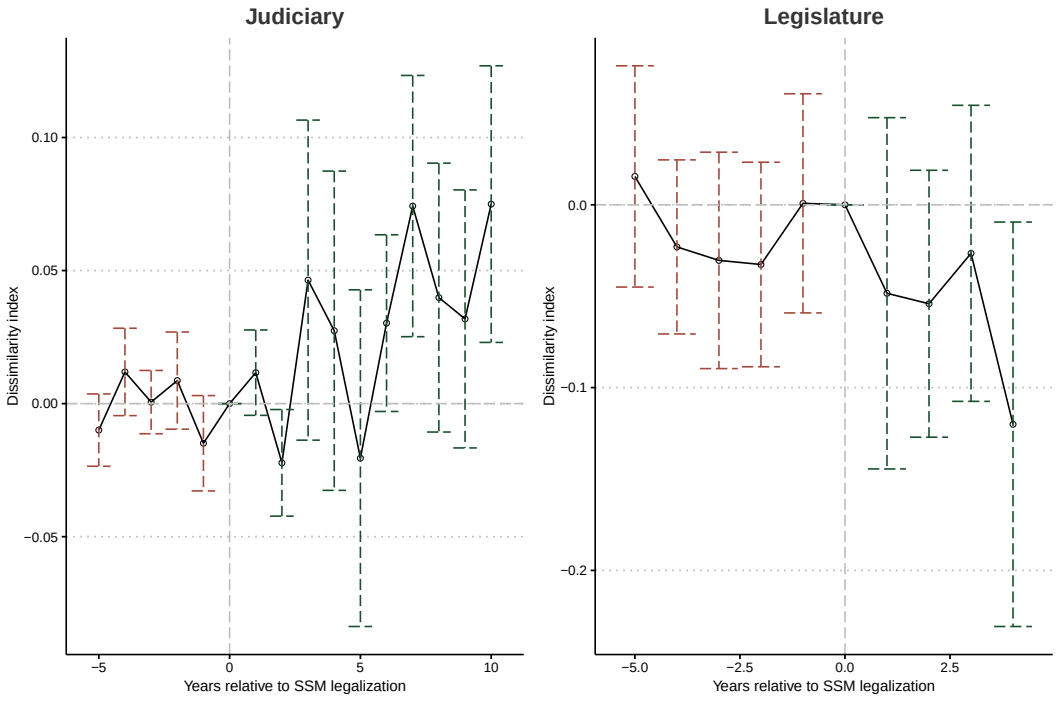


Figure 8: Event study by legalization method using stacked regressions. $D_{j,t}^{Ind}$, dissimilarity index of industries, as dependent variable.

The impact of SSM legalization on $D_{j,t}^{Ind}$ and $D_{j,t}^{Occup}$ is also mediated by the method of legalization, I show this in Figures 8 and 9, respectively. In both cases, the parallel trends assumption seems to hold, in particular for the judiciary case as the pre-treatment coefficients are concentrated around zero and the standard errors are smaller than in the legislature case. The results suggest that SSM through the judiciary resulted in an

increase in labor market segregation of homosexual men.

In the industry case, states that legalized SSM through the judiciary are, on average, 0.074 index points more segregated than they would have been if they did not legalize SSM through this method. To set things in context, this is more than 13% of the nation-wide segregation average throughout the period. It is also a significant amount considering that the dissimilarity index ranges from 0 to 1, 0 being the case where there is no segregation, and 1 being the case where there is complete segregation. The (opposite) effect seems to be more readily apparent in states that legalized SSM through the legislature: four years after legalization, the dissimilarity index decreased, on average, 0.12 index points. The interpretation is that, four years after the legalization of SSM 12% of male workers moved across industries in a way such that the distribution of heterosexual and homosexual workers became more similar.

The effects on occupational segregation are of greater magnitude, especially considering that there is less variance in the respective dissimilarity metric. In states in the judiciary case, segregation increases by 0.13 index points ten years after SSM legalization, which is almost half of the segregation level of California. In states in the legislature case, segregation decreases by 0.10 index points.

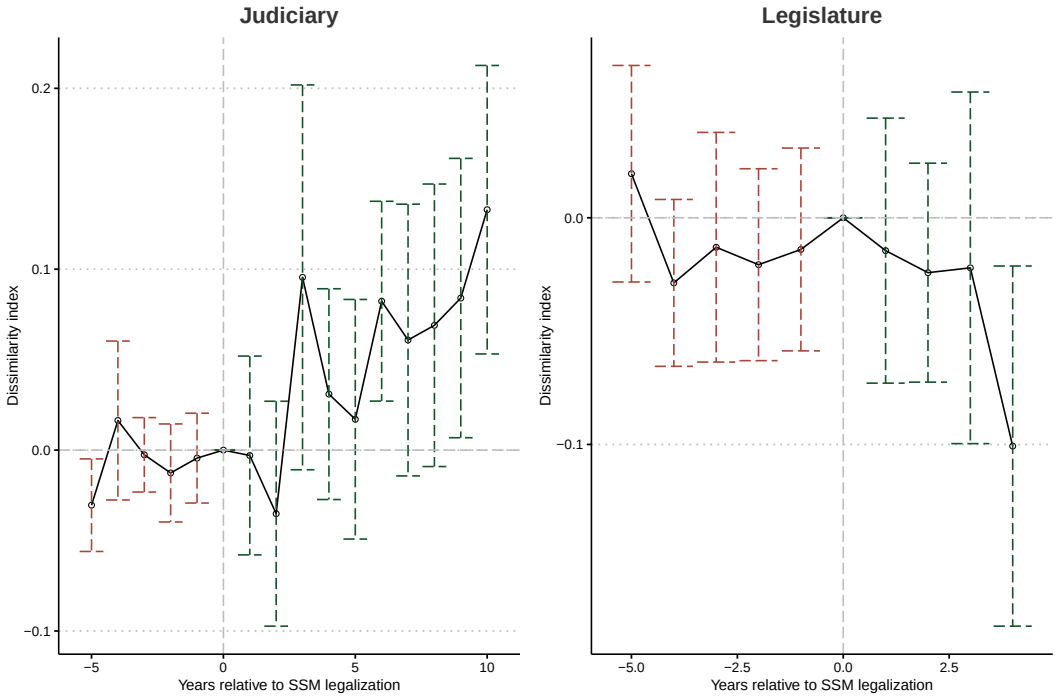


Figure 9: Event study by legalization method using stacked regressions. $D_{j,t}^{Occup}$, dissimilarity index of industries, as dependent variable.

The results line up with the story of homophobic attitudes driving labor market segregation: when homophobic attitudes increase, labor market segregation increases, while the opposite relationship holds when homophobic attitudes decrease. This implies that

segregation is not driven by a difference in preferences between both groups, but are the consequence of an unwelcoming environment for homosexual men in certain industries. Disentangling the reason behind segregation this way is relevant as a taste-based segregation does not necessarily imply a misallocation of resources, and in fact, might be a result of the industry/occupation selection based on the workers preferences and skills. However, if it is the consequence of an unwelcoming environment in certain industries, it might imply a sub-optimal allocation of resources.

As Hsieh et al. (2019) show, segregation in the labor market can have pernicious effects in the economic performance of industries and even countries, when it is not preference-driven. The authors demonstrate that in the last century the segregation of women and blacks was mainly driven by obstacles to their accumulation of human capital as well as labor market discrimination. The authors also demonstrate how this segregation led to a hampering of economic growth. Taken together, the results from this paper suggest that a similar segregation occurs in the case of sexual minorities, in particular of homosexual men.

7 Concluding remarks

Are all same-sex rights are created equal? My research, using a measure of implicit bias for anti-gay attitudes, suggests that this is not the case. The literature of public opinion changes due to SSM remains far from settled. I hypothesize that this is mainly due to the lack of considering heterogeneities. More recent research does place more weight on these potentially different effects via method of legalization. Aksoy et al. (2020), published the most recent study on the topic, contributing to bridging this gap as the authors' main focus is to test for differentiated effects of SSM across demographies. Having a better understanding of the different channels through which social norms shift, means more and better tools to keep moving forward. Normatively, one can agree that more equal rights for sexual minorities imply a Pareto improvement in society. The small print is that there are more and less effective ways to get there, whilst some may end up being counterproductive. Even more so, as this research provides suggestive evidence that some of these ways have real effects on the economy.

A note of caution. It is easy to make generalizations whether some policies are "good" or "bad" using reduced form estimates, as the ones used in this paper. However, it is important to emphasize that these are only partial equilibrium findings. For instance, Seror and Ticku (2021) find that the effect of SSM on enrollment in priestly studies fell after legalization of SSM for both methods of legalization. The decrease in enrollment is actually higher for states that legalized it through a court order. The authors attribute these findings to a decrease in the cost of coming out, hence, making marginal enrollees better off. With this in mind, the net effect of SSM on sexual minorities' well-being in

states that legalized it through the judiciary is not clear.

More and better research regarding minorities help us build a fairer and more equal society. This research is my attempt to contribute towards this goal.

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A Google Trends estimation for non-reported values

Google Trends is a great source for retrieving high quality data that, in my view, has been underused for social science research. It provides insights that survey data are not likely to deliver. Most surely, if the research topic carries some taboo weight. Still, its main downside is Google's unreported absolute threshold that, when crossed, yields zeros in its index.

Using Stephens-Davidowitz (2014) algorithm idea of considering an auxiliary search term that most likely yields an index above the threshold such as "weather" or "food", the threshold problem can be overcome almost entirely.

The idea is that if term "M" does not cross the threshold for many observations, one can search for "$M + A$", where "A" is the auxiliary term to get above this threshold. Then, if the raw volume search were provided, the solution would be to simply subtract "A" from "$M+A$".[11] As this is not the case, complications arise from sampling, rounding and normalizing. The first two are solved by constantly retrieving samples.

In order to get a normalized search index that is comparable across time and geos I obtain data for each geographical area plus data at the national level and renormalize each area by $maxIndex_s/maxIndex_{U.S.}$, as suggested by Paul Goldsmith-Pinkham (2020).

Once the index is scaled, I compute Model 6, where B is the set that contains positive values for all three queries but below the maximum, 100. γ_g is a geo fixed effect. In the results from regression 6, I get that α_0 is positive and α_1 is negative, which is consistent with the idea of subtraction mentioned above. I then use these coefficients to predict the observations that have zeros reported.

It is worth noting, that the share of the predicted observations decreases as the sample size increases. As of the closing of this document, the share of predicted geo-month observations and number of samples used is 6.9 percent and 39, respectively. The analysis conducted throughout this paper was at the geo-year level.

$$M_{b\,\epsilon\,B} = \gamma_g + \alpha_0(M + A)_{b\,\epsilon\,B} + \alpha_1 A_{b\,\epsilon\,B} + \varepsilon \tag{6}$$

[11] For details, see Stephens-Davidowitz (2014).

B Additional figures and tables

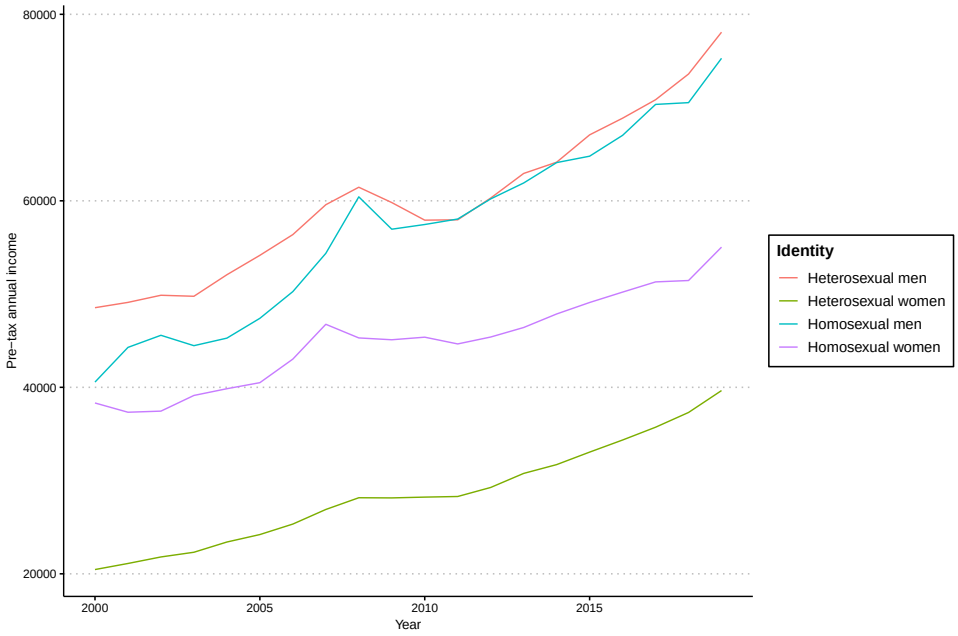


Figure 10: Time series of the pre-tax annual income identity-average

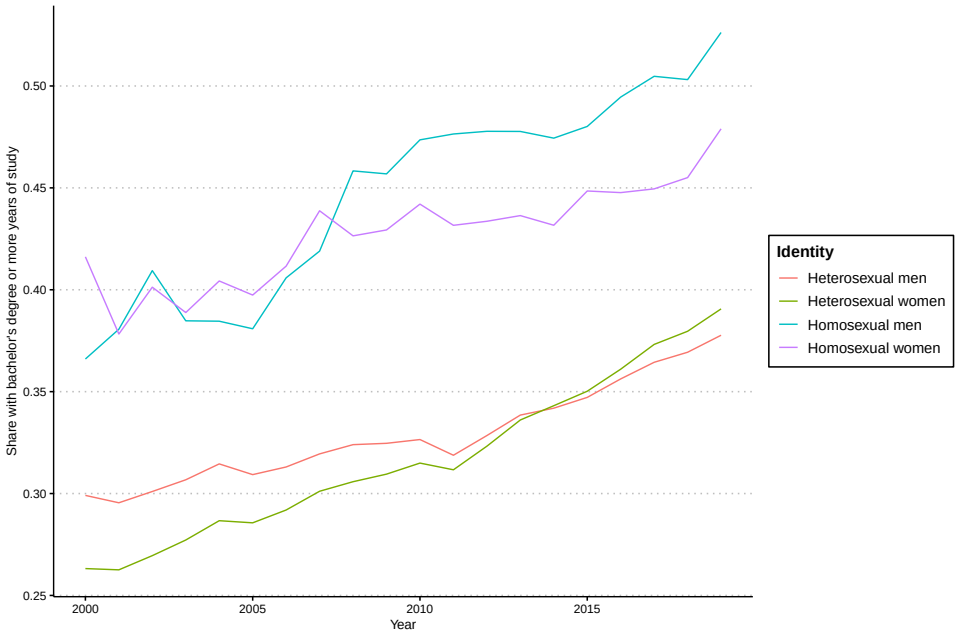


Figure 11: Time series of the identity-share with bachelor's degree or more years of study

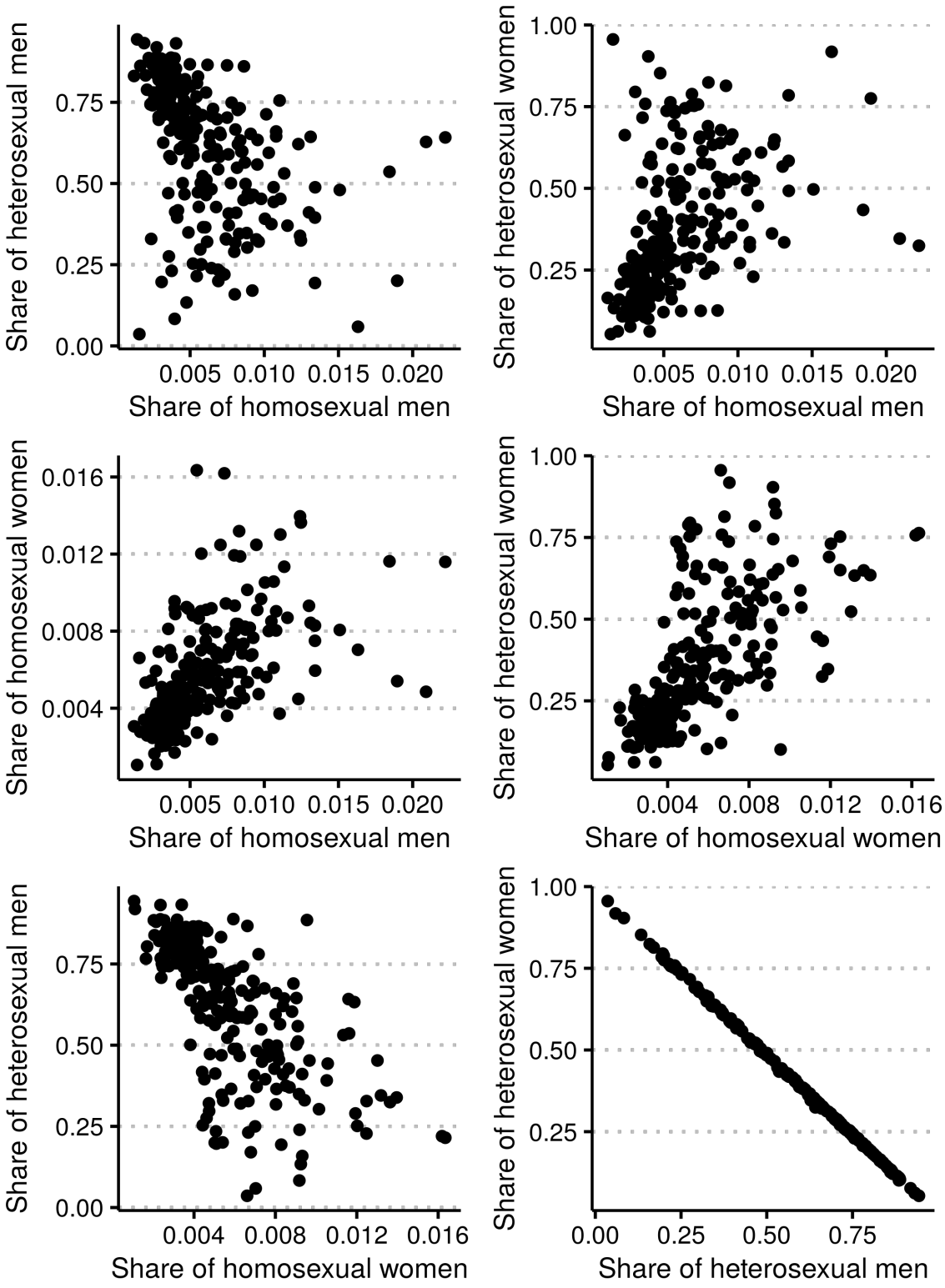
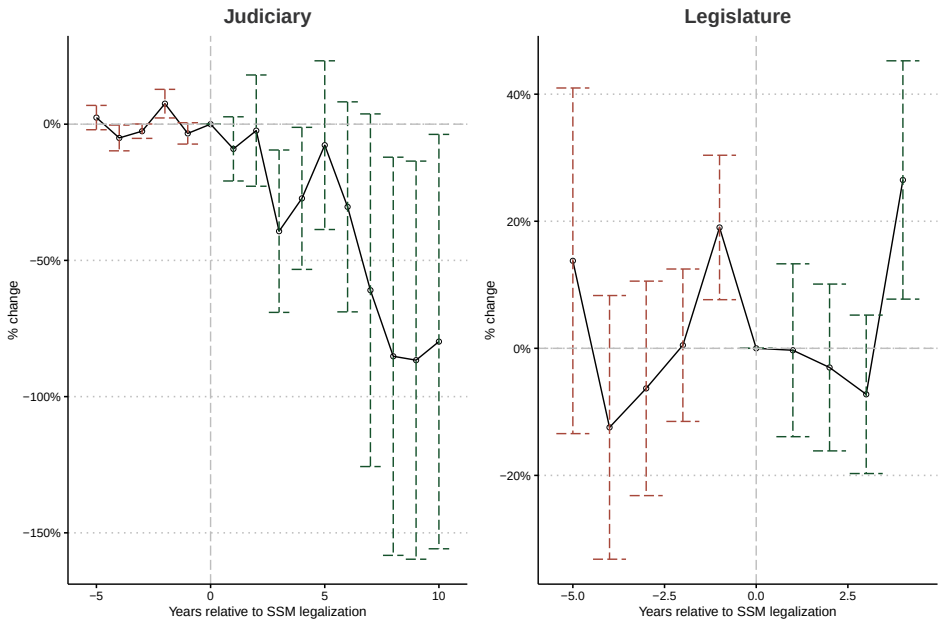


Figure 12: Industry shares correlations by behavioral sexual identity



Note: Using the public Sexuality IAT dataset from 2004-2019. The possible range of the implicit biases measure is [-2,2], -2 signifying the most negative bias against sexual minorities and 2 signifying the most positive bias about sexual minorities. I consider the average implicit bias change at the state-year level.

Figure 13: IAT implicit bias change rate DID event studies relative to SSM legalization.