

# Pink Work

## Same-Sex Marriage, Employment and Discrimination <sup>^</sup>

Dario Sansone<sup>1</sup>

This version: 14 November 2018

### JOB MARKET PAPER

The most recent version of the paper and the Online Appendix are available on my [website](#).

#### Abstract

This paper analyzes how the legalization of same-sex marriage in the U.S. affected gay and lesbian couples in the labor market by using data from the American Community Survey. Access to marriage led to amendments in tax, health insurance, and adoption laws that could have encouraged some same-sex partners to specialize in household production and *decrease* their labor supply. Nevertheless, estimates from a difference-in-difference model show that the individual and joint probabilities of being employed *increased* among same-sex couples. Additional empirical evidence from survey data and Google searches for homophobic terms suggests that these changes in employment were driven by improvements in attitudes and lower discrimination against sexual minorities following the introduction of marriage equality.

**Keywords:** same-sex marriage; discrimination; employment; labor market; LGBT; gay; lesbian

**JEL:** D10; J12; J15; J22; J71

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<sup>^</sup> I am grateful to Garance Genicot, Laurent Bouton, Francis Vella, Jim Albrecht, Lee Badgett, Patrick Button, Christopher Carpenter, Luca Flabbi, James Foster, Paul Goldsmith-Pinkham, Alev Gurbuz, Arik Levinson, Adam Looney, Hiren Nisar, Michael Packard, Justin Pierce, Mariacristina Rossi, Ben Solow, Allison Stashko, Milan Thomas, and Susan Vroman for their helpful comments. Participants to the APPAM, IWPR, and SAGE conferences, the IZA Summer School and seminars at American University, Collegio Carlo Alberto, and Georgetown University have provided lively debates and useful feedback. I have also benefited from fruitful discussions with several seminar speakers and co-workers at Georgetown University. The usual caveats apply.

<sup>1</sup> Department of Economics, Georgetown University. Website: <https://sites.google.com/view/dariosansone/>  
E-mail: [ds1289@georgetown.edu](mailto:ds1289@georgetown.edu)

## 1. Introduction

The last twenty years have seen major improvements in lesbian, gay, bisexual and transgender (LGBT) rights. The Netherlands became the first country to allow same-sex marriage (SSM) in 2001. Homosexuality became legal across the U.S. in 2003, pursuant to the Supreme Court decision in *Lawrence v. Texas*. Shortly following this ruling, Massachusetts became the first U.S. state to legalize SSM in 2004. Twelve years later, the U.S. Supreme Court legalized SSM in all states (*Obergefell v. Hodges*). As of 2018, same-sex couples could legally get married in 24 countries across the world.

These legal changes across states provide a unique opportunity to study the effect of an expansion in the definition of marriage on labor market outcomes. Specifically, this paper investigates how the legalization of SSM affected employment among gay and lesbian couples. Historically, the only other case in which marriage conventions were disrupted is the legalization of interracial marriage after the 1967 Supreme Court ruling in *Loving v. Virginia* (Fryer, 2007). Previous amendments in marriage laws, such as the introduction of unilateral divorce, led to substantial changes in the labor market (Fernández and Wong, 2014). Little is instead known about the economic consequences of SSM legalization on the large share of the U.S. population (7.5%) who identifies as non-heterosexual (Gates, 2017).

The direction of the impact of SSM legalization on employment is unclear *ex-ante*. Access to marriage could have led to increased commitment among partners (Badgett, 2009) and lower uncertainty, as well as shifts in tax, health insurance, and adoption laws. Following a standard Becker (1991) model, these changes could have discouraged individuals in a same-sex couple from both being employed at the same time. Indeed, researchers have documented declines in the level of within-household specialization and increases in female labor supply following changes in opposite-sex marriage laws – notably unilateral divorce – both in the U.S. (Stevenson, 2007) and in Europe (Bargain et al., 2012). Furthermore, although it is rather difficult to estimate the share of same-sex couples who decided to get married,<sup>2</sup> a hypothetical low interest in getting married among gays and lesbians could have led to a null or low average impact of SSM legalization.

On the other hand, homophobic sentiments – although underreported – are still widespread (Coffman et al., 2017). Gays and lesbians commonly experience discrimination from employers, consumers and co-workers (Plug and Berkhout, 2004; Carpenter, 2007; Drydakis, 2009; Tilcsik, 2011; Aksoy et al., 2018a). Researchers have already documented improvements in attitudes and social norms following the recognition of same-sex relationships in the U.S. (Kreitzer et al., 2014; Tankard and Paluck, 2017) and in Europe (Aksoy et al., 2018b). Bishin et al. (2016) found no evidence of opinion backlash against gays and lesbians following SSM legalization. More generally, civil right legislations can affect social customs perceived by employers (Donohue and Heckman, 1991; Hersch and Shinall, 2015), and institutions can influence attitudes about social or political issues (Franklin and Kosaki, 1989; Hoekstra, 1995; Bartels and Mutz, 2009; Beaman et al., 2009). Therefore, it is possible that SSM legalization drove a shift in social norms and a reduction in discrimination against sexual minorities.

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<sup>2</sup> Fisher et al. (2018) found that same-sex couples represented 0.48% of all joint tax-filers in 2015 (250,450 couples). This number increased from 131,080 couples in 2013 and 183,280 in 2014.

A more tolerant working environment may have then increased both the labor supply and demand for gays and lesbians.

By estimating the impact of SSM legalization on employment, this paper tests which one of the above theories dominates and is consistent with the observed trends, as well as whether the effect is economically significant. Although there is a lack of large datasets containing information on labor market outcomes and sexual orientation, same-sex couples can be identified in the American Community Survey (ACS) by matching household heads with their same-sex spouses or unmarried partners. The empirical analysis exploits variation in the timing of SSM reforms across U.S. states to estimate a difference-in-difference model. Same-sex couples in states that introduced marriage equality are compared over time with same-sex couples in states that had yet to legalize SSM. The estimates show that SSM legalization led to higher individual and joint probabilities of being employed among same-sex couples. To give a sense of the magnitude, the probability that both partners were employed increased by 2.4 percentage points. No heterogeneity is found when examining male and female same-sex couples separately. Similar results are obtained from a triple-difference model, i.e. by comparing opposite-sex and same-sex couples within the same state over time. Conversely, there was no effect of SSM legalization on the probability of being employed among opposite-sex couples. The analysis is further extended to show that same-sex couples were more likely to work full-time and more hours per week following the legalization of SSM.

Contrary to past studies reporting higher labor supply following the introduction of unilateral divorce laws, this paper does not find evidence that SSM legalization led to a symmetric negative reduction in the joint probability of being employed among gays and lesbians. Far from exhibiting more intra-household specialization, the estimates also show a reduction in the gap in hours worked between the household head and her partner following the legalization of SSM. A possible explanation for these differences is that there was no increase in the key variable affecting specialization, i.e. fertility. The estimated changes in the probability of having a child or in the number of children among gay or lesbian couples following the legalization of SSM are not statistically different from zero. This is in contrast to the descriptive evidence reported in Aldén et al. (2015) that entering into a registered domestic partnership in Sweden was positively related to fertility rates among lesbian women.

Discrimination is then proposed as the main mechanism behind these improvements in labor market outcomes among same-sex couples. In order to formally describe how SSM legalization affected employment through a decrease in discrimination based on sexual orientation, a theoretical framework presents a search model with sexual minority workers and prejudiced employers. The model implies that marriage equality led to a lower proportion of prejudiced employers in the economy, a lower cost of hiring minority workers, and a greater effort from minority workers in job search. Additional suggestive evidence from various surveys and Google searches for homophobic terms is provided to support the model predictions that SSM legalization changed perceived social norms, improved attitudes in the population, and reduced discrimination based on sexual orientation. This progress may have been the primary driver of the increase in the labor supply and demand for gay and lesbian workers. In accordance with the theory, there was also a decline in occupational segregation, defined as the share of minority workers in female-dominated occupations, following the legalization of SSM.

Alternative explanations - including changes in assortative matching, health, homeownership, and earnings – are ruled out as the main mechanism.

The estimated increase in employment is robust across numerous tests. The main model includes several state controls and state-specific quadratic trends. Particular care has been devoted to reducing any misclassification error. An event study supports the parallel trend assumption, as well as the lack of changes predating the reforms. A model exploiting only federal law changes is estimated to address the potential endogeneity of the timing of the reform. Furthermore, it is possible to rule out compositional shifts due to migration. Changes in the probability of coming out are then taken into account by extending the definition of same-sex couples to include “closeted” couples, as well as by merging the difference-in-difference model with propensity score matching. Finally, data from the Survey of Income and Program Participation (SIPP), a longitudinal study, confirm that the introduction of marriage equality led to an increase in the probability of being employed among gays and lesbians.

The findings from this study provide guidance to policymakers as they continue to face conflicts over LGBT issues both in the U.S. (The Economist, 2018) and Europe (Gillet, 2018). In particular, the results support the expansion of marriage equality. Homosexuality is illegal or barely tolerated in most countries in Asia and Africa. However, this and previous studies show there is no effect of SSM legalization on heterosexual behavior (Badgett, 2009), including non-marital sex (Francis et al. 2012), marriage, divorce and extramarital birth rates (Trandafir, 2015), thus dispelling any concerns about the potential negative consequences for opposite-sex couples. A more welcoming environment can instead increase the contribution of gay and lesbian individuals in the labor market, thus offering an economic argument for the expansion of LGBT rights.

## **2. Institutional context underlying the difference-in-difference model**

The campaign for marriage equality in the United States started - with rather limited initial results - in the 1970s. In 1972, the U.S. Supreme Court denied appeal in *Baker v. Nelson*, a case in which the Minnesota Supreme Court ruled that the state statute limiting marriage to opposite-sex couples did not violate the U.S. Constitution. In 1973, Maryland became the first state to explicitly introduce a ban on SSM in its statute.

In 1993, the Supreme Court of Hawaii ruled that prohibiting SSM violated the state constitution (*Baehr v. Miike*). The response at the state and federal level was immediate. In 1996, President Bill Clinton signed the Defense of Marriage Act (DOMA): a law defining marriage for federal purposes as the union of one man and one woman, and allowing states to refuse recognition of same-sex marriages granted in other states. Between 1994 and 1998, several states included a ban on SSM in their statute. For the first time in U.S. history, voters in Alaska and Hawaii approved constitutional bans to SSM in 1998.

Despite these backlashes, substantial progresses towards marriage equality were achieved between the end of the twentieth century and the beginning of the twenty-first century. In 1999, California introduced domestic partnerships, while Vermont became the first state to introduce civil unions in 2000. Massachusetts was instead the first U.S. state to legalize SSM in 2004, followed by Connecticut

in 2008, and Iowa in 2009. Vermont also became the first state in 2009 to legalize SSM by statute instead of following a court decision.

All these changes generated reactions in other states: 26 states introduced bans to SSM in their constitution between 2004 and 2008. California swung several times over the years between legalizing and banning domestic partnerships, civil unions and SSM. Nevertheless, in 2013 the U.S. Supreme Court deemed Section 3 of DOMA unconstitutional (*United States v. Windsor*), thus forcing the U.S. government to recognize same-sex marriages performed in states that allowed SSM, and to extend marriage-related federal benefits to same-sex married couples. Finally, SSM became legal across the U.S. after the Supreme Court decision in *Obergefell v. Hodges* (5 judges in favor, 4 dissenting).<sup>3</sup>

### 3. Data

#### 3.1 The American Community Survey

The main dataset used in the empirical analysis is the version of the ACS publicly available through IPUMS-USA (Ruggles et al., 2017). The ACS is a nationally representative repeated cross-section survey conducted every year since 2000. It contains demographic, economic, social, and housing data. Its sample size has increased over time: since 2005, it includes 1% of the U.S. population.

Even if the ACS does not contain information on sexual orientation, it is possible to identify unmarried same-sex couples living together. Indeed, household members can be classified as “unmarried partners” when recording their relationships with the household head. In other words, roommates and unmarried partners have been treated as two separated categories. Furthermore, same-sex couples have been allowed to report their marital status since 2012. Between 2000 and 2012, the partner who reported being a *spouse* of the household head was imputed as *unmarried partner* if the two individuals had the same sex.

Most of the empirical analysis focuses on household heads aged between 18 and 65 with married or unmarried partners. The household head is defined as the person who owns or rents the house, apartment or mobile home. If there is no such person, the first person listed can be any adult living in the household.<sup>4</sup>

#### 3.2 Data quality

The ACS is a mandatory survey.<sup>5</sup> Despite this, one key issue when dealing with same-sex couples is misclassification error: individuals can incorrectly report their sex. The proportion of opposite-sex couples is much larger than that of same-sex couples. Given this imbalance, there is the risk that several same-sex couples may actually be misidentified opposite-sex couples even if measurement errors in the sex variable are rare. The U.S. Census Bureau implemented several changes between 2007 and 2008 to address this issue. These improvements resulted in a substantial drop in the reported number of same-sex couples between these two years, thus indicating more reliable estimates (U.S. Census,

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<sup>3</sup> Section A in the Online Appendix provides a more detailed timeline and discussion of LGBT laws.

<sup>4</sup> Even if the terminology is debatable, for simplicity the words “gay couple”, “gays” and “male same-sex couple” are used as synonyms throughout the paper. The same logic applies to female same-sex couples and opposite-sex couples.

<sup>5</sup> Although nobody has been prosecuted for not responding to the survey (Selby, 2014), this approach significantly increases self-response rate and the quality of the data: around 95% of U.S. counties are deemed to have acceptable data (U.S. Census, 2017).

2013). Therefore, only observations from 2008 have been considered in the main empirical analysis. Moreover, observations with imputed sex or relation to the household head have been dropped to further reduce such measurement errors (as suggested in Black et al., 2007).

Notwithstanding these issues, the U.S. Census and the ACS remain the largest and most reliable data on same-sex couples. In fact, the across-metropolitan distribution of gay couples in the 1990 Census line up extremely well—with a correlation of nearly 0.90—with AIDS deaths in 1990, a year during which AIDS deaths were predominately concentrated among gay men (Black et al., 2000). Fisher et al. (2018) found similar estimates when comparing economic statistics (such as income distribution) between Census and tax data. Using health data, Carpenter (2004) showed that same-sex unmarried partners were indeed behaviorally gay and lesbian, i.e. they exhibited sexual behaviors that were different from opposite-sex couples. Moreover, Carpenter was able to replicate the findings on lower household income among lesbian couples and earning penalty for gay workers highlighted in previous studies based on Census data. Another advantage of ACS is that a third of the households use Computer Assisted Telephone or Personal Interviews (CATI or CAPI). In such interviews, respondents are asked to verify the sex of their same-sex husband/wife, thus reducing such miscoding (Gates and Steinberger, 2007).

There are other surveys that contain information on sexual orientation, e.g. the General Social Survey (GSS). However, these alternative data sources have limited sample sizes. On the other hand, the main disadvantage of using ACS data is that it is not possible to identify singles or same-sex partners who do not live together. Furthermore, there is no information on sexual behavior, so researchers cannot detect members of opposite-sex couples who are bisexuals.

As discussed in Section 6 and Appendix A.7, the estimated effect of SSM legalization on employment holds when focusing on individual categories less likely to be misclassified. These sections also show that the estimates remain positive for plausible levels of misclassification errors. Additional evidence is provided using the 2008 SIPP, a longitudinal study with limited measurement error since respondents' sex and relationship status was recorded every 4 months.

### **3.3 Descriptive statistics**

In 2016, same-sex couples represented 1.5% of all unmarried and married couples in the ACS. This is a substantial increase from 2008, when same-sex couples represented only 0.9% of the sample. Among same-sex couples who decided to report their status in 2016, 52% of gays and 55% of lesbians were married (89% among opposite-sex couples).

In 66% of same-sex couples, both partners were working in the week preceding the interview, a higher percentage than among opposite-sex couples (58%). These statistics are qualitatively similar to those reported in Black et al. (2007) using Census data. Even when focusing on young couples with children, same-sex couples were more likely to have both partners working (63%) than opposite-sex couples (60%).<sup>6</sup>

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<sup>6</sup> All these differences are statistically significant. Section B in the Online Appendix reports additional summary statistics, while Section C.1 clearly defines each variable included in the empirical analyses.

## 4. Econometric framework

The main analysis exploits differences among states in the timing of SSM legalization to estimate a difference-in-difference model. Individuals in same-sex couples are compared over time and across states before and after the legalization of SSM in their state of residency. Except Massachusetts, all 50 states (plus DC) legalized SSM in the time period under consideration (2008-2016). Most of the empirical analysis examines the impact of SSM legalization on the individual or joint probability of being employed among same-sex couples. Additional employment outcomes, such as number of hours worked, probability of working full-time, and earnings are also analyzed.

### 4.1 Difference-in-difference model

Formally, the estimated difference-in-difference model is the following:

$$y_{ist} = \beta SSM_{st} + \delta_s + \alpha_t + \tau_{ts} + \tau_{ts}^2 + x'_{st}\gamma_1 + x'_{ist}\gamma_2 + \varepsilon_{ist}$$

where  $y_{ist}$  is the relevant labor market outcome for individual (or same-sex couple)  $i$  living in state  $s$  at time  $t$ . The coefficient of interest is  $\beta$ .  $SSM_{st}$  is an indicator equal to one if individual  $i$  lived at time  $t$  in a state where same-sex marriage had been legalized. The specification includes state fixed effects ( $\delta_s$ ), year fixed effects ( $\alpha_t$ ), time-varying state-level controls ( $x'_{st}$ ), as well as individual-level controls ( $x'_{ist}$ ).<sup>7</sup> As described in Angrist and Pischke (2014), the common trends assumption can be relaxed by controlling for state-specific linear and quadratic trends ( $\tau_{ts} + \tau_{ts}^2$ ). Since gay and lesbian couples may differ in their behavior (or be treated unequally), this specification is estimated both for all same-sex couple, and for male or female same-sex couples separately. Standard errors are clustered at the state level (Bertrand et al., 2004).

The state-level controls  $x'_{st}$  are similar to those included in Stevenson and Wolfers (2006): unemployment rate, income per capita, racial and age composition, proportion of state population with positive welfare (public assistance) income. In addition to these,  $x'_{st}$  includes the heterosexual cohabitation rate, i.e. the proportion of opposite-sex couples who classify themselves as “unmarried partners”. The vector of individual and household controls  $x'_{ist}$  consists of household head’s and partner’s age, education, language, race and ethnicity. Moreover,  $x'_{ist}$  includes the interaction between household head’s and partner’s education and age.

It is important to stress that this difference-in-difference model estimates the impact of SSM legalization, not the impact of getting married. In other words, it is possible to estimate an intention-to-treat (ITT) effect, not an average treatment effect of marriage. A LATE estimate through IV is not feasible since SSM legalization is not a valid instrument for marital status: it could have affected labor market outcomes also through different channels other than marriage. Nevertheless, this ITT estimate is the relevant one for policy-makers since it quantifies the overall impact of the reform, not just the effect of marital status.

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<sup>7</sup> While running a state-level regression with weights for population would give the same point estimates, the inclusion of individual-level controls may increase precision (Angrist and Pischke, 2009).

## 4.2 Timing of the reform

A key concern when interpreting difference-in-difference estimates as causal is that the timing of SSM legalization in each state should not reflect pre-existing differences in state-level characteristics. It is worth remembering that some of the most liberal states, such as New York and California, were not among the firsts to legalize SSM. Unexpectedly, Iowa became the third state to introduce marriage equality.

Moreover, unlike other policy reforms such as unilateral divorce laws, SSM legalization was primarily driven by state and federal courts' decisions. Judges were less influenced by public opinion than policymakers since most of them were not directly elected by voters. Indeed, state courts started to legalize SSM in Massachusetts, Iowa and Connecticut before 2010, even if opinion polls did not show national popular support for SSM until 2011-2013 (McCarthy, 2017). In New England, only 36% of residents did not oppose sexual relationships between two adults of the same sex when Massachusetts legalized SSM in 2004.<sup>8</sup> The independence of the justice system from public discussion was emphasized by Justice Kennedy in *Obergefell v. Hodges*:

“Of course, the Constitution contemplates that democracy is the appropriate process for change, so long as that process does not abridge fundamental rights. [...] It is of no moment whether advocates of same-sex marriage now enjoy or lack momentum in the democratic process. The issue before the Court here is the legal question whether the Constitution protects the right of same-sex couples to marry.”

In addition to this, state fixed effects encompass all time-invariant state characteristics. The time span considered in the empirical analysis is rather short (2008-2016), so it is likely that variables such as religion or political affiliation –although not fixed in the long-run - did not change in this limited time period. This is the same argument used by Bailey (2006) when analyzing the impact of the contraceptive pill on female labor supply to control for the fact that a strong Catholic lobby may have delayed the diffusion of birth control methods. The main difference-in-difference specification also includes linear and quadratic state-specific time trends, as well as several state-level variables which may have been related with the legalization of SSM. For instance, the set of controls comprises the share of opposite-sex unmarried couples in the state: higher cohabitation rates may signal a higher level of openness towards sexual minorities and different family structures in the society (Badgett 2009).<sup>9</sup> Additional policy indicators (such as antidiscrimination laws) are included and discussed in Section 8.4.

To further support the hypothesis that the estimated impact of SSM legalization was not driven by time-varying state characteristics, Section 5.1 shows that the positive impacts of SSM legalization on the employment outcomes of same-sex couples are robust to restricting the analysis to the years in which SSM legalization was driven by decisions from the U.S. Supreme Court, thus excluding the

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<sup>8</sup> Source: General Social Survey (GSS) data.

<sup>9</sup> Since some of these state indicators may be considered endogenous, Section D.1 in the Online Appendix shows that the main conclusions do not change when excluding these state characteristics from the set of controls. Section D.1 also shows that all these state controls cannot predict SSM legalization: the coefficients  $\gamma$  are not statistically different from zero in  $SSM_{st} = x'_{st}\gamma + \delta_s + \alpha_t + \tau_{ts} + \tau_{ts}^2 + \varepsilon_{st}$  when examining the changes in laws between 2008 and 2016.

possibility that state unobservable factors led to such law changes. As placebo tests, Section 5.2 shows that SSM legalization did not affect the probability of being employed when analyzing opposite-sex couple, while Section 6.1 shows that changing the timing of SSM legalization results in statistically insignificant estimates. A triple-difference model that compares employment probability between same-sex and opposite-sex couples across space and over time, while controlling for any state-specific time-varying factor, also yields positive estimates of the impact of SSM legalization on same-sex couples.

## 5. Effect of SSM on employment

### 5.1 Main results

Table 1 shows the estimated effect of SSM legalization on the probability that both partners were working in the week preceding the interview. Column 1 includes only male same-sex couples, Column 2 focuses on female same-sex couples, and Column 3 combines all these couples. These regressions are run at the household level. The estimated coefficients are statistically significant and very similar (2.3 percentage points) for both gays and lesbians. A close estimate (2.4 percentage points) is obtained when looking at the effect on all same-sex couples (Column 3).

In order to understand whether this estimated impact is economically significant, it is worth noting that the magnitude associated with SSM legalization is comparable to the effect of other related policy reforms. Stevenson (2007) found an increase of 2 percentage points in the probability of both spouses being employed full time, and an increase of 2.4 percentage points in the probability that the wife was working following the introduction of unilateral divorce laws. Similarly, Bailey (2006) found an increase of 2-4 percentage points in the labor force participation rates of women aged 26 to 35 following the introduction of the pill.

As discussed in the previous section, Columns 4-5 in Table 1 limit the analysis to federal reforms to rule out that state time-varying unobservable characteristics drove both the timing of SSM legalization and the observed increase in employment. Column 4 shows that the effect of SSM legalization on the probability that both same-sex partners were working remains positive, statistically significant, and with an even larger magnitude when restricting the sample to the years between 2012 and 2016. The sample size is reduced even more in Column 5 (2014-2016): the coefficient of SSM legalization is then identified only through the *Obergefell v. Hodges* decision by the federal Supreme Court, a sentence independent of state characteristics. The estimate remains positive and statistically significant. Its magnitude increases up to 6 percentage points.<sup>10</sup>

For the sake of completeness, Column 6 shows the estimates obtained using all the years available in the ACS (2000-2016). It is reassuring to note that, despite the higher risk of misclassification errors described in Section 3.2, the coefficient of SSM legalization remains positive and statistically

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<sup>10</sup> *Obergefell v. Hodge* is the consolidation of six lower-court cases. All six federal district court rulings were in favor of the same-sex couples. On 6<sup>th</sup> November 2014, the Court of Appeals reversed these previous decisions and claimed that state bans on SSM did not violate the U.S. Constitution. It is unlikely that this decision had any impact on employment since it did not change existing laws and it was reversed by the U.S. Supreme Court a few months later. If the ruling had the same impact across states, it is taken into account by the time fixed effects. Furthermore, the media coverage was very limited - the search intensity on Google for *Obergefell* was extremely low before Spring 2015 - making it difficult to affect attitudes and perceived social norms.

significant. In line with the downward bias expected with classical measurement errors, its magnitude is lower than in Column 3.<sup>11</sup>

Since labor market decisions are often made at the household level (Flabbi and Mabli, 2018), all these estimates look at the impact of SSM legalization on the probability of *both* partners working. Nevertheless, the positive impact of SSM legalization is also found when looking at the individual probability of being employed. Male and female household heads in same-sex couples were 1.8 percentage points more likely to work following the introduction of marriage equality compared to household heads in state that had not yet legalized SSM (Column 7). In addition, a similar increase is found among second-earners in same-sex couples, i.e. household heads' spouses or unmarried partners (Column 8).

## 5.2 Additional employment outcomes

To further test the hypothesis of a positive effect of SSM legalization on labor market outcomes, Table 2 reports the estimated coefficient of  $SSM_{st}$  on other related employment indicators. The introduction of marriage equality led to an increase of around 1.3 hours in the amount of time spent working weekly by the household head and her partner (Column 1), as well as an increase in the probability of both partners working at least 40 hours per week (Column 2), or at least 30 hours per week (Column 3). In addition to this, the difference in the number of hours worked weekly by both partners got smaller (Column 4).<sup>12</sup>

These variables were measured considering the twelve months preceding the interview, while the employment status information examined in Table 1 was in regard to the week before the survey was conducted. Therefore, the estimated positive impact of SSM on labor market outcomes is found both at the intensive (worked, Yes/No) and extensive margin (number of hours worked), and it is not sensitive to the time frame used to elicit employment. Furthermore, also in this case the estimated magnitudes are similar to those of other policy reforms: for instance, Bailey (2006) found an employment increase of 1.5-2.3 hour/week among women aged 26 to 35 after the introduction of the pill.

It is worth noting that the dependent variable in Table 1 is equal to one only if both the household head and her partner worked for pay; zero for couples in which at most one partner was working, while the other was unemployed or out of the labor force. Similar estimates are obtained when the dependent variable is equal to one if both partners are working or unemployed; zero if at least one of them is out of the labor force (Column 5). This suggest that SSM legalization led not only to higher employment, but also to higher labor force participation.

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<sup>11</sup> Section D.1 in the Online Appendix shows that the coefficient associated with SSM legalization remains positive and statistically significant also when focusing on the 2008-2014 period, thus excluding the impact of the U.S. Supreme Court decision in 2015.

<sup>12</sup> Since the total number of hours worked by the household head and her partner is a continuous indicator, it is possible to analyze the impact of SSM legalization over the entire distribution of this outcome variable. The estimated effect of SSM is higher at the 0.25 quartile than at the 0.75 quartile (Section D.7 in the Online Appendix). These results are in line with the lower gap between partners shown in Table 2 (Column 4): it suggests that unemployed and part-time workers experienced the largest increase in hours worked, thus reducing within-couple differences.

### 5.3 Opposite sex couples: placebo test and triple-difference

In a placebo analysis, the true impact of the regressor of interest on a pseudo-outcome is known to be zero, so the goal is to test whether the estimate from the difference-in-difference model is close to zero when applied to this alternative dependent variable (Athey and Imbens, 2017). As shown in Table 3 (Column 1), the coefficient of SSM legalization is indeed statistically insignificant and with a tight confidence interval around zero when focusing on the probability of being employed for opposite-sex couples. This finding is in line with the work of Badgett (2009), Francis et al. (2012), and Trandafir (2015) highlighting that SSM legalization did not affect heterosexual couples.

The main econometric specification can be extended by estimating a triple-difference model, i.e. by comparing same-sex and opposite-sex couples within the same state over time. More formally, the equation of interest can be written as follow:

$$y_{igst} = \alpha SSM_{gst} + \mu_{st} + \pi_{gt} + \rho_{gs} + x'_{igst}\gamma + \varepsilon_{ist}$$

where  $y_{igst}$  indicates whether both the household head and the partner in couple  $i$  living in state  $s$  at time  $t$  were employed. The subscript  $g$  indicates whether the couple is same-sex or opposite-sex. The coefficient of interest is  $\alpha$ .  $SSM_{gst}$  is an indicator equal to one if a same-sex couple lived at time  $t$  in a state where same-sex marriage had been legalized. The specification includes state-specific time effects that are common across couples ( $\mu_{st}$ ), time-varying effects specific to same-sex couples ( $\pi_{gt}$ ), state-specific shocks among same-sex couples ( $\rho_{gs}$ ), and individual controls ( $x'_{igst}$ ).

As shown in Table 3 (Column 2), the estimated coefficient of the triple interaction  $SSM_{gst}$  is positive, statistically significant, and with magnitude close to the coefficients in Table 1. Since this estimate is obtained by comparing same-sex and opposite-sex couples *within* the same state, it also suggests that the positive impact found in the difference-in-difference estimates when comparing same-sex couples *between* states was not due to backlashes and negative employment outcomes in states that had not legalized SSM, but rather to actual improvements in states that legalized SSM.

## 6. Additional robustness checks

As usual with a difference-in-difference model, there are several potential issues which may lead to violations of the underlying assumptions. This section aims at discussing and ruling out the major threats. Additional extensions and sensitivity analyses are discussed in Appendix A.7.

### 6.1 Anticipation and parallel trends

If same-sex couples expected SSM to be legalized in the forthcoming years and reacted to such expected law change before the actual implementation of the policy, this would have led to an underestimation of the contemporaneous effect of marriage equality. There are several reasons to believe that this hypothesis is not actually true. Most of the SSM laws followed state or federal court decisions, so they may be less predictable than bills proposed by local politicians.

Furthermore, expected positive legal changes had often been overturned. For instance, following the decision of the Hawaii State Supreme Court in 1993 that refusal to grant marriage license to same-sex

couples was discriminatory, the state enacted a statute ban on SSM in 1995, while voters approved a constitutional ban in 1998. Similarly, in 2009 the State Senate and House of Representatives voted a bill to legalize SSM in Maine. However, opponents petitioned for a referendum, and voters repealed the law before it went into effect. Members of the U.S. Supreme Court were often inclined to dismiss cases on SSM (Liptak, 2013). Given these precedents, it is likely that individuals in same-sex relationships waited for SSM laws to become effective before actually changing their behavior, even if they were expecting these legislative changes.<sup>13</sup>

In addition, it is possible to modify the specification in Table 1 (Column 3) by using a lead indicator ( $SSM_{st+1}$ ), i.e. whether SSM was legal in state  $s$  at time  $t+1$ , instead of  $SSM_{st}$ . This model can also be seen as a placebo test in which the timing of SSM legalization has been shifted. The coefficient of  $SSM_{st+1}$  is statistically insignificant and close to zero in magnitude (Column 1 Table A1). When both  $SSM_{st}$  and  $SSM_{st+1}$  are included, the coefficient of  $SSM_{st}$  remains positive, significant and with magnitude close to the ones in Table 1 (Column 2). In line with Aksoy et al. (2018b), this result rules out both any anticipation effect and the hypothesis that improvements in the labor market were actually driven by changes in attitudes among the general population *before* SSM legalization. The statistically insignificant coefficient of  $SSM_{st+1}$  does not support the idea that - after controlling for linear and quadratic trends - attitudes towards sexual minorities among heterosexuals improved before the legalization of SSM, and that they led to both law changes and variations in employment.

More generally, adding up to three lead operators still results in statistically insignificant coefficients, while the contemporaneous effect of SSM legalization remains significant (Column 3 Table A1). These findings not only confirm that no changes occurred before the policy reform, but also support the parallel trend assumption in the difference-in-difference model.<sup>14</sup>

## 6.2 Intentional misreporting: roommates

The estimation and interpretation of the impact of SSM legalization may depend on how same-sex couples have been identified: individuals may differ over time and between states in their propensity to be in a same-sex relationship (and to be open about it). Indeed, despite the anonymity guaranteed by the U.S. Census, some individuals may have decided not to truthfully report their sexual orientation.<sup>15</sup> In order to include these “closeted” cases, couples in which one household member was listed as roommate and had the same sex of the household head have been included among same-sex couples. With multiple roommates, it was not possible to infer the identity of the household head’s partner (if any). Roommates were not considered when the household head had a spouse or an unmarried partner.

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<sup>13</sup> It is worth pointing out that, even if all same-sex couples in a state were certain that SSM would have become legal in the future, such shared expectation would have been controlled for by the interaction between state fixed effect and the sexual orientation indicator ( $\rho_{gs}$ ) in the triple-difference estimates.

<sup>14</sup> Appendix A.1 also shows that the coefficients of  $SSM_{st}$  remain statistically significant after the introduction of additional leads and lags in the model. Moreover, it provides suggestive evidence that the impact was concentrated in the year SSM was legalized, with little effect before or after. In addition, it shows that the estimated impact remains positive and significant when using as independent variable the number of years SSM had been legal in a given state. As shown Appendix A.2, similar conclusions can be obtained from an alternative formulation of this event study, i.e. by defining  $SSM_{st}$  as equal to one the year in which SSM was legalized, zero otherwise (even in the years after the legalization), and by adding leads and lags of this indicator variable.

<sup>15</sup> This behavior is similar to the historical manipulations of racial appearance and the attempts to “pass” as white among Americans with African ancestry (Nix and Qian, 2015).

Only couples whose household head was aged between 30 and 60 have been considered to reduce the risk of including cohabitating students or older individuals living with non-relatives.

It is interesting to note that there are large differences among states in the proportion of opposite-sex and same-sex couples (married, unmarried or roommates). For instance, 98.9% of these couples are opposite-sex in Mississippi. In contrast, opposite-sex couples represent 89% of all couples in DC. The proportion of same-sex roommates is similar to that of same-sex married/unmarried couples in less tolerant states such as Alabama, Mississippi, Texas and Louisiana, while it is smaller in more LGBT-friendly states such as Massachusetts, Vermont, New York and DC. Moreover, while the proportion of same-sex roommates (over the total number of same-sex roommates and same/opposite-sex married or unmarried couples) has remained stable over time in more tolerant states, it has declined in less tolerant states. At the same time, the proportion of unmarried and married same-sex couples has increased.<sup>16</sup> These results support the hypothesis that individuals in same-sex relationships were more likely to report being roommates when they preferred not to disclose their sexual orientation. These statistics are also consistent with the finding based on health data that a substantial share of households containing exactly two men or two women are non-heterosexual couples (Carpenter et al., 2018).

The coefficient of SSM legalization remains positive, statistically significant and with a magnitude equal to the one in Table 1 (Column 3) even when estimating the probability that both partners are working among same-sex married couples, unmarried couples, and households with two same-sex roommates (Table 4 Column 1). Therefore, the main results are not driven by SSM legalization affecting this type of sample composition, i.e. by changing how many same-sex couples decided to be open about their sexuality rather than classifying themselves as roommates.

### **6.3 Other compositional changes**

Between-state migration may have changed the geographical composition and distribution of same-sex couples, thus leading the difference-in-difference model to compare unstable samples over time. For instance, individuals with a higher propensity to work might have been more likely to move to states that introduced marriage equality early on. Nevertheless, there is no evidence that migration rates of same-sex couples towards states that legalized SSM increased after the introduction of marriage equality (Appendix A.3).

In order to further rule out any sample compositional changes, Appendix A.4 shows that SSM legalization did not lead to changes in the probability that a (married or unmarried) couple was reported as same-sex or opposite-sex, or to shifts in the demographic composition (such as race, ethnicity and language) of same-sex couples. In addition, Appendix A.5 combine difference-in-difference with matching (Blundell and Costa Dias, 2015). This extension compares individuals in treated states following SSM legalization with comparable individuals in treated states at baseline, as well as with comparable individuals in control states at baseline and after law change. In other words, merging these two methods ensures that similar individuals are compared across time and space, thus verifying that sample compositional changes are not pivotal. The estimated impact of SSM legalization when augmenting the difference-in-difference model with kernel weights computed from propensity scores

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<sup>16</sup> Section D.3 in the Online Appendix provides additional summary statistics and time trends.

remains positive, statistically significant and with magnitude close to the coefficients shown in Table 1.

Finally, the main analysis can be validated using a different dataset. The 2008 SIPP is a nationally representative longitudinal study collected between 2008 and 2013 every 4 months. The SIPP is generally deemed to have the highest quality data among the surveys administered by the U.S. Census Bureau (Meyer et al., 2018). As in the ACS, it is possible to identify same-sex couples by linking the reference person with her unmarried partner. The resulting sample size is smaller than the ACS. Nevertheless, since respondents' sex is validated in each wave, the risk of misclassify opposite-sex couples as same-sex is substantially reduced. Compositional changes are also more limited than in repeated cross-sections since the same individuals are followed over time, even if they split-up. If two partners decided to truthfully declare their relationship status only in a follow-up wave, their employment history (including the first waves) is included in the analysis. Moreover, single individuals who found a same-sex partner between 2008 and 2013 are included in the relevant sample, together with their partners. In addition, the ACS is conducted once a year and the month of the interview is not available: some respondents may have been interviewed in the same year SSM was legalized in their state, but in a preceding month. Employment status is recorded monthly in the SIPP, thus resolving this ambiguity. Given these advantages, it is reassuring that the estimated impact of SSM legalization on the (individual) probability of being employed is positive and statistically significant after two months, and persists over time (Figure A2).

## **7. Specialization: shouldn't the effect be negative?**

There is one pivotal reason which would have explained a *negative* impact of SSM legalization on employment: intra-household specialization. Indeed, Becker (1991) identified this factor as the main advantage from marriage: one person in the couple increases her productivity and earnings in the labor market, while her partner specializes in the production of household commodities. However, most of the production complementarities emphasized by Becker have lost their central role in modern families (Stevenson and Wolfers, 2007). New household technologies (e.g., washing machines and vacuum cleaners) have reduced time devoted to household tasks, while the development of service industries has allowed individuals to buy most of the goods (such as processed food) which used to be produced within the household.<sup>17</sup> The only area where the gains from specialization have remained large is with respect to children. Indeed, when considering individuals without children, there is no evidence that married women earn less than single women, while women with children have substantially lower earnings (Juhn and McCue, 2017).

The effect of SSM legalization on the number of children in the household is close to zero and statistically insignificant both for gays (Column 1 Table 5) and lesbians (Column 5). There is also no detectable effect on the probability of having a child (Columns 2 and 6). These conclusions do not change if lagged indicators of SSM legalization are used to allow couples more time to adjust their

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<sup>17</sup> It is worth mentioning that several studies have shown a more egalitarian division of housework and childcare in same-sex couples than in opposite sex couples (Badgett, 2009; Giddings et al., 2014; Jepsen and Jepsen 2015). Therefore, the lack of change in intra-household specialization among same-sex couples may also be due to different or absent gender norms.

behaviors and fertility decisions (Columns 3 and 4 for gays, Columns 7 and 8 for lesbians).<sup>18</sup> The main factor behind the advantages of home production – fertility – was not affected by SSM legalization. It is true that married same-sex couples were more likely to have children and higher levels of intra-household specialization, but the policy reform itself did not trigger an increase in fertility among same-sex couples. Actually, the difference in fertility between married and unmarried same-sex couples predated the policy reform: this gap is mainly due to children older than five, thus suggesting that same-sex couples with a higher fertility rate were more likely to get married, not vice versa.

After adding an interaction between SSM legalization and fertility to the model in Table 1 examining the impact of SSM legalization on the probability that both partners were working, one can also conclude that couples with children were less likely to have both partners employed, but SSM legalization positively affected these couples more than those without children, thus partially compensating the negative relation between fertility and employment. This descriptive evidence is in contrast to the hypothesis that marriage would provide a legal vehicle to further increase specialization within families with children.<sup>19</sup>

## 8. Discrimination

Given the positive impact of SSM legalization on employment, it is worth investigating more in depth whether this improvement was actually led by a decrease in discrimination against sexual minorities. Previous studies have emphasized the positive effect of lower discrimination on employment for women and racial minorities (Leonard, 1990; Collins, 2001), so it is possible that SSM legalization triggered the same mechanism. Other potential channels are discussed in Appendix A.8.

This section describes the conceptual framework linking SSM legalization with discrimination and employment. It then collects a set of supplementary analyses to support this theory. The Online Appendix provides additional evidence using data on hate crimes (Section F.4) and on attitudes towards homosexuals (Section F.5). It is also interesting to mention that the actual number of charges for sexual orientation and gender identity discrimination filed with the Equal Employment Opportunity Commission slightly decreased after the U.S. Supreme Court ruling in 2015 (Badgett et al., 2018).

The findings in Tankard and Paluck (2017) are in line with the mechanism highlighted in this section: the authors randomly assigned participants from Amazon Mechanical Turk to read either a positive or a negative analysis of the U.S. Supreme Court decision on SSM before the actual ruling. Individuals in the positive treatment group were more likely to report higher perceived support for gay marriage among Americans. In addition to this, improvements in social norms were found in the longitudinal data when comparing participants' answers before and after *Obergefell v. Hodges*. Similar results were discussed in Kreitzer et al. (2014) when analyzing the effect of the legalization of SSM in 2009 following the Iowa Supreme Court decision.

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<sup>18</sup> Section E.1 in the Online Appendix reports relevant summary statistics regarding fertility. Section E.2 shows that restricting the sample size to consider only households in childbearing years also results in statistically insignificant coefficients. Section E.3 tests the existence of heterogeneities by income levels. The coefficient of SSM legalization remains statistically insignificant after including household income as controls. The interaction term between SSM legalization and income is positive, but its magnitude is not large enough to compensate the negative relation between fertility and household income.

<sup>19</sup> Estimates reported in Section E.4 in the Online Appendix.

## 8.1 Conceptual framework

There are different theories which may explain discrimination against sexual minorities. The classical model is the one of taste-based discrimination (Becker, 1957): some employers may dislike minority workers, or they may expect customers and other employees to have a preference for heterosexual co-workers. The second leading theory is the one of statistical discrimination (Arrow, 1973): given the uncertainty about the actual productivity of a gay or lesbian job candidate, employers may try to infer her quality from the (perceived) average productivity of minority workers. From this perspective, gay men are discriminated because they are deemed less masculine or more likely to have HIV. Lesbian women may actually be positively discriminated due to their perceived lower fertility, higher labor force attachment, and stronger personality (Patacchini et al., 2015), although the empirical evidence is far from clear-cut (Weichselbaumer, 2003). Second-order statistical discrimination stems instead from the (perceived) higher variance in productivity among minority workers (Klumpp and Su, 2013). Employers are less familiar with minority workers, so even if they perceive these workers to be on average as productive as heterosexual workers, they might be reluctant to hire them due to the higher uncertainty. More recently, Pęski and Szentes (2013) based their model of discrimination on social norms: heterosexual employers may discriminate minority workers because such behavior is tolerated, even expected, and deviations are punished.

SSM legalization may affect all these kinds of discrimination. First, this policy may shape preferences and change attitudes among employers, workers and consumers (Aksoy et al., 2018b). Greater visibility of the LGBT community, as well as the legal and ethical arguments raised by the Supreme Court judges when justifying their ruling, may induce more people to have a more tolerant or accepting perspective. Second, as more homosexual workers are hired or decide to come out, employer would adjust their expectations about average productivity and variance for this group of employees. Given the time required to update employers' expectations, short-term decreases in discrimination would be mainly due to a decline in taste-based discrimination, while lower statistical discrimination could drive long-term trends. Third, social norms might be affected and employers may realize that past discriminatory behaviors are no longer considered acceptable, and that having a diverse workforce is not punished, but actually valued. Fourth, the documented increase in employment among same-sex couples may be due not only to an increase in labor demand, but also to higher labor supply. Through a feedback mechanism, lower expected discrimination may incentivize more gay and lesbian individuals to participate in the labor market.

## 8.2 Theoretical framework

In order to formalize how SSM might have affected labor market outcomes for same-sex couples through a reduction in discrimination, this section presents a search model with minority workers and prejudiced employers by adapting and extending the work in Flabbi (2010a) and Flabbi (2010b).<sup>20</sup>

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<sup>20</sup> All technical details and proofs are discussed in Section F.1 in the Online Appendix. An alternative model could focus on social norms to justify the shift from an equilibrium with widespread discrimination to a tolerant one, in line with the tipping models with multiple equilibria described in Schelling (1971) and Akerlof (1980). However, unlike a dynamic search model, this model of segregation would not emphasize the change in taste-based discrimination, or the feedback effect in the labor supply of gay and lesbian workers. Moreover, Burn (2016) showed that changes in the gay wage penalty following shifts in attitudes and in the proportion of gay workers are consistent with the predictions from a search model of taste-based discrimination.

Models developed to explain racial and gender differentials are adapted here in the context of discrimination based on sexual orientation. In order to better describe the channels driving the impact of SSM legalization, this model extends previous studies by including additional heterogeneity in the job arrival rates between minority and non-minority workers. Supplementary comparative statics are computed and discussed in order to explain the underlying mechanisms behind the impact of SSM legalization.

This model is a random search model set in continuous time (agents live forever) with job destruction and no on-the-job search. There are two types of employers: prejudiced firms ( $P$ ) and unprejudiced ones ( $N$ ). The share of prejudiced employers is  $p$ . There are two types of workers: minority employees ( $G$  for gay) and non-minority ones ( $S$  for straight). Types are fully revealed once worker and employer meet, so the category “minority workers” includes only individuals who are open about their sexuality. This can be justified by assuming that researcher and employer have the same level of information: if the worker does not hide her sexual orientation in the ACS survey, it is likely that she is open about her sexuality also in the workplace. Moreover, employers often use social networks such as Facebook to gather personal information on job applicants and existing staff (Margolis, 2017).

Employers maximize profits, labor is the only input in the production function, and there are constant returns to scale. The disutility incurred by prejudiced employers when hiring a minority worker is  $d$ . The fact that prejudiced employers may hire minority workers is in line with Becker (1957) and extends the model in Black (1995). Workers can be in one of three different states: employment ( $e$ ), unemployment ( $u$ ) and non-participation in the labor market ( $1 - l$ ). The introduction of the non-participation rate is rather innovative since most search models on racial and gender discrimination focus only on wage differentials (Lang and Lehmann, 2012), while in this case it is important to explain the impact of SSM legalization on both wages and employment.

The flow value of non-participation in the labor force is  $z \sim Q(z)$ , while  $b$  is the value of unemployment. Unemployed workers and firms randomly meet following a Poisson process characterized by parameters  $\lambda_G$  and  $\lambda_S$  for minority and non-minority workers, respectively. Since  $p$  is not necessarily 0.5, the rate of arrival of offers from the two types of employers is allowed to be different. Once employer and worker meet, the match-specific productivity value  $x \sim G(x)$  is revealed.<sup>21</sup> If a match is realized, the wage  $w(x)$  is determined through Nash-bargaining with the worker’s weight equal to  $\alpha \in [0,1]$ . Finally,  $\eta$  is the job-destruction rate and  $\rho$  is the intertemporal discount rate.

Once an individual decides to enter into the labor market, she can either be employed or unemployed, but she cannot exit the market. Therefore, the present-value of non-participating in the labor market  $NP_J(z)$  is simply (for  $J = G, S$ ).

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<sup>21</sup> If no match is realized after an employer and a worker meet, the firm does not incur into any extra cost, so its outside option is zero. It is worth mentioning that common knowledge of the matching value rules out the possibility of statistical discrimination. Previous researchers have shown that the gay wage penalty is robust to including controls for occupation (Antecol et al., 2008) and personality characteristics (Sabia, 2014). The evidence presented in this paper also points towards a decline in taste-based discrimination and improvements in social norms. Therefore, this model focuses on these channels rather than on statistical discrimination.

$$NP_J(z) = \frac{z}{\rho}$$

The present-value of employment  $V_J[w_{JI}(x)]$  depends on the worker's wage and outside option (for  $J = G, S$  and  $I = N, P$ ):

$$V_J[w_{JI}(x)] = \frac{w_{JI}(x) + \eta U_J}{\rho + \eta}$$

The total (dis)utility from unemployment, the expected value from meeting a prejudiced employer, and the one from meeting an unprejudiced employer determines instead the present-value of unemployment  $\rho U_J$ :

$$\rho U_J = b + \lambda_j \left( p \int \max[V_J[w_{JP}(x)] - U_J, 0] dG(x) + (1 - p) \int \max[V_J[w_{JN}(x)] - U_J, 0] dG(x) \right)$$

Wages are instead determined through Nash bargaining:

$$w_{JI}(x) = \alpha(x - d1_{\{G,P\}}) + (1 - \alpha)\rho U_J$$

Reservation values can be easily derived from these equations, and it is then possible to define the following equilibrium.

**Proposition 1.** *Given the exogenous parameters  $\{\lambda_G, \lambda_S, \eta, \rho, b, \alpha, d, p\}$  and the distribution functions  $G(x)$  and  $Q(z)$ , the unique steady state equilibrium is defined by the following three conditions:<sup>22</sup>*

$$\rho U_J = b + \frac{\lambda_j \alpha}{\rho + \eta} \left( p \int_{\rho U_J + d1_{\{G,P\}}}^{+\infty} [x - d1_{\{G,P\}} - \rho U_J] dG(x) + (1 - p) \int_{\rho U_J}^{+\infty} [x - \rho U_J] dG(x) \right);$$

$$u_j = \frac{\eta}{\eta + \lambda_j \{p[1 - G(\rho U_J + d1_{\{G,P\}})] + (1 - p)[1 - G(\rho U_J)]\}};$$

$$l_j = Q(\rho U_J)$$

The first equilibrium condition can be obtained by simply rearranging and rewriting the previous equations on  $\rho U_J$ ,  $V_J[w_{JI}(x)]$ , and  $w_{JI}(x)$  in term of the exogenous parameters. The second condition states that flows between unemployment and employment have to be equal in equilibrium. The third condition requires a stable level of labor force participation.

SSM legalization may have led to a lower  $d$  since employers expected lower discrimination from co-workers and consumers. Moreover, employers were less afraid of violating outdated social norms when acting within a supporting legislative framework. In this context, the similarity with the Civil Rights

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<sup>22</sup> One may argue that competition should wipe out prejudiced employers, but the model can be extended as in Black (1995) to allow employers to differ in term of entrepreneurial ability, thus allowing high-ability prejudiced firms to survive even in equilibrium. Moreover, search frictions generate monopsony power, thus allowing firms to have positive profits and to reduce part of their rents in exchange for the ability to hire only certain types of workers (Altonji and Black, 1999).

Act of 1964 is remarkable: Donohue and Heckman (1991) emphasized that “in certain ways the South was ripe for change. There is evidence that some Southern employers were eager to employ blacks if given the proper excuse”. In addition to this, SSM improved health outcomes among gays and lesbian (see Appendix A.8), thus leading to lower health insurance costs for employers. Similarly, the introduction of marriage equality might have led to a reduction in the proportion of prejudiced employers ( $p$ ). Some of these firms were damaged by boycotts, while others decided not to base anymore their hiring and promotion decisions on sexual orientation.

In addition to these effects through direct changes in labor demand, direct changes in labor supply may have occurred since same-sex couples expected lower discrimination following SSM legalization. This resulted in larger efforts in the job search, thus increasing the probability of meeting a firm ( $\lambda_G$ ). This mechanism is in line with the feedback effect hypothesized by Neumark and McLennan (1995) when examining female employment: women may invest less in the labor market when expecting discrimination. Similarly, Goldin and Rouse (2000) found an increase in the percentage of female musicians among job candidates when symphony orchestras introduced blind auditions. The comparative statics for such changes in  $d$ ,  $p$  and  $\lambda_G$  are summarized in the following proposition.

**Proposition 2.** *For any equilibrium previously defined, as the disutility from hiring minority workers ( $d$ ) decreases, or the proportion of prejudiced employers ( $p$ ) decreases, or the job arrival rate for minority workers ( $\lambda_G$ ) increases, their wage ( $w_G$ ) increases, their unemployment rate ( $u_G$ ) decreases, and their labor force participation rate ( $l_G$ ) increases.*

All these comparative statics are in line with the results discussed in Sections 5-6 and Appendix 9, while the next sections provide evidence to support the hypothesis that SSM legalization reduced discrimination. Finally, the model provides an interesting testable prediction regarding occupational segregation. While non-minority workers are indifferent between prejudiced and unprejudiced employers since they are not treated differently, minority workers would prefer ex-ante to work for an unprejudiced firm, but they might end up working for a prejudiced employer if the match has a high enough productivity value. Consequently, the proportion of minority workers working for unprejudiced employers in equilibrium is:

$$P_{GN} = \frac{(1-p)[1-G(\rho U_G)]}{p[1-G(\rho U_G + d)] + (1-p)[1-G(\rho U_G)]}$$

It is then possible to prove that, under certain functional form assumptions:

**Proposition 3.** *For any equilibrium previously defined, as the disutility from hiring minority workers ( $d$ ) decreases, occupational segregation ( $P_{GN}$ ) declines.*

As the level of prejudice  $d$  declines, minority workers are more willing to work for prejudiced employers (direct effect). Moreover, a lower  $d$  increases the reservation value  $\rho U_G$ , pushing individuals towards higher paying occupations (indirect effect). In line with this prediction, Section 8.6 shows that minority workers moved from more tolerant to less tolerant occupations after the legalization of SSM.

### 8.3 Heterogeneities by relation status.

If indeed SSM legalization led to lower discrimination based on sexual orientation, then all gays and lesbians should have benefited. Going back to Table 4, this hypothesis is investigated in Column 2 by examining same-sex married couples, unmarried partners and same-sex roommates. The interaction term between SSM and the roommate indicator is statistically insignificant. This suggests that the impact of SSM legalization was similar among same-sex couples and (potentially closeted) same-sex roommates.

An alternative way to test the hypothesis that SSM legalization affected all same-sex couples, not only married ones, is to look for heterogeneous impacts among married and unmarried couples. The usual caveat in this case is that marital status is endogenous, so results in this section are only presented as suggested evidence.<sup>23</sup> In line with the idea of a widespread impact among gays and lesbians, SSM legalization led to an increase in the probability that both partners were working also among unmarried same-sex couples (Column 3 Table 4).<sup>24</sup>

### 8.4 Additional policy reforms

Additional evidence supporting the hypothesis of lower discrimination following SSM legalization is provided by Table 6. This table extends the difference-in-difference model with male and female same-sex couples estimated in Table 1 (Column 3) by including additional policy indicators, that is, whether states introduced other policies affecting LGBT individuals in the time period considered.

In particular, these variables indicate whether and in which year a state introduced a constitutional ban on same-sex marriage (Column 2), legalized domestic partnership and civil union (Column 3), introduced anti-discrimination laws (Column 4), and allowed or prohibited adoptions by same-sex couples (Column 5). It is worth emphasizing that these results are only presented as suggestive evidence to reinforce the findings on SSM legalization. Indeed, while 49 states (plus DC) legalized SSM between 2008 and 2016, only between 1 and 7 states implemented one or more of these additional reforms.<sup>25</sup>

The estimated coefficient of SSM legalization remains positive and statistically significant. Moreover, the impact of these policy reforms is consistent with the idea that employment increased because of higher tolerance signaled and caused by these laws. As for marriage equality, there is a positive association between the legalization of domestic partnerships (or civil unions) and employment. Similarly, the coefficients of anti-discrimination laws and second-parent adoption are also positive. On the other hand, couples living in states that introduced a constitutional ban on SSM or adoptions were

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<sup>23</sup> It is worth emphasizing that the interaction term between marital status and SSM legalization would still be consistently estimated if certain higher-order conditions were met (Bun and Harrison, 2018). Nizalova and Murtazashvili (2016) argued that the interaction term is consistently estimated when the endogenous regressor (marital status) and the unobservables are jointly independent from the treatment variable (SSM legalization), but this assumption seems less realistic in this context.

<sup>24</sup> It is not possible to test with the ACS data whether SSM legalization also benefited individuals without a partner. Nevertheless, the 2008 SIPP is a longitudinal dataset, so it is possible to identify same-sex couples and then track individuals in previous interviews when they were single, or in follow-up interviews even if they broke up. As shown in Section D.5 in the Online Appendix, there is evidence that SSM legalization led to increases in employment when examining gay and lesbian individuals only in the months when they were not living with a same-sex (un)married partner, although the sample size is greatly reduced and the estimates are not always statistically significant.

<sup>25</sup> See Section A in the Online Appendix for the complete timeline of these reforms.

less likely to be both working.<sup>26</sup>

## 8.5 Evidence from Google Trends

Google searches provide an interesting alternative data source to investigate changes in animosity towards gays. Indeed, Google data are a good proxy for socially-sensitive attitudes since users are online, alone, and have an incentive not to lie in order to obtain what they are looking for: all these factors make it easier to express opinions on sensible topics such as race, health, or sexual practices (Stephens-Davidowitz, 2014). It is possible to use Google Trends to compute a time series index of the volumes of queries entered by users into Google in each given U.S. state. This search intensity index is based on query shares normalized between from 0 to 100. A query share is the total query volume for a given search term(s) within a particular geographical region divided by the total number of queries in that region during the time period being considered. The following difference-in-difference model can therefore be estimated:

$$q_{st} = \beta SSM_{st} + \delta_s + \alpha_t + \tau_{ts} + \tau_{ts}^2 + x'_{st}\gamma + \varepsilon_{st}$$

where  $q_{st}$  is the search intensity for a given word in state  $s$  at time  $t$ . All the other regressors are defined as in Section 4. In this case, data are available only at the state level, not the individual level, so the number of observations is substantially reduced and it is not possible to include individual controls as in the previous sections.

*Leviticus* is the first word whose search intensity is used to approximate attitudes towards homosexuals. This is a book in the Bible that contains the reference “You shall not lie with a man as with a woman, this is an abomination” which has been often used among Christians and Jews to justify homophobia. As reported in Table 7, SSM legalization led to a statistically significant reduction in search intensity for this term of almost 2 points out of 100 even when including the additional policy indicators described in Table 6 (Column 1). Since this decline may simply reflect lower media coverage and interest after the passage of the law, Column 2 also controls for the overall search intensity for LGBT topics (as defined by Google). Column 3 further includes two lagged operators: the decline in Google searches is negative and significant even two years after the legalization of SSM, thus reflecting a long-lasting decline. These coefficients are still significant when including state-specific linear time trends (Column 4). The estimates remain negative but become too imprecise only after adding state-specific quadratic time trends (Column 5).

The specification can then be extended by including two lead operators ( $SSM_{st+1}$  and  $SSM_{st+2}$ ). Their estimated coefficients are not statistically significant, thus supporting the hypothesis that searches for the word *Leviticus* did not start to decline before the legalization of SSM. This is consistent with the hypothesis discussed in Section 6.1 that changes in attitudes did not predate legal changes. In line with these findings, similar (although not always statistically significant) declines in search intensity

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<sup>26</sup> As reported in Section F.2 in the Online Appendix, there is no evidence of heterogeneity in the effect of SSM marriage between more or less tolerant states. Indeed, the interaction terms between SSM legalization and whether the state passed sexual orientation anti-discrimination laws to protect private and/or public employees are not statistically significant. There is also no evidence that SSM legalization had a different impact in states that had already introduced domestic partnership.

following the introduction of marriage equality are found from the analysis of Google searches for other words with a negative connotation (*Sodomy* and *Faggot*).

A homophobic index can then be constructed by combining through principal component analysis the search intensities for all three terms (*Leviticus*, *Sodomy* and *Faggot*). Also in this case, the legalization of SSM was associated with a decline in such index.<sup>27</sup> Finally, as shown in the last column of Table 7, there was a negative relation between this measure of homophobic searches and the probability that both partners in same-sex couples were working. This result further emphasizes the direct link between employment and attitudes towards minority workers.

## 8.6 Occupational segregation

Gay and lesbian workers tend to sort into tolerant occupations. Plug et al. (2014) compared twins with different sexual orientations to show that gays and lesbians were less likely to work in occupations with prejudiced workers. Similarly, Black et al. (2007) noticed that gay workers were in occupations with a higher proportion of women than straight male workers. Similar summary statistics are obtained from the ACS: male workers in same-sex couples are in occupations with a higher share of women than men in opposite-sex couples.<sup>28</sup> As stated in Proposition 3, one of the implications from the search model outlined in Section 8.2 is that a lower level of discrimination following the legalization of SSM might induce a shift of minority workers towards historically less tolerant occupations (or to disclose their sexual orientation if already employed in these sectors). One way to test this prediction is by investigating whether individuals in same-sex couples were employed in occupations with a lower share of female workers after the legalization of SSM. Indeed, male-dominated occupations includes historically intolerant blue-collar jobs.

Table 8 reports estimates from a difference-in-difference model as the one introduced in Section 4. The dependent variable in Column 1 is a binary indicator equal to one if the respondent (either the household head or the spouse/partner in a same-sex couple) was employed in an occupation with a majority of female workers. The coefficient associated with SSM legalization is negative (1.4 percentage points) and statistically significant. Similar estimates are obtained from alternative specifications. The coefficient of SSM legalization remains negative and significant when restricting the sample to household heads only (Column 2). Each respondent reported her last occupation, but the estimates are similar when examining only individuals who were employed at the time of the interview (Column 3). Qualitatively similar results are obtained when examining the share of female workers within occupation as dependent variable rather than a binary indicator (Column 4).<sup>29</sup>

Related to this, it is interesting to investigate whether SSM legalization affected another main occupational choice: paid work vs. self-employment. The last column of Table 8 shows a decline in

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<sup>27</sup> Sections F.3.1-3 in the Online Appendix reports all these estimated coefficients and shows that the same conclusions are also obtained from estimating an event study. In addition, there is some evidence of an increase in Google searches on *Gay pride* after the legalization of SSM, although the coefficients are not precisely estimates.

<sup>28</sup> In addition to this, there are no differences in the average shares of women within occupation when comparing married and unmarried couples by gender and sexual behavior. Additional descriptive statistics in Section F.6.1 in the Online Appendix.

<sup>29</sup> Section F.6.2 in the Online Appendix includes additional robustness checks: computing the share of women within occupation using weighted averages rather than unweighted ones leads to very similar estimates. Moreover, the decline seems to have been larger among lesbian workers than gay ones. Section F.6.3 presents additional analyses using occupational data from GSS.

self-employment among same-sex couples following the legalization of SSM. These couples are 1.9 percentage points less likely to have at least one household member working for her own enterprise. This result is in line with the hypothesis that gays and lesbians shifted out of self-employment given lower expected discrimination from employers (and co-workers).<sup>30</sup>

## 9. Conclusions

This paper has exploited variations in the different timing of same-sex marriage reforms across U.S. states to show that these law changes were associated with an improvement in labor market outcomes among same-sex couples. Empirical evidence supports the hypothesis that a reduction in discrimination against sexual minorities following the introduction of marriage equality led to such improvements. This result is in line with experimental and observational studies showing that prejudiced attitudes towards LGBT individuals can be effectively and durably reduced (Broockman and Kalla, 2016; Aksoy et al., 2018b), thus suggesting that individual preferences and social norms might change with legal and economic reforms coming into effect.

From a policy perspective, these findings emphasize the overwhelming positive effects of extending civil and human rights to sexual minorities. This paper provides an economic rationale to marriage equality. Analogous to the increases in female labor force participation witnessed in the past decades, legalizing SSM led to higher integration of same-sex couples in the labor market, thus potentially stimulating economic growth and a more efficient allocation of human capital. LGBT individuals represent a sizable portion of the U.S. population: Stephens-Davidowitz (2017) combined different online U.S. data to argue that 5% of men are gay, and a substantial share of them have yet to come out (or are even married to a female partner). Therefore, lower discrimination based on sexual orientation and higher employment among gays and lesbians are likely to have had positive macroeconomic effects (and improved matching based on sexual preferences in the marriage market). Even if using conservative estimates, an increase of 2% in the probability of being employed for 5% of the U.S. labor force (around 160 million) may have resulted in 160,000 additional individuals employed.

This study has two clear limitations due to data availability. First, homosexual individuals are identified only through their relation with the household head. Therefore, this paper has focused on cohabitating same-sex couples. There is no information available in the ACS on gays and lesbians without a partner, same-sex couples not living together, or bisexual individuals living with an opposite-sex partner. While the empirical analysis has tested the validity of the main results to potential compositional changes, and the SIPP data include single individuals who had been in a same-sex relationship between 2008 and 2013, it would be interesting by itself to investigate the impact of SSM legalization to other members of the LGBT community. Unfortunately, such an extension is not possible with the current data available for the U.S.

Although the sample size is often extremely limited, future studies could exploit the panel dimension in the available longitudinal data to deepen the current analysis. For instance, one could investigate

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<sup>30</sup> Section F.6.2 in the Online Appendix includes additional robustness checks: similar conclusions are obtained when analyzing only whether the household head was self-employed, or when using an alternative definition of self-employment (“Occupation Not Available” counted as zero instead of missing). Furthermore, the effect seems to be larger among male same-sex couples than female same-sex couples.

whether lower discrimination following SSM increased the probability for minority workers of getting a raise or a promotion within the same job, or actually led these workers to switch to a less tolerant but more remunerative occupation. Future research could also extend this analysis by looking at additional economic outcomes and how these variables have been impacted by SSM legalization. For instance, due to lack of data and small sample sizes, there is not enough information on how time use differs between same-sex and opposite-sex couples, and whether such time allocation has changed once same-sex couples have been allowed to get married.

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## Tables

**Table 1: Effect of SSM legalization on employment.**

	Same-sex couples						Individuals	
	Male	Female	Male and female				Head	Partner
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSM legal	0.023** (0.011)	0.023** (0.010)	0.024*** (0.008)	0.044*** (0.014)	0.060*** (0.009)	0.015** (0.006)	0.018*** (0.005)	0.012** (0.006)
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
State trends	✓	✓	✓	✓	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓	✓	✓	✓
Observations	28,118	29,796	57,914	35,991	23,242	92,282	57,914	57,914
Number clusters	51	51	51	51	51	51	51	51
Average dep var	0.668	0.660	0.664	0.662	0.666	0.652	0.824	0.767
Adjusted R <sup>2</sup>	0.108	0.098	0.102	0.105	0.110	0.097	0.086	0.080
Starting year ACS	2008	2008	2008	2012	2014	2000	2008	2008

The dependent variables are: whether both the household head and her partner were employed in the week preceding the interview (Columns 1-6), whether the household head was employed (Column 7), and whether the household head's spouse or unmarried partner was employed (Column 8). Only individuals in same-sex couples have been considered: male same sex couples in Column 1, female same-sex couples in Column 2, male and female same-sex couples in Columns 3-6, male and female individuals in same-sex couples in Columns 7-8. Standard errors in parenthesis clustered at the state level. State trends includes both linear and quadratic state-specific time trends. Individual controls: household head's and partner's age, education, ethnicity, race, language, interaction terms between household head's and partner's age and education. State controls: unemployment rate, income per capita, racial and age composition, percentage of state population with positive welfare income, and cohabitation rate among opposite-sex couples. Source: ACS 2008-2016. The sample size is limited in Column 4 (ACS 2012-2016) and Column 5 (ACS 2014-2016) to focus the analysis only on law changes following federal court decisions. The sample size is extended in Column 6 to include all years available (ACS 2000-2016), even if the initial years have higher rates of misclassification errors. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 2: Effect of SSM legalization on additional employment outcomes.**

	Male and female same-sex couples				
	HH hours	Both 40h	Both 30h	HH gap	In labor force
	(1)	(2)	(3)	(4)	(5)
SSM legal	1.294*** (0.483)	0.030*** (0.008)	0.025*** (0.009)	-0.936*** (0.340)	0.022*** (0.007)
Year FE	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
State trends	✓	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓
Observations	57,815	57,914	57,914	57,815	57,914
Number clusters	51	51	51	51	51
Average dep var	69.40	0.461	0.612	15.40	0.732
Adjusted R <sup>2</sup>	0.151	0.078	0.097	0.020	0.123

The dependent variables are: total number of hours usually worked weekly by the household head and her partner (Column 1), whether both the household head and her partner worked more than 40 hours per week (Column 2), whether both the household head and her partner worked more than 30 hours per week (Column 3), absolute value of the difference in hours worked weekly by the household head and her partner (Column 4), whether both the household head and her partner were in the labor force (employed or unemployed) in the week preceding the interview (Column 5). The sample also includes same-sex couples with the household head or her partner not working, i.e. with zero hours worked. Couples with individuals usually working more than 99h/week have been excluded in Columns 1 and 4. Male and female same-sex couples have been considered jointly. Same standard errors, state trends, individual and state controls as Table 1. Source: ACS 2008-2016. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 3: Opposite-sex couples: placebo test and triple difference. Both partners working.**

	Difference-in-difference	Triple difference
	Opposite-sex couples	Same-sex and opposite-sex couples
	(1)	(2)
SSM legal	0.0010 (0.0008)	
SSM legal * Same-sex		0.0153** (0.0062)
Year FE	✓	
State FE	✓	
State FE * Year FE		✓
State FE * Same-sex		✓
Year FE * Same-sex		✓
State trends	✓	
Individual controls	✓	✓
State controls	✓	
Observations	4,823,933	4,881,847
Number of clusters	51	51
Average dep var	0.576	0.577
Adjusted R <sup>2</sup>	0.083	0.084

This table analyzes whether same-sex and opposite-sex couples were more likely to have both partners working after the legalization of same-sex marriage. Column 1 reports the estimates from the difference-in-difference model for opposite-sex (married or unmarried) couples only. Column 2 reports the estimates from the triple-difference model comparing same-sex and opposite-sex couples between states and over time. Same standard errors, state trends, individual and state controls as Table 1. Source: ACS 2008-2016. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 4: Roommates and married couples. Both partners working.**

	Same-sex couples and roommates		Same-sex couples
	(1)	(2)	(3)
SSM legal	0.024*** (0.008)	0.018** (0.007)	0.035** (0.014)
Roommate		-0.021*** (0.006)	
SSM legal * Roommate		0.013 (0.009)	
Married			-0.054*** (0.009)
SSM legal * Married			0.024** (0.009)
Year FE	✓	✓	✓
State FE	✓	✓	✓
State trends	✓	✓	✓
Individual controls	✓	✓	✓
State controls	✓	✓	✓
Observations	79,524	79,524	35,991
Number of clusters	51	51	51
Average dep var	0.682	0.682	0.662
Adjusted R <sup>2</sup>	0.083	0.083	0.107

This table analyzes whether same-sex couples were more likely to have both partners working after the legalization of same-sex marriage. The sample in Columns 1-2 includes same-sex married couples, unmarried couples, and roommates aged 30-60 (Source: ACS 2008-2016). Since the U.S. Census started allowing same-sex couples to classified themselves as married only from 2012, Column 3 have been estimated using the ACS 2012-2016. Same standard errors, state trends, individual and state controls as Table 1. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 5: Effect of SSM legalization on fertility.**

	Male same-sex couples				Female same-sex couples			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	NChild	Child	NChild	Child	NChild	Child	NChild	Child
SSM legal	0.002 (0.019)	0.002 (0.009)	-0.005 (0.020)	-0.002 (0.009)	-0.011 (0.019)	-0.000 (0.010)	-0.003 (0.021)	0.003 (0.012)
SSM legal (Lag 1)			-0.021 (0.013)	-0.009 (0.008)			0.021 (0.018)	0.007 (0.010)
SSM legal (Lag 2)			-0.012 (0.015)	-0.008 (0.008)			0.017 (0.020)	0.007 (0.012)
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
State trends	✓	✓	✓	✓	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓	✓	✓	✓
Observations	28,047	28,118	28,047	28,118	29,701	29,796	29,701	29,796
Number of clusters	51	51	51	51	51	51	51	51
Average dep var	0.215	0.125	0.215	0.125	0.456	0.281	0.456	0.281
Adjusted R <sup>2</sup>	0.053	0.055	0.053	0.055	0.080	0.087	0.080	0.087

The dependent variables are: number of children in the households (odd-numbered columns), and whether there is a child living in the household (even-numbered columns). A child is defined as any household member whose relationship with the household head is “child”, “adopted child”, “stepchild”, or “foster child”. These two dependent variables do not include individuals related to the household head but living outside the household. Households with more than 4 children (top 1%) have not been considered in odd-numbered columns. Male and female same-sex couples have been considered separately. Same standard errors, state trends, individual and state controls as Table 1. Source: ACS 2008-2016. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 6: Effect of same-sex laws on probability both partners working.**

	Male and female same-sex couples				
	(1)	(2)	(3)	(4)	(5)
SSM legal	0.024*** (0.008)	0.024*** (0.008)	0.024*** (0.008)	0.025*** (0.008)	0.023*** (0.008)
SSM ban		-0.068*** (0.015)	-0.071*** (0.015)	-0.064*** (0.015)	-0.087*** (0.018)
Domestic partnership			0.069*** (0.024)	0.071*** (0.025)	0.073*** (0.025)
Civil union			0.007 (0.017)	0.011 (0.018)	0.012 (0.018)
No discrimination				0.186*** (0.057)	0.180*** (0.059)
No discrimination public employees				0.026 (0.022)	0.035 (0.022)
Second-parent adoption					0.270*** (0.094)
No adoption by same-sex couples					-0.063 (0.043)
Year FE	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
State trends	✓	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓
Observations	57,914	57,914	57,914	57,914	57,914
Number of clusters	51	51	51	51	51
Average dep var	0.664	0.664	0.664	0.664	0.664
Adjusted R <sup>2</sup>	0.102	0.102	0.102	0.102	0.102

This table analyzes whether same-sex couples were more likely to have both partners working after the introduction of laws concerning same-sex individuals. A second-parent adoption is a legal procedure that allows a same-sex parent to adopt her partner's biological or adoptive child without terminating the legal rights of the first parent. Same standard errors, state trends, individual and state controls as Table 1. Source: ACS 2008-2016.  
 \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 7: Effect of SSM legalization on Google searches for *Leviticus*.**

	Web search intensity ( <i>Leviticus</i> )					Both Work
	(1)	(2)	(3)	(4)	(5)	(6)
SSM legal	-1.974** (0.809)	-1.969** (0.796)	-1.365* (0.761)	-1.323* (0.769)	-1.150 (1.130)	0.022*** (0.006)
SSM legal (Lag 1)			-1.143 (0.834)	-0.636 (0.809)	-0.438 (0.967)	
SSM legal (Lag 2)			-3.974*** (0.907)	-2.483** (1.074)	-1.827 (1.199)	
Homophobia						-0.011*** (0.004)
Year FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓	✓
Policy controls	✓	✓	✓	✓	✓	✓
LGBT searches		✓	✓	✓	✓	
Individual controls						✓
Linear state trends				✓	✓	✓
Quadratic state trends					✓	✓
Observations	663	663	663	663	663	83,447
Number of clusters	51	51	51	51	51	51
Average dep var	20.87	20.87	20.87	20.87	20.87	0.655
Within R <sup>2</sup>	0.606	0.606	0.620	0.729	0.761	
Overall R <sup>2</sup>	0.069	0.062	0.060	0.129	0.138	0.101

Columns 1-5 analyze whether state-specific search intensities on Google for the word *Leviticus* changed after the legalization of same-sex marriage. LGBT searches measures the intensity of Google searches on LGBT topics. Source: Google Trends 2004-2016 (Google data are available from 2004 onwards). Column 6 analyzes how homophobia was related to the probability that both partners in a same-sex couple were working. Homophobia has been measured by combining through principal component analysis state-specific search intensities on Google for the words *Leviticus*, *Sodomy*, and *Faggot*. Source: ACS and Google Trends 2004-2016. Same standard errors, state trends, individual, state and policy controls as Table 6. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 8: Effect of SSM legalization on occupation.**

	Male and female same-sex couples				
	Share women > 0.5			Share women	Self-Empl
	Head and Partner	Head	Employed		
	(1)	(2)	(3)	(4)	(5)
SSM legal	-0.014** (0.006)	-0.019** (0.009)	-0.012* (0.007)	-0.006* (0.003)	-0.019*** (0.006)
Year FE	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
State trends	✓	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓
Observations	106,230	54,124	92,135	106,230	56,633
Number of clusters	51	51	51	51	51
Average dep var	0.530	0.504	0.526	0.534	0.175
Adjusted R <sup>2</sup>	0.010	0.009	0.009	0.011	0.035

The dependent variables are: whether respondent worked in an occupation in which more than 50% of employees were women (Columns 1-3), the share of employees within respondent's occupation who were women (Column 4), whether the household head or her partner were self-employed (Column 5). In order to have a substantial amount of observations within each occupation, the shares of women within each occupation have been computed using the 5% sample of the 2000 Census. This dataset predates any law change regarding same-sex marriage. In line with the main empirical analysis, only respondents aged between 18 and 65 and who had worked in the 5 years preceding the interview have been considered when computing these shares. Same standard errors, state trends, individual and state controls as Table 1. Individual controls in Columns 1,3,4 also include whether the individual was identified as the household head or her partner. Individuals without any work experience in the 5 years preceding the interview or who had never worked have been excluded in Columns 1-4. Source: ACS 2008-2016. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Appendix

### A.1 Lead and lag operators

It is possible to add lag operators to test whether SSM legalization had long-term effects. However, since ACS data are available until 2016 and many states legalized SSM only in 2015, the lag effects after two or three years would be identified only through a subset of states. Moreover, the 2016 presidential election may have increased biased towards women and minorities in certain states. Despite these concerns,  $SSM_{st}$  remains statistically significant when including both  $SSM_{st+1}$  and  $SSM_{st-1}$  (Column 4). Its magnitude is similar to the estimates in Table 1.  $SSM_{st+1}$  remains statistically insignificant.  $SSM_{st-1}$  is negative and slightly significant, but it becomes insignificant and with magnitude close to zero when excluding the recent election year (Column 5). Similar results are obtained when including the 2000-2007 waves (Column 6).

**Table A1: Effect of SSM legalization on probability of being employed. Leads and lags.**

	Male and female same-sex couples						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SSM legal		0.024*** (0.008)	0.024** (0.010)	0.023*** (0.008)	0.027*** (0.009)	0.020*** (0.007)	
SSM legal (Lead 1)	-0.006 (0.006)	-0.006 (0.006)	-0.003 (0.006)	-0.012 (0.007)	-0.012 (0.008)	-0.004 (0.007)	
SSM legal (Lead 2)			-0.011 (0.010)				
SSM legal (Lead 3)			0.011 (0.011)				
SSM legal (Lag 1)				-0.013* (0.007)	-0.001 (0.007)	-0.004 (0.006)	
# years SSM legal							0.015** (0.006)
Year FE	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓
State trends	✓	✓	✓	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓	✓	✓
Observations	57,914	57,914	57,914	57,914	49,869	84,237	57,914
Number of clusters	51	51	51	51	51	51	51
Average dep var	0.664	0.664	0.664	0.664	0.663	0.651	0.664
Adjusted R <sup>2</sup>	0.102	0.102	0.102	0.102	0.100	0.096	0.102
Initial year ACS	2008	2008	2008	2008	2008	2000	2008
Final year ACS	2016	2016	2016	2016	2015	2015	2016

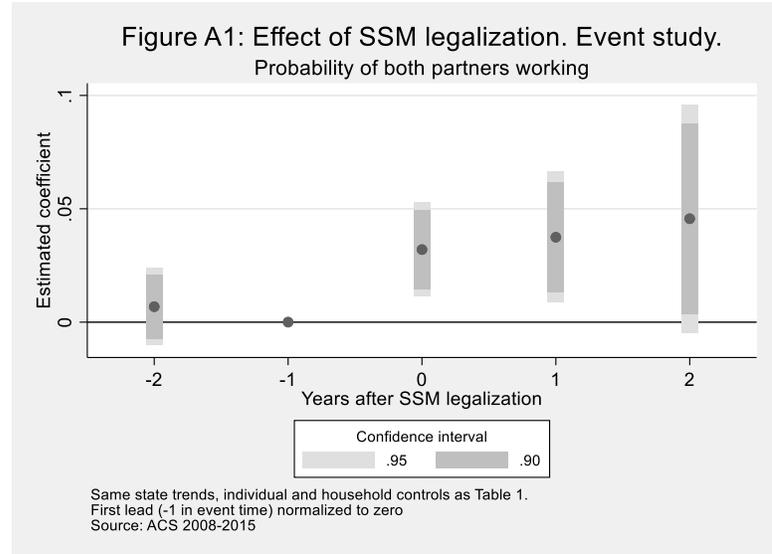
Male and female same-sex couples have been considered jointly. The key independent variable in Column 7 measures the number of years SSM has been legal in respondent's state. Same standard errors, state trends, individual and state controls as Table 1. Source: ACS 2008-2016. The sample size has been modified in Column 5 (ACS 2008-2015) and Column 6 (ACS 2000-2015).  
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### A.2 Event study

An alternative formulation of the event study discussed in Section 6.1 is the following:

$$y_{ist} = \sum_{k=\underline{T}}^{\bar{T}} \beta_k SSM_{st}^k + \delta_s + \alpha_t + \tau_{ts} + \tau_{ts}^2 + x'_{st}\gamma_1 + x'_{ist}\gamma_2 + \varepsilon_{ist}$$

where  $SSM_{st}^0$  is an indicator variable equal to one if state  $s$  had introduced SSM at time  $t$ , zero otherwise (even in the years after the legalization, unlike  $SSM_{st}$  in Table 1).  $SSM_{st}^k$  are the resulting lead ( $k > 0$ ) and lag ( $k < 0$ ) operators. Figure A1 plots the estimates for the above specification with endpoint  $\bar{T} = 2$  and  $\underline{T} = -2$ .  $SSM_{st}^1$  is equal to one if state  $s$  had legalized SSM one year before time  $t$ ,  $SSM_{st}^2$  is equal to one if state  $s$  had legalized SSM two or more years before time  $t$ , while  $SSM_{st}^{-2}$  is equal to one if state  $s$  was not going to legalize SSM in the following year. As already mentioned, since the majority of states legalized SSM between 2014 and 2015 and LGBT rights were negatively affected by the 2016 Elections and the following announcements and decisions by President Trump, Vice-President Pence and Secretary of Education DeVos, only data until 2015 have been considered. Since all states ended up legalizing SSM by 2015, the first lead ( $SSM_{st}^{-1}$ ) is omitted to avoid perfect multicollinearity.



The coefficient of  $SSM_{st}^0$  is positive, statistically significant, and with magnitude close to the estimates in Table 1. The lag operators  $SSM_{st}^1$  and  $SSM_{st}^2$  are also positive and statistically significant, while  $SSM_{st}^{-2}$  is statistically insignificant. Section D.2 in the Online Appendix reports the estimated coefficients for Figure A1 and alternative specifications with different time periods or additional leads and lags. However, it is worth emphasizing that these additional lag operators are identified only through legal changes in a limited number of states.

An important caveat discussed in Kahn-Lang and Lang (2018) is that the statistically insignificant coefficients of the lead operators in Table A1 and Figure A1 do not imply acceptance of the null hypothesis of parallel pre-trends, nor they can confirm that trends would have been parallel in the post-period in absence of the treatment. Nevertheless, as reported in Sections D.1-2 in the Online Appendix, it is reassuring that results in Table 1 are robust to the exclusion of linear and quadratic state-specific trends ( $\tau_{ts}$  and  $\tau_{ts}^2$ ). The same conclusions are reached when including linear time trends specific to states won by Democrats (2000 Elections). Furthermore, even if a logit or a probit model could better represent counterfactual trends than a linear model, the estimated marginal effects from both models are almost identical to the coefficients in Table 1. Finally, it is possible to reject the null hypothesis of

different pre-trends when examining not only short-term pre-trends, but also long-term ones.

### A.3 Migration

SSM legalization did not increase the probability that a same-sex couple moved between states (Columns 1-2 Table A2). In line with this result, the proportion of same-sex couples whose household head was born in the same state in which they lived at the time of the survey did not change significantly after the introduction of marriage equality (Columns 3-4). Similarly, Stephens-Davidowitz (2013) found low migration rates from less tolerant states using data from Facebook. Furthermore, the estimated impact of SSM reported in Table 1 is robust to the exclusion of same-sex couples who had migrated from a different U.S. state in the year preceding the interview (Column 5).

**Table A2: SSM legalization, migration from a different state, and employment.**

	Male and female same-sex couples				
	Moved		Birth = residency		Both working
	(1)	(2)	(3)	(4)	(5)
SSM legal	-0.002 (0.003)	-0.003 (0.002)	-0.008 (0.007)	-0.007 (0.008)	0.026*** (0.009)
SSM legal (Lag 2)		-0.004 (0.004)		0.004 (0.012)	
Year FE	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
State trends	✓	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓
Observations	57,914	57,914	57,914	57,914	56,257
Number of clusters	51	51	51	51	51
Average dep var	0.029	0.029	0.432	0.432	0.666
Adjusted R <sup>2</sup>	0.016	0.016	0.123	0.123	0.103

The dependent variables are: whether the household head lived in a different U.S. state one year before the interview (Columns 1-2); whether the household head lived in the same state in which she was born (Columns 3-4), and whether both the household head and her partner were employed in the week preceding the interview (Columns 5). Couples that had migrated from a different U.S. state in the year preceding the interview have been excluded in Column 5. The dependent variable in Columns 1-2 is equal to zero if the household head lived in the same house in the previous year, or if she moved within the same state, or from a different country. Conclusions do not change if this dependent variable is set to one for households who lived abroad one year before the interview (not reported in table). Same standard errors, state trends, individual and state controls as Table 1. Source: ACS 2008-2016. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### A.4 Demographic composition and bounds

As shown in columns 1-5 in Table A3, there is no evidence that SSM legalization led to significant changes in the probability that a (married or unmarried) couple was reported as same-sex or opposite-sex, nor that it affected the composition of same-sex couples within each state in terms of race, ethnicity, language or age (Columns 1-5).<sup>31</sup> However, it seems that more individuals without tertiary education decided to be open about their sexuality following the introduction of marriage equality (Column 6).

<sup>31</sup> Similarly, controlling for the proportion of same-sex couples in the state does not change the estimates in Table 1.

If anything, this change should have led to a downward bias in the estimates in Table 1 since education is positively related with employment: 87% of the household heads in same-sex couples with at least a Bachelor’s degree were employed at the time of the survey, 76% among those without tertiary education.

Given these variations in education and employment, one way to construct bounds for the impact of SSM legalization is to restrict the sample only to individuals with a certain educational level, thus limiting compositional changes by construction. Couples in which both partners had at least a Bachelor’s degree were 2.2 percentage points more likely to be employed following SSM legalization. The same coefficient goes up to 2.4 percentage points when examining couples in which only one partner had at least a Bachelor’s degree, while the upper bound is 3.1 percentage points among couples without tertiary education.<sup>32</sup>

**Table A3: Effect of SSM legalization on compositional changes.**

	Male and female same-sex couples (household head)					
	Same-sex	Black	Hispanic	Speak English	Age	High Ed
	(1)	(2)	(3)	(4)	(5)	(6)
SSM legal	0.0002 (0.0003)	0.001 (0.004)	-0.005 (0.007)	0.00003 (0.00053)	0.231 (0.197)	-0.018** (0.009)
Year FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
State trends	✓	✓	✓	✓	✓	✓
Individual controls	✓					
State controls	✓	✓	✓	✓	✓	✓
Observations	4,881,847	57,914	57,914	57,914	57,914	57,914
Number of clusters	51	51	51	51	51	51
Average dep var	0.012	0.056	0.103	0.003	45.07	0.526
Adjusted R <sup>2</sup>	0.004	0.029	0.054	0.001	0.011	0.034

The dependent variables are: whether a couple is a same-sex or opposite-sex couple (Column 1), whether the household head was African-American (Column 2), Hispanic (Column 3), whether she did not speak English (Column 4), her age (Column 5), and whether she had at least a Bachelor’s degree (Column 6). Same standard errors, state trends and state controls as Table 1. In contrast with the estimates in Table 1, the specifications in Columns 2-6 do not include individual controls since such factors are used as dependent variables here. Source: ACS 2008-2016. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

### A.5 Difference-in-difference with matching (MDiD)

For simplicity, this section focuses only on a basic difference-in-difference model: it compares over time individuals in states that had legalized SSM before 2015 ( $z_i = 0$ ) with those directly affected by the U.S. Supreme Court decision in 2015 ( $z_i = 1$ ). Following the notation in Villa (2016), the difference-in-difference estimator can be written as:

$$\{E[y_{it}|d_{it=1} = 1, z_i = 1] - E[y_{it}|d_{it=1} = 0, z_i = 0]\} - \{E[y_{it}|d_{it=0} = 0, z_i = 1] - E[y_{it}|d_{it=0} = 0, z_i = 0]\}$$

<sup>32</sup> Estimates reported in Section D.4 in the Online Appendix. Similarly, as reported in Section D.1, the coefficient of SSM legalization remains positive, statistically significant, and with magnitude close to those in Table 1 when examining the probability of both partners working while excluding individual controls ( $x'_{ist}$ ).

where  $d_{it}$  is equal to one only at  $t=1$  (2015) for states directly affected by *Obergefell v. Hodges*. Individuals in treated and control states can then be matched using observable covariates ( $X_i$ ) according to their propensity scores  $p_i = E(z_i = 1|X_i)$ . Such propensity scores are then used to calculate kernel weights (Heckman, et al., 1997) and obtain a propensity-score matching difference-in-difference estimator.

In case of repeated cross-sections as in the ACS, it is necessary to ensure that the treated group can be reproduced in all three control groups (Blundell et al., 2004): individuals in treated states before treatment ( $d_{it=0} = 0, z_i = 1$ ), individuals in non-treated states before treatment ( $d_{it=0} = 0, z_i = 0$ ) and after treatment ( $d_{it=1} = 0, z_i = 0$ ). The propensity-score matching difference-in-difference estimator then includes three different weights:  $w_{it=1}^c$  for observations in the control group in the follow-up period,  $w_{it=0}^t$  for observations in the treatment group at baseline, and  $w_{it=0}^c$  for observations in the control group at baseline.

$$\{E[y_{it}|d_{it=1} = 1, z_i = 1] - w_{it=1}^c E[y_{it}|d_{it=1} = 0, z_i = 0]\} \\ - w_{it=0}^t \{E[y_{it}|d_{it=0} = 0, z_i = 1] - w_{it=0}^c E[y_{it}|d_{it=0} = 0, z_i = 0]\}$$

Each weight is calculated independently. The dependent variable in the propensity score is always equal to one for treated individuals in the follow-up period ( $z_i = 1$ ), zero otherwise. Each of the three control groups are then matched to the treated observations after treatment separately. In order to ensure that each treated observation can be reproduced among the non-treated individuals, a common support can be imposed.

**Table A4: Effect of SSM legalization on probability both partners working. MDiD.**

	Male and female same-sex couples							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SSM legal	0.031** (0.015)	0.035* (0.017)	0.035** (0.017)	0.033* (0.017)	0.035* (0.017)	0.033* (0.017)	0.035* (0.017)	0.035* (0.018)
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓	✓	✓	✓	✓
State controls	✓	✓	✓	✓	✓	✓	✓	✓
Common support		✓		✓	✓	✓	✓	✓
Kernel function		Epan	Epan	Uniform	Epan	Epan	Epan	Epan
PS function		Probit	Probit	Probit	Logit	Probit	Probit	Probit
Bandwidth		0.06	0.06	0.06	0.06	0.07	0.05	0.06
Observations	15,197	15,189	15,197	15,189	15,183	15,189	15,189	15,189
Standard errors	Cluster	Cluster	Cluster	Cluster	Cluster	Cluster	Cluster	Bootstrap
Average dep var	0.663	0.663	0.663	0.663	0.663	0.663	0.663	0.663

Estimates have been computed using the command *diff* in Stata (Villa, 2016). Standard errors in parenthesis clustered at the state level (Columns 1-7) or bootstrapped (500 replications, Column 8). Same individual and state controls as Table 1. Source: ACS 2014-2015. The matching variables ( $X_i$ ) should be determined before the time of the treatment and be time-invariant. Therefore, only demographic and educational individual variables have been used to match observations, while time-varying state variables have been included as additional controls in the difference-in-difference specification, but not in the propensity score. The treatment and control group are balanced at baseline once the covariates are weighted (Section D.4 in the Online Appendix). \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Column 1 in Table A4 reports the estimated coefficient from the simple difference-in-difference model. The estimated impact of SSM legalization is around 3.1 percentage points, thus within the range of the estimates presented in Table 1. When combining difference-in-difference with propensity score matching, the coefficient of SSM legalization is 3.5 percentage points and statistically significant (Column 2). This estimate remains stable across several robustness checks (Columns 3-8).

### A.6 Evidence from SIPP

The following event study has been estimated using the SIPP 2008-2013 panel:

$$y_{ist} = \sum_{k=\underline{T}}^{\bar{T}} \beta_k SSM_{st}^k + \delta_s + \alpha_t + \tau_{ts} + \tau_{ts}^2 + x'_{st}\gamma_1 + x'_{ist}\gamma_2 + \varepsilon_{ist}$$

where  $y_{ist}$  indicates whether respondent  $i$  had a paid job in month  $t$ .  $SSM_{st}^0$  is an indicator variable equal to one if state  $s$  had introduced SSM at time  $t$ , zero otherwise (even in the month after the legalization).  $SSM_{st}^k$  are the resulting lead ( $k > 0$ ) and lag ( $k < 0$ ) operators. The specification includes state and time (month) fixed effects ( $\delta_s$  and  $\alpha_t$ ), state-specific linear and quadratic time trends ( $\tau_{ts} + \tau_{ts}^2$ ), individual controls ( $x'_{ist}$ : individual's age, education, ethnicity, race and language), and state controls ( $x'_{st}$  as in Table 1, aggregated from ACS).

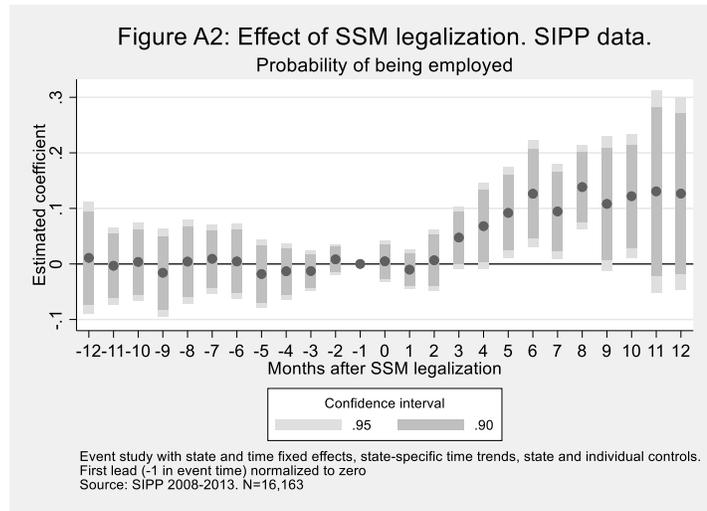


Figure A2 plots the estimated coefficients with endpoint  $\bar{T} = 12$  and  $\underline{T} = -12$ . The relevant sample includes all individuals who were cohabitating as same-sex partners in the baseline interview. Since these individuals were followed over time (up to 64 consecutive months) and have been included in the sample even if they later broke up, this analysis focuses only on the effect of SSM legalization on the *individual* probability of being employed, not the joint probability of both partners working (unlike Table 1). Individuals who have been identified as same-sex partners in follow-up interviews have been included (for all time periods available, even when single). Couples with inconsistent information over time regarding their sex have been excluded.

To give a sense of the economic significance of the estimated coefficients, the sample mean for the dependent variable is 0.84. As reported in Section D.5 in the Online Appendix, similar estimates are obtained even when excluding state controls, varying the number of leads and lags, or excluding individuals living in Massachusetts (the only state that legalized SSM before 2008). One may argue that the increase in employment following SSM legalization may have affected the probability of forming stable relationships among same-sex couples, thus creating a sample selection bias. Nevertheless, the estimates from the event study remain positive also when focusing the analysis on individuals in a same-sex couple at the baseline interview.

## **A.7 Additional sensitivity analysis**

### **A.7.1 Measurement error**

Older respondents in opposite-sex couples were more likely to be misclassified as same-sex couples due to their lower levels of familiarity with the terminology pertaining to same-sex couples (Lewis et al., 2015). Similarly, since the number of married opposite-sex couples is much larger than that of unmarried opposite-sex couples, married same-sex couples are much more likely to be misclassified opposite sex couples than unmarried same-sex couples (O’Connell and Feliz, 2011). Nevertheless, results from Table 1 are robust to restricting the sample to prime age workers or to excluding same-sex married couples from the analysis.

The source of measurement error is well-known in this case: opposite-sex couples misclassified as same-sex couples. Therefore, it is possible to test how sensible are the main estimates of the effect of SSM legalization on the employment outcomes of same-sex to such misclassification by randomly adding some opposite-sex couples to the sample of same-sex couples. As expected given the null impact of SSM legalization on opposite-sex couples (Table 3), the estimated coefficient of SSM gets smaller and smaller as the misclassification error increases. Nevertheless, it remains positive and statistically significant up to plausible levels of misclassifications.<sup>33</sup>

### **A.7.2 Heterogeneities**

There is some evidence that the gains from SSM legalization were higher among more marginalized groups. The positive impact of SSM legalization on employment was higher among lesbian couples without a Bachelor’s degree, or with medium-low household income, or living in Republican states. Black gay couples particularly benefited from SSM legalization. This result is consistent with the idea of intersectionality and multiple discrimination (Brewer et al. 2002): being part of more than one minority group can have further negative effects in the labor market, so a lower discrimination against sexual minorities following SSM legalization could have benefited racial minorities the most.

The estimated impact of SSM legalization on employment is instead qualitatively similar between couples in urban and rural areas. The estimates on work intensity (Columns 1-4 Table 2) are qualitatively similar when examining gays and lesbian couples separately, although not always significant when focusing on male same-sex couples only. The estimates for labor force participation (Column 5 Table 2) are instead positive and significant for both gays and lesbians. For the sake of completeness, it is also possible to investigate whether the effect of SSM legalization was different in states that legalized SSM following a state or federal court decision than in states that directly changed their state statute. The interaction term between SSM legalization and how the law was introduced (state/federal court decision vs. state statute) is always close to zero and statistically insignificant.<sup>34</sup>

### **A.7.3 Other tests**

The results in Table 1 are not driven by changes in only one state. Indeed, the estimated impact of SSM legalization remains positive and statistically significant even when excluding one state at a time. This

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<sup>33</sup> All estimates from this section are reported in Section D.6 in the Online Appendix.

<sup>34</sup> All estimates from this section are reported in Section D.7 in the Online Appendix or available upon request.

is particularly reassuring since several findings published in top economic journals have been found to be extremely sensible to outliers (Young, 2017).

The stability of the estimated coefficient of SSM legalization in case of omitted variables can be tested by following Oster (2017). The key assumption is that the bias due to unobservable components is correlated with the observable controls. This is plausible since unobserved attitudes and social norms are likely to be correlated with the included state-level controls. Since this method is based on changes in the  $R^2$ , it is reasonable to focus on a continuous outcome: total hours worked weekly by the household (Table 2 Column 1). Oster's method and suggested calibration implies that the unobservables would need to be 5.2 times as important as the observables to produce a zero treatment effect of SSM, well above the heuristic threshold of 1.<sup>35</sup>

## **A.8 Other potential mechanisms**

### **A.8.1 Marriage premium**

Marriage is usually associated with an earning premium for heterosexual male workers. This may be due to increased productivity following intra-household specialization or behavioral changes (e.g., higher reliability and loyalty), employer discrimination in favor of married men, or positive selection into marriage. The magnitude and the mechanisms behind such marriage premium have been extensively debated in the literature (see for instance Antonovics and Town, 2004).<sup>36</sup>

Table A5 reports the difference-in-difference estimates of the effect of SSM legalization on earnings among male same-sex couples (Column 1), female same-sex couples (Column 2), and all same-sex couples jointly (Column 3). The coefficients are positive in all specifications. The coefficient for women is not precisely estimated, while the one for men implies an increase of 2.8%.<sup>37</sup> Such an increase in earnings may have incentivized individuals to work more, thus supporting the results regarding employment in Tables 1 and 2. However, recent empirical estimates of labor supply elasticities following changes in wages are rather small (Martinez et al., 2018). Moreover, estimates from the triple-difference model are not statistically significant.

### **A.8.2 Savings and assortative matching**

Married individuals may have decided to start working more to save money and build a family later on. For instance, same-sex couples may have decided to save more in order to buy a house. This hypothesis is not supported in a difference-in-difference model by the estimated null (or even negative) impact of SSM legalization on homeownership rates.

SSM legalization may have also changed the composition and matching patterns among gays and lesbians, thus leading individuals with a higher propensity to work to match with similar partners. Indeed, marriage laws may have affected the quality of couple matches (Stevenson, 2007): being able

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<sup>35</sup> Estimates from this section are reported in Section D.8 or available upon request.

<sup>36</sup> According to the U.S. Equal Employment Opportunity Commission, pre-employment inquiries regarding marital status *may* be seen as evidence of intent to discriminate, especially if asked only to certain groups (e.g. female applicants). However, employers can legally ask questions on marital status once a job offer has been made and accepted. This is often done for insurance purposes.

<sup>37</sup> Section G.1 in the Online Appendix provides summary statistics on earning. Similar results are obtained once wages are adjusted for inflation, or if part-time workers are excluded from the sample (to disentangle marriage premium from part-time penalty).

to marry implied that it was more difficult to exit from a relationship, thus individuals may have been reluctant to risk on a high-variance match. On the other hand, marriage equality increased the benefits of entering into a relationship, which may have led individuals to become less selective. In both cases, legalizing SSM may have influenced match quality, which may have in turn affected labor market decisions. For this reason, all specifications in Tables 1-2 control for respondents' and their partners' age and education. Furthermore, there is no evidence that SSM legalization led to higher positive assortative matches among same-sex couples.<sup>38</sup>

### **A.8.3 Health and productivity**

A more tolerant environment may have improved mental health among LGBT members, thus increasing productivity and indirectly leading to higher employment and earning levels. In fact, SSM legalization may have reduced the so-called “minority stress” due to internalized homophobia, anticipated rejection, hiding of sexual identity, and actual experiences of discrimination and violence. There is evidence of a relation between harassment, minority stress and health outcomes in the LGBT community (Mays and Cochran, 2001; Hatzenbuehler, et al., 2009). Reductions in sexually-transmitted diseases (syphilis) after SSM legalization have been found by Dee (2008) and Francis et al. (2012). Several researchers have also documented improvements in mental health following SSM legalization (Hatzenbuehler et al., 2012; Kail et al., 2015; and Flores et al., 2018), but it is not possible to test with the available data whether increased mental health actually led to higher productivity and better labor market outcomes.

### **A.8.4 Tax and health insurance**

There are two additional reasons which may have explained a negative impact of SSM legalization. First, SSM may have led to an expansion of health insurance coverage among same-sex partners. Therefore, spouses who gained access to health insurance through their partners were no longer obliged to have a job in order to be covered by insurance. However, such access to health insurance depended not only on federal and state regulations, but also on case-by-case decisions by single employers and insurance companies.<sup>39</sup> Therefore, given the resulting uncertainty, it is understandable that individuals in same-sex relationships did not overwhelmingly stop working just because they could potentially access their partners' health insurance.

Second, SSM legalization affected how same-sex married couples were taxed. Federal agencies, states and employers often link employee benefits to marital status (Badgett, 2001), and there are strong connections between tax regulations and marital status (GAO, 2004). However, federal tax laws were not enforced until the U.S. Supreme Court decision in 2013, and numerous studies have found only small effects of taxation on male labor supply (Keane, 2011). Overall, given the “marriage penalty” in the U.S. tax system (Widiss, 2016), or the negative income participation elasticity (Isaac, 2018), any tax variation might have attenuated the positive impacts estimated in Tables 1-2. This explanation is thus in contrast with the larger effect found following the U.S. Supreme Court decision in 2015 (Table 1). Such a tax mechanism should have led to a smaller impact of SSM legalization on employment

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<sup>38</sup> Estimates from this section are reported in Sections G.2-3 in the Online Appendix. A triple difference model comparing homeownership among same-sex and opposite-sex couples in the same state over time also provides insignificant estimates.

<sup>39</sup> Section G.4 in the Online Appendix provides a detailed description of the legislative framework.

while focusing the 2014-2016 period (Column 5), when married same-sex couples were taxed jointly by the U.S. government, than while analyzing the 2008-2016 period (Column 3).

**Table A5: Effect of SSM legalization on hourly earnings (in logs).**

	Same-sex couples		
	(1) Male	(2) Female	(3) Male and female
SSM legal	0.028** (0.014)	0.006 (0.010)	0.014 (0.010)
Year FE	✓	✓	✓
State FE	✓	✓	✓
State trends	✓	✓	✓
Individual controls	✓	✓	✓
State controls	✓	✓	✓
Observations	40,757	44,983	85,740
Number of clusters	51	51	51
Average dep var	3.16	3.00	3.08
Adjusted R <sup>2</sup>	0.267	0.302	0.286

Only individuals with positive earnings have been considered. Earnings above 99<sup>th</sup> percentile and below 1<sup>st</sup> percentile have been excluded. Self-employed individuals and individuals usually working more than 99h/week have been excluded. Same standard errors, state trends, individual and state controls as Table 1. Source: ACS 2008-2016. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$