Spousal Visa Policy and Mixed-Citizenship Couples: Evidence from the End of the Defense Of Marriage Act

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Without spousal visas, failed visa renewal can dissolve couples and marriage can invalidate visas for some non-citizens. In 2013, same-sex couples gained access to spousal visas. I measure the change in the number of mixed-citizenship same-sex couples after 2013, net of changes in the number of same-citizenship same-sex couples and mixed-citizenship different-sex couples. I find the number of mixed-citizenship same-sex couples increases 36%; and when restricted to married couples, I find it increases 79%. Thus, spousal visas enable many mixed-citizenship couples to form and marry, resulting in more couples disassortatively matched by citizenship and birth country.

JEL: J12, J15, J18

Keywords: Assortative Mating, Marriage Incentives, Spousal Visa Policy, Same-Sex Couples

Policy can impact partner choice. One federal marriage policy, spousal visas, grants permanent residency (Green Card) and an expedited path to citizenship for the non-citizen spouse of a citizen. Absent this policy, marrying a citizen is quasi-illegal[1] for non-permanent residents and failed visa renewal can dissolve *mixed-citizenship* couples—where one partner is a citizen and the other is a non-citizen. Therefore, spousal visas reduce barriers to mixed-citizenship couple formation and equip mixed-citizenship couples with a tool to preserve their union in the face of visa uncertainty. This paper studies the effect of access to spousal visas on couple formation and marriage, in the United States.

Measuring how spousal visas affect couple formation and assortative mating is difficult because it requires policy variation. Meaningful policy change regarding spousal visas has not occurred for half a century, when social norms regarding couple formation were substantively different and data sparser. Recently, however, the federal government expanded its definition of spouse and, by extension, expanded access to federal marriage benefits. This followed the Supreme Court decision in *United States v. Windsor*, which ended the Defense Of Marriage Act (DOMA). I exploit this police change to understand how access to marriage benefits affected same-sex couple formation.

Passed in 1996, DOMA forbade the federal government from recognizing the marriages of same-sex couples. Hence, same-sex couples could not access spousal visas. Most non-permanent residents must switch to a spousal visa

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[1]Marriage is performed at a local level, so any couple who meets state and local requirements can get married. However, marrying a citizen shows an intent to remain in the country, which violates non-immigrant visa rules. Violating federal immigration policy can result in denied visa renewal, deportation, and disqualification from future entry.

upon marrying a citizen because marrying a citizen shows an intent to stay in the United States permanently, which violates most non-permanent visas. Therefore, non-permanent residents were effectively barred from same-sex marriage. However, when DOMA was struck down in 2013, the federal government immediately recognized same-sex marriages and granted married same-sex couples all federal marriage benefits, including spousal visas. Consistent with access to spousal visas increasing couple formation, the number of mixed-citizenship same-sex couples recorded in the American Community Survey (ACS) doubles from 2012 to 2017 (shown in Figure 1a), a larger proportional increase than same-citizenship same-sex couples.

This paper analyzes the 2008 to 2019 rounds of the ACS, repeated cross-sections that sample 1% of the United States population each year. The ACS designates a "head-of-household" and lists her or his relationship to every other household member. Possible relationships include "spouse" and "unmarried romantic partner". Therefore, same-sex couples are identifiable, but not the sexual orientation of non-coupled individuals.

To account for unobserved same-sex attracted singles, I use a count model for the analysis. I create state-by-year counts for the number of individuals in four types of couples: mixed-citizenship same-sex, same-citizenship same-sex, mixed-citizenship different-sex, and same-citizenship different-sex. The effect of access to spousal visas is the difference between the change over time in number of people in mixed-citizenship same-sex couples and the changes over time in the number of people in same-citizenship same-sex couples, minus the difference between the change over time in number of people in mixed-citizenship different-sex couples and the changes over time in the number of people in same-citizenship different-sex couples. I use a

difference-in-differences-in-differences (DDD) design to identify this effect; and I find an effect of 36%, statistically significant at the 1% level. Instead of using the year a household is surveyed, I estimate a similar specification using the year a couple is married. I find an effect of 79% conditional on marriage, which jumps up in 2013 and persists. This suggests visa policy absent spousal visas is hostile to mixed-citizenship couples; and spousal visas enable mixed-citizenship couples to both form and marry.

Spousal visas are not the only federal marriage benefit. Marriage can increase the value of and access to federal transfer benefits, such as SNAP, the EITC, Social Security, and Medicaid. Likewise, many health insurance plans cover spouses but not unmarried partners, so health insurance is another incentive to marry. To address concerns that federal transfer benefits or health insurance are driving the results, I use a similar empirical framework. I find no evidence of changes in the number of same-sex couples accessing federal transfer benefits or health insurance.

Another concern is that the estimated effect could be driven by a change in how existing same-sex couples report their relationship: that is, couples reported themselves as roommates in the past to avoid stigma and increasingly report their true couple status. However, I find no evidence of same-sex roommates relabeling themselves as couples.

In sum, I exploit exogenous variation in access to federal marriage benefits for same-sex couples. The results show that marriage policy impacts couple formation and, specifically, that federal marriage benefits increase disassortative mating by citizenship status and by birth country. This contributes new evidence to the literatures on: the rationale for and benefits of marriage (Becker, 1991; Weiss, 1997; Stevenson and Wolfers, 2007; Ed-

lund, 2013; Lafortune and Low, 2020), government policy and marriage rates (Bitler et al., 2004; Francesconi and Klaauw, 2007; Klerman, 2009; Bobonis, 2011; Abramowitz, 2016), expanding access to marriage (Fryer Jr, 2007; Gevrek, 2014; Carpenter et al., 2018), immigration and marriage (Kelly, 2010; Lafortune, 2013; Adserà and Ferrer, 2015; Kawaguchi and Lee, 2017; Dziadula, 2020), and the determinants of assortative mating (Abramitzky, Delavande and Vasconcelos, 2011; Mansour and McKinnish, 2014; Chiappori, Salanié and Weiss, 2017). In particular, I measure how spousal visa policy, an understudied incentive for and benefit of marriage, increases the number of couples. These results are consistent with individuals wanting to form couples and to marry but prevented from doing so until 2013. This implies that ending DOMA improved the welfare of individuals who formed new couples or new marriages and, more broadly, that spousal visa policy improves the welfare of mixed-citizenship couples. Lastly, this paper also contributes to a growing literature on same-sex couples and LBGTQ+ individuals (see Badgett, Carpenter and Sansone (2021) for a review). Specifically, in the context of same-sex couples, this is the first paper to study the effects of access to federal marriage benefits in the United States and to consider assortative mating by citizenship and birth country.

The paper is organized as follows: Section I covers the institutional background of marriage, same-sex marriage, and the policy change; Section II explains the data set and reports summary statistics; Section III explains the research design and estimation; Section IV reports and discusses the results; and Section V concludes.

I. Background

A. *Marriage and its Benefits*

Marriage is a public commitment made by two partners. The commitment was once enforceable with strong social norms and a strong legal contract. However, current couples may live together and procreate without ostracization or shame and with laws stating unwed, absentee fathers must pay child-support (Lundberg and Pollak, 2007). Laws regarding dividing assets upon divorce, alimony, child-custody, and medical visitation rights form the legal *marriage contract* and are state-level laws. States determine marriage eligibility (unless overruled by federal court) and the strength of the marriage contract.

Marriage is also a category for government taxes and transfers. "Single/never married" and "Married" are classifications that affect federal and state tax rates and transfers, usually because the incomes of unmarried couples are considered on an individual basis while the incomes of married couples are considered together preferentially. Although a committed couple may live together, opting into or out of marriage could lower or raise their taxes and affect their eligibility for transfer programs. Transfer programs include Medicaid, Supplemental Nutrition Assistance Program (SNAP or foodstamps), the Earned Income Tax Credit (EITC), Supplemental Security Insurance (SSI) and any other means tested program. Social Security benefits can also depend on marriage because benefits can pass on to the surviving spouse. Thus, while states determine the marriage contract, both state and federal governments offer benefits that depend on marital status.

Unlike states, the federal government determines eligibility for immigra-

tion and citizenship. Non-citizen spouses and fiancé(e)s of citizens are eligible for: i. a temporary visa to enter or remain in the United States while applying for a permanent visa (and, for fiancé(e)s, to get married); ii. a visa for permanent residency (Green Card), conditional upon remaining married for two years; iii. United States citizenship after three years of permanent residency and marriage to the US citizen[2]. This is an important benefit for mixed-citizenship couples because it meaningfully increases the match surplus of a mixed-citizenship match, since Green Cards and citizenship are valuable for US residents. The other benefits (or penalties) of marriage primarily operate through uncombined versus combined incomes for tax and transfer purposes which, unlike citizenship status, can adjust within couples in addition to across couples. That is, a mixed-citizenship match mechanically generates surplus that does not exist for same-citizenship matches, however, match surplus from taxes and transfers can be optimized within any couple by adjusting each partner's earnings.

B. Legality of Same-Sex Marriage

Attitudes towards same-sex attracted individuals and the legality of same-sex marriage changed considerably in the past few decades, especially during the period of this paper's analysis. Same-sex sexual and romantic attraction was considered a mental disorder by the American Psychological Association until 1973 (Bayer, 1987), and same-sex sexual activity was illegal in the United States until the Supreme Court overturned the remaining "anti-sodomy" laws in *Lawrence v. Texas* in 2003. Moreover, some states offered

[2]Green Card holders may apply for US citizenship after 5 years; however, the spouses of US citizens may do so after 3 years with a Green Card.

marriage benefits to same-sex couples[3], while other states banned same-sex marriage, which blocked access to the legal marriage contract and state-level marriage benefits. In 2004, Massachusetts legalized same-sex marriage for its residents; and California followed suit in 2008, including for non-residents. This spurred a rush in same-sex marriages (visible in Figure 1b), with couples traveling from all over the country and world to get married in California[4]. In response, Massachusetts began offering same-sex marriage to non-residents in July 2008. With states offering marriage to non-residents, same-sex couples all over the country could access the marriage contract. Same-sex couples residing in states recognizing same-sex marriage could access state-level marriage benefits[5].

The Defense of Marriage Act (DOMA) banned federal recognition of same-sex marriage in 1996. So as same-sex couples gained access to the marriage contract in 2008 and access to state-level marriage benefits (depending on their state of residence), same-sex couples could not access federal marriage benefits. On June 26, 2013 the Supreme Court ruled in *United States v. Windsor*. The Supreme Court struck down the section of DOMA that prevented the federal government from recognizing same-sex marriages, essentially nullifying the entire act. Thus, in one day, the federal government ended a nearly two-decade policy of ignoring marriages of same-sex couples

[3]In 1997, Hawai'i offered same-sex couples some marriage benefits with "limited beneficiary partnerships"; in 2000, Vermont offered full (state-level) marriage benefits with "civil unions".

[4]After a referendum (Proposition 8) in November 2008, same-sex marriage became illegal again in California, although all legally performed marriages remained lawful. California re-legalized same-sex marriage in 2013.

[5]Couples that traveled to get married would get the marriage contract but not necessarily state-level marriage benefits. For example, a same-sex couple from Ohio that married in Massachusetts was not married for Ohio tax and transfer purposes; upon divorce however, the couple must divide their marital assets according to Massachusetts law (a typical divorce).

and immediately gave full federal marriage benefits to married same-sex couples. With federal marriage benefits available to same-sex married couples, the Green Cards for same-sex spouses came in late 2013 and the naturalizations of same-sex spouses began in 2017. Two years later in 2015, the Supreme Court ruled in *Obergefell v. Hodges* that same-sex marriage is legal in all states, requiring the remaining states to immediately legalize, perform, and recognize same-sex marriage as they would different-sex marriage.

This paper uses the variation in access to federal marriage benefits for same-sex couples induced by the end of DOMA. (This paper does not use variation in state-level access to the marriage contract or marriage benefits.) This change in federal marriage policy, moreover, was quasi-exogenously ordered after years of litigation and a close decision—made in a branch of government separate from those that grant the benefits or by elected officials. This change happens in the midst of same-sex couples gaining access to state-level marriage benefits, which occurs between 1997 and 2015[6]; and importantly, it happens after same-sex couples gain access to the marriage contract in 2008.

C.   Immigrant and Non-Immigrant Visas

Immigrant visas (Green Cards) grant holders permanent residence in the United States, whereas non-immigrant visas are for temporary travel for those with permanent residence abroad. Non-immigrant visas are issued for temporary visits based on, for example, temporary work, study, tourism, medical treatment, or business (United States Customs and Border Protection, 2018). Since non-immigrant visas are for temporary stays in the United

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[6]See Table A10 for when each state legalized same-sex marriage, the method of legalization, and prior marriage-like state-level benefits.

States, non-immigrant visa holders must not show an intent to stay in the country. A student visa holder, for example, should not work an unauthorized job off-campus and a temporary work visa holder should not seek any long-term employment. Importantly, if a non-immigrant visa holder marries a United States permanent resident or citizen, then that shows an intent to stay in the United States. Therefore, upon marriage, non-immigrant visas holders must switch to the spousal visa to remain in the United States.

However, a non-citizen who marries a citizen with the sole intent to obtain residency or citizenship, commits immigration fraud—risking deportation, jail time, and denaturalization (Smith and Elmilady, 2014). Immigration officers decide if marriages are *bona fide*, that is, if couples are married for immigration purposes. Couples should hire a lawyer to assist help with extensive the application and interview process that determines if their marriage meets immigration standards[7] (Chetrit, 2011).

For same-sex couples, spousal visas were not available prior to 2013, so if a non-immigrant visa holder married a citizen, then it would show an intent to stay without the ability to obtain a spousal visa. Therefore, the non-immigrant visa terms are violated and no other visa is possible (nor an unlawful presence waiver). Hence, non-immigrant visa holders were strongly discouraged from marrying same-sex partners prior to 2013. After *United States v. Windsor*, non-citizens could marry a same-sex partner and expect to obtain immigrant status. However, same-sex couples face greater challenges[8] in proving *bona fide* marriage to an immigration officer (Carron,

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[7]Immigration officials may check social media, quiz partners' knowledge of each other, and inspect shared living space. Failure to perform immigration policy's normative marriage can result in decades of legal marriage and denied spousal visas.

[8]For example: a public relationship status requires public disclosure of sexual orientation (which is potentially quite costly); filing taxes jointly was not possible in all states; and same-sex couples have larger age differences.

2014). Therefore, I do not believe the results are driven by marriage fraud.

II.   Data

A.   American Community Survey

I use repeated cross-sections of survey data from the 2008-2019 rounds of the US Census Bureau's American Community Survey (ACS), accessed via IPUMS (Steven Ruggles et al., 2020). The ACS continuously surveys new households throughout the year; the ACS surveys households once and collects information on demographics, household composition, health insurance, and other topics. Annually, each ACS samples 1% of US households, hence the sample size is much larger than other surveys. The ACS is the largest, most detailed data set that identifies same-sex couples in the US.

Each household in the ACS designates one individual as the "head-of-household" (typically an owner/renter of the property), all other members of the household are then given a "relationship to head", for example: spouse, unmarried romantic partner, parent, sibling, child, tenant, roommate, etc. This paper restricts the sample to heads-of-household and their spouse or unmarried romantic partner, so every individual in the sample is: i. cohabiting and ii. either the head-of-household, the spouse of the head-of-household, or the unmarried romantic partner of the head-of-household. Couples are "same-sex" (SS) couples if they are both female or both male, and couples are "different-sex" (DS) couples if one is female and the other male. Married couples who do not live together and couples that live together but neither partner is the head-of-household are not identifiable in the sample and are therefore excluded from study. Likewise, the sexual and romantic preferences of single individuals are not identifiable because they do not have a

partner, so they are not included in the sample. The sample is further restricted to individuals aged 18 or older and 64 or younger, regardless of their partner's age.

2008 is the starting year for the analysis because there were data issues inflating the number of male same-sex couples in the ACS prior to 2008[9]. To further address concerns about data quality, individuals with imputed sex, imputed relationship to household head, and imputed citizenship are dropped from the sample.

For analyses that consider married couples only, the I restrict data to the 2012-2019 surveys because prior to 2013, same-sex married couples were recoded as unmarried romantic partners and only in 2012 is there a data quality flag that explicitly identifies the recoded couples. Furthermore, when considering married couples only, I order them by marriage year. Marriage year may extend arbitrarily far into the past; however, I keep couples married between 2008 and 2019 to match the years in the main analysis. Note that this selects on marriage duration: couples in the pre-period are married for 0-12 years and couples in the post-period are married for 0-6 years[10]. Unlike a cross-section that captures the stock of couples, marriage year indicates when couples form—at least, when they form a legal union. Thus ordering couples by marriage year informs us of a flow into marriage.

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[9]Coding errors for "sex" were imputed as male until 2008, when improved coding practices were implemented—see Chesnut (2008) for a details regarding survey methodology. Switching the sex for a small portion of individuals (in DS couples) would result in a large change in the estimated number of SS couples—see O'Connell et al. (2010) for a discussion of the change in same-sex couple estimates between the 2007 and 2008 ACSs.

[10]For example: a couple married in 2008 is in the pre-period, but they could be in the 2012 or 2019 surveys, hence married for 4 or 12 years. A newlywed couple, married in the same year as the survey, is married for 0 years. Since 2019 is the last survey year, all couples married in 2019 are newlyweds.

B.   Summary Statistics

Table 1 reports weighted[11] individual-level summary statistics for mixed-citizenship same-sex couples (MSS), same-citizenship (not mixed) same-sex couples (NSS), mixed-citizen different-sex couples (MDS), and same-citizenship different-sex couples (NDS), pooled across survey years 2008-2019. Although there are no surprising differences between mixed-citizenship couples and same-citizenship couples, it is worth noting that MSS couples are more likely to be married (0.53 compared to 0.33), more likely to be male (0.66 to 0.47), and less likely to have transfer benefits (0.13 to 0.20) than NSS couples. While MSS couples are slightly less likely to have any health insurance than NSS couples (0.91 to 0.95), MSS couples are much more likely than MDS couples to have any health insurance (0.91 to 0.84). These summary statistics do not suggest federal transfer benefits or access to health insurance drive change in mixed-citizenship or same-sex coupling patterns.

C.   Couple Counts

To identify the policy's effect on changes in mixed-citizenship same-sex coupling net of changes in other mixed-citizenship coupling and other same-sex coupling, I employ a triple difference regression design. This design is not defined on the individual level in this context because individuals' preferences over partner sex and partner citizenship are unobserved. Therefore, I aggregate the data from individuals up to state×years.

I create four groups of couples (MSS, NSS, MDS, NDS) and assign each

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[11]For each survey year, the weights make the sampled individuals representative of the population in that year.

(weighted) individual to one group. Then to create counts, I sum over individuals within group×state×years. The individual weights make the sample representative of each group's population in a given state and survey year.

I could divide the counts by a state×year's subpopulation of interest[12] to create proportions. The ideal denominator is the number of individuals who would enter a couple type based on their sexual orientation; however, sexual orientation of singles is unobserved. Other denominators cannot account for singles becoming couples, whereas a count model can implicitly control for singles. The log-linear relationship of a count model means a well-behaved denominator drops out of the equation.

Suppose within each state, the population with same-sex attraction and different-sex attraction is constant across years[13] and take this number as given. Then with a log-linear model, an increase in a group's subpopulation is also interpretable as an increase in the coupling rate for the subpopulation whose preferences align with that group. For example, an increase in mixed-citizenship same-sex couples is also interpretable as an increase in the proportion of same-sex attracted individuals in a mixed-citizenship same-sex couple.

Lastly, these groups are the Cartesian product of a treatment status (same-sex coupled) and a treatment channel or intensity (mixed-citizenship coupled). For robustness checks I will use other treatment channels. Specifically, I base the groups on treatment status (same-sex coupled) and another couple-level binary variable Z. To understand transfer benefits, Z is an indicator for receipt of a federal transfer benefit. To understand health in-

[12]For example, number of: couples, same-sex or different-sex couples, or adults.
[13]Or suppose for all states, these subpopulations change each year in the same way.

surance, Z is an indicator for a health insurance type. And to understand naturalization, Z is an indicator for a naturalization type.

Figure 1a shows the number (weighted count) of individuals in each couple type on a logarithmic scale, from the 2008 survey until the 2019 survey. Notably, the number of individuals in different-sex relationships (both mixed- and same-citizenship) remains stable, while the number of individuals in same-sex relationships increases, with the number of individuals in mixed-citizenship same-sex relationships tripling from 2012 to 2017.

Figure 1b shows the weighted count of married individuals in each couple type, for the 2019 survey, plotted by their year of marriage (2006-2018). While the number of married DS couples remains relatively stable, the number of married SS couples increases substantially. The number of individuals in same-citizenship same-sex marriages increases by a factor of 10; and the number of individuals in mixed-citizenship same-sex marriages also increases by a factor of 10, with most of the change occurring in 2013. Notably, there is a large bump in same-citizenship same-sex marriages in 2008, this is because California legalized same-sex marriage and couples rushed from all over the country to marry. In 2013, several states (including California) (re-)legalize same-sex marriage and the federal government begins recognizing same-sex marriages, there is a large increase in the number of same-sex married individuals, particularly for those in mixed-citizenship marriages. For a timeline of when states legalize same-sex marriage, see Table A10.

III.   Method

I employ a difference-in-differences-in-differences (DDD) design and estimate a Conditional Fixed Effects Poisson regression model of Hausman, Hall and Griliches (1984) by Quasi-Maximum Likelihood to identify the effect of access to spousal visas on assortative mating, as follows:

$$(1) \quad E[y_{gst}|\mathbf{x}_{gst}] = \exp(\beta_0 + \beta_1 post_t + \beta_2 M_g \times post_t + \beta_3 SS_g \times post_t$$
$$+ \beta_4 M_g \times SS_g \times post_t + \sigma_{gs} + \tau_t).$$

Where y_{gst} is the number of individuals in group g, in state s, in year t; M_g is an indicator variable for mixed-citizenship; SS_g is an indicator variable for same-sex; $post_t$ is an indicator variable for the post-period, when married same-sex couples can access spousal visas; σ_{gs} are group×state fixed effects; τ_t are year fixed effects; t are survey years or marriage years. β_4 is the coefficient of interest: $\exp(\beta_4)-1$ represents the percent change in the incidence of mixed-citizenship same-sex coupled individuals relative to same-citizenship same-sex coupled individuals and net of the change in mixed-citizenship different-sex coupled individuals relative to same-citizenship different-sex coupled individuals. $\exp(\beta_4) - 1$ also represents the percent change in the incidence rate of mixed-citizenship coupling for same-sex attracted individuals relative to the change in the incidence rate of mixed-citizenship coupling for different-sex attracted individuals.

Thus the log-linear relationship bestows $\exp(\beta_4)$ an interpretation as the incidence rate ratio of mixed-citizenship coupling in same-sex attracted individuals relative to different-sex attracted individuals, despite unobserved preferences of singles. Furthermore, counts fit naturally with a log-linear

model. I use a Generalized Linear Model with a logarithmic link, also called a Poisson Model, instead of a typical linear model[14] because there are many state×years with no same-sex couples. The typical linear model would drop these observations, whereas the Poisson model keeps the zeros. Therefore, to capture the increases in same-sex couples without restricting the sample to a few large states, I use a Poisson Model.

The conditional fixed effects Poisson model partials out the fixed effects, so σ_{gs} and τ_t are not estimated. Similarly, indicator variables M_g and SS_g are not included in Equation (1) because they are subsumed by σ_{gs}.

The model is estimated using quasi-maximum likelihood; therefore, estimates are consistent assuming the mean of the dependent variable is correctly specified (Gourieroux, Monfort and Trognon, 1984). That is, Quasi-Maximum Likelihood Estimation (QMLE) for Poisson regression does not assume the mean and variance are equal[15]. Instead, Quasi-MLE computes the variance/covariance matrix using the outer product of the gradient vector. These QMLE robust standard errors do not assume a Poisson distribution, are robust to arbitrary patterns of serial correlation (Wooldridge, 1999) and are, therefore, not subject to the problems of Bertrand, Duflo and Mullainathan (2004) regarding difference-in-differences inference. I cluster the standard errors at the states×group level in all specifications.

For the difference-in-differences-in-differences design to isolate the effect, the groups must have parallel pre-trends. Dynamic estimates, furthermore, provide insight into how the effects evolve over time. Therefore, I estimate

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[14]A generalized linear model with a logarithmic link has the logarithm on the outside of the expectation: $\log E[Y] = \alpha + \beta X$. Whereas a typical linear model has the logarithm on the inside of the expectation: $E[\log Y] = \alpha + \beta X$.

[15]The Poisson probability distribution has the property of equal mean and variance and the generic MLE Poisson regression assumes this.

the following:

(2)

$$E[y_{gst}|\mathbf{x}_{gst}] = \exp(\alpha + \sum_{k=2008}^{2019} \delta_k M_g \times 1\{t = k\}_t + \sum_{k=2008}^{2019} \gamma_k SS_g \times 1\{t = k\}_t$$

$$+ \sum_{k=2008}^{2019} \beta_k M_g \times SS_g \times 1\{t = k\}_t + \sigma_{gs} + \tau_t),$$

where β_{2012}, γ_{2012}, δ_{2012}, τ_{2012} are omitted, then test that

(3) $$\beta_{2008} = \beta_{2009} = \beta_{2010} = \beta_{2011} = \beta_{2012} = 0.$$

For Poisson regression, the pre-trends test yields a χ^2-statistic instead of an F-statistic. The χ^2-statistics and p-values are reported in the regression tables. For additional specifications, I adjust the parallel pre-trends test as appropriate and report the test statistics and p-values.

A.   Marriage Specification

I estimate equation 1 for couples married between 2008 and 2019 and surveyed between 2012 and 2019. (As mentioned above, there is selection into this sample by marriage duration.) However, instead of Survey Year, t represents Marriage Year.

Ordering couples by their marriage year (omitting unmarried couples) instead of the survey year is useful for two reasons. The first is a simple robustness test: the response should only come in the post-period. That is, couples surveyed after the policy change who report being married before the policy change should not appear treated. The second reason is more subtle: the survey year estimates are for annual cross-sections of the *stock*

of couples. The marriage year estimates capture annual entry into marriage, hence are akin to a *flow*. The dynamic estimates from the marriage specification, therefore, tell us whether the relative flow into mixed-citizen same-sex couples is temporary or persistent, which is important for understanding the policy.

B.   Additional Specifications

I estimate additional specifications with the same sample and with the same temporal ordering Survey Years as the main specification, described in equation 1. I do so to: i. address concerns related to federal transfer benefits and health insurance, ii. measure downstream effects on assortative mating and naturalization, and iii. explore how the sample composition changes over time. Instead of mixed-citizenship and same-citizenship (M_g) dividing the sample, another variable ($Attribute_g$) divides the sample. So the four groups are: same-sex couples with the attribute, same-sex couples without it, different-sex couples with the attribute, and different-sex couples without it. The attribute is participation in a federal transfer program (Table A1), having health insurance (Table A2), possibly naturalizing through marriage (Table A7), or having certain household characteristics (Tables A6 and A4). I also estimate a specification to check for roommates relabeling as couples (Table A3)[16]. Conceptually, these specifications to measure the policy effect on the relative incidence of other outcomes of interest. If these relative incidences are significant, it implies they could explain some of the main results or that they are somewhat explained by the main results.

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[16]The sample drawn from households with two adults who are "single/never married", where one adult is the "head-of-household" and the other is related to the head-of-household as "roommate". This is the only difference with the main specification.

IV.   Results & Discussion

A.   Main Results

Table 2 reports the Poisson Conditional Fixed Effects maximum likelihood estimates for the difference-in-differences-in-differences effect of federal marriage benefits on the number of mixed-citizenship same-sex coupled individuals, described in Equation (1). The coefficient of interest is for $post \times$ Same-Sex Couple $\times$ Mixed-Citizenship Couple, given in the first row of Table 2. The first column reports the estimates for all cohabiting individuals (married and unmarried), where year refers to the year an individual is surveyed. The second column reports the estimates for cohabiting married individuals, where year refers to a couple's year of marriage. The statistic and p-value, described by Equations (2) and (3), for a parallel pre-trends test is also reported at the bottom of the table. Finally, Figure 2 plots the dynamic estimates, described by Equation (2).

This paper's primary effect of interest is in the first column of Table 2. The increase in mixed-citizenship same-sex coupled individuals is 0.309 log points. The Exponentiated coefficient is the relative incidence rate ratio, a quantity interpretable as a percent change. The relative incidence rate ratio is 1.363 with a standard error of 0.080. Thus the relative incidence rate ratio represents a 36.3% increase in the relative incidence of mixed-citizenship same-sex couples, statistically significant at the 1% level. The χ^2-statistic for parallel pre-trends is 5.274, which fails to reject the assumption of parallel pre-trends. Figure 2a shows the pre-period estimates do not appear to have statistically or economically significant pre-trends.

Since the Column 1 estimates use total counts at a given point in time

(calendar years), they represent changes in a stock. Hence, the relative stock of mixed-citizenship same-sex couples is 36% higher in the post period than the pre period. The dynamic estimates show steady increases in the relative number of these couples each year, consistent with spousal visa access causing a permanent change in couple formation (or dissolution); as opposed to mixed-citizenship same-sex couples merely waiting until after the policy change to get married or move in together. If couples were just waiting, then the yearly estimates should increase temporarily while the couples move in together before leveling off.

Column 2 shows the increase in mixed-citizenship same-sex married individuals is 0.583 log points. The relative incidence rate ratio is 1.791 with a standard error of 0.339. Thus the relative incidence rate ratio represents a 79.1% increase in married mixed-citizenship same-sex couples, statistically significant at the 5% level. The χ^2 statistic for parallel pre-trends is 1.246, which fails to reject the assumption of parallel pre-trends. Figure 2b plots the dynamic estimates. The 2008 estimate is off-trend because of the disproportionate number of same-citizenship same-sex marriages that occurred when California legalized same-sex marriage that summer. After 2012, the estimates shift up to a higher level.

Since the Column 2 estimates use counts for entry into marriage at a given time, marriage year, they represent a flow into marriage[17]. So the relative entry into mixed-citizenship same-sex married couples is 79% higher in the post period than the pre period. Dynamic estimates show a permanent increase in the relative number of these couples marrying each year—except for 2015 when same-sex marriage was legalized for all states. These esti-

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[17]Conditional on marriage duration as described in section II.

mates are consistent with access to spousal visas permanently increasing mixed-citizenship marriage, as opposed to mixed-citizenship same-sex couples merely waiting until after the policy change to get married. If couples were just waiting, then the relative yearly entry to marriage should increase temporarily while couples marry, then fall back down to earlier relative levels.

This result moreover, quantifies the fact that mixed-citizenship same-sex couples were discouraged from marrying under DOMA. And confirms that spousal visas are an important incentive for marriage—or conversely that current immigration policy, absent spousal visas, is an important disincentive for marriage. Absent spousal visas, there are greater potential hurdles for mixed-citizenship couples. Mixed-citizenship couples where the noncitizen partner does not have a Green Card cannot get married without risking deportation; and for all mixed-citizenship couples there is the persistent threat of denied visa renewal. For example, if for every non-spousal visa there is non-zero probability of non-renewal, then every mixed-citizenship couple will eventually dissolve—even with infinitely lived partners. Hence, possibly the greatest benefit of a spousal visa is to avoid dissolution caused by a denied visa renewal. The additional benefits of a spousal visa, a guaranteed Green Card and faster path to citizenship, might not create as much surplus as that which is destroyed absent a spousal visa policy.

B.   Robustness Checks

Federal Transfer Benefits and Health Insurance

Access to federal marriage benefits increases the number of mixed-citizenship couples; however, there are federal marriage benefits beyond spousal visas.

Similarly, health insurance is a large benefit associated with marriage. The summary statistics in Table 1 do not show meaningful differences in federal transfer receipt or health insurance between groups. Nevertheless, I estimate specifications to test for increases in same-sex couples accessing federal transfer benefits (Table A1) and health insurance (Table A2). Same-sex couples receiving any transfer falls 1.2%, same-sex couples with any health insurance increases 12.1%, and both estimates are statistically insignificant. Thus transfer benefits and health insurance are not driving the increase in mixed-citizenship couples.

An important conceptual difference, furthermore, is that couples can make joint labor market decisions that will immediately influence their transfer benefit or health insurance eligibility. So a change in the relative incidence of couples with these benefits does not necessarily imply a change in couple formation. Unlike a change in the relative incidence of mixed-citizenship couples, because changing a partner's citizenship is a long-term process.

Same-Sex Roommates

Stigma against same-sex couples fosters clandestine relationships. If these "closeted" couples hide their relationships by self-identifying themselves as roommates in the survey then, as stigma declines, there could be more same-sex couples honestly self-identifying as couples in the survey. If mixed-citizenship couples disproportionately self-identify as roommates in the pre-period and a couples in the post-period, then that could drive part of the result. This is not the case, however. The number of mixed-citizenship same-sex roommates (seen in Figure A1) would need to fall dramatically to account for the rise of mixed-citizenship same-sex couples (seen in Fig-

ure 1a). Furthermore, I estimate equation (1) where the sample is composed of two-roommate households (Table A3). I find the number of mixed-citizenship same-sex roommates is trending upwards, which is inconsistent with relabeling relationships from roommate to partner/spouse.

OTHER ROBUSTNESS CHECKS

Another concern is a changing sample composition because, as same-sex marriage legalized across states and attitudes towards same-sex couples changed, the composition of same-sex couples grew to include less privileged individuals (for example, by income or education). I examine changes in other household attributes using the same strategy as for federal transfer benefits and health insurance. Similarly, the estimates are far smaller in magnitude than the main results, suggesting they are not the driving cause. For example, I find the relative incidence of same-sex couples with household income above their state median decreases by 11.4% (Table A4). While a changing composition could explain part of the results, the opposite is also true: enabling mixed-citizenship couples to form and marry could disproportionately help disadvantaged couples. This is plausible since, for different-sex couples, mixed-citizenship couples tend to be disadvantaged (as seen by the summary statistics in Table 1.)

C. Downstream Effects

DISASSORTATIVENESS

By enabling mixed-citizenship couples to form and marry, spousal visa policy increases disassortative mating by citizenship status. I examine the downstream effect on other measures of disassortativeness (Table A6); and I

find increased relative incidence disassortativeness by birth country, a 10.8% increase significant at the 5% level. However, changes in other measures of disassortativeness (race, student/non-student, education, age) are smaller in magnitude and statistically insignificant or reject parallel pre-trends. Statistical insignificance aside, the 7.0% increase in the relative incidence of interracial couples is consistent with spousal visa policy increasing within-couple diversity; and the 4.8% decrease in the relative incidence of student/non-student couples is consistent with switching from student visas to spousal visas, which is required upon marriage.

Naturalization

A Green Card is a non-immigrant visa granting permanent residence and, after five years, the option to apply for United States citizenship. A spousal visa, however, is a Green Card that permits its holders to apply for citizenship after three years. Given processing times for visas and citizenship (United States Citizenship and Immigration Services), I expect an increase in naturalizations for certain same-sex married individuals in 2017[18]. Specifically, naturalizations should increase for individuals who married a citizen three or more years ago (and whose partner was a citizen during those three years). I estimate a naturalization specification where years are years of naturalization, groups are determined by same-sex/different-sex couples and whether naturalization could possibly occur through a spousal visa or not, and the post-period is 2017-2019. However, I interpret the results with caution because the large increase in mixed-citizenship same-sex cou-

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[18]The change should occur in 2017 instead of 2016 because processing times for Green Cards and citizenship are upwards of 5 months (United States Citizenship and Immigration Services) and the policy change occurred in the summer of 2013.

ple marriages beginning in 2013 mean naturalizations possibly resulting from spousal visas (as I define them) should mechanically increase in 2016.

Looking at raw data for individuals in same-sex couples in 2019 (Figure A2), naturalizations not from spousal visas are constant over time while naturalizations possibly from spousal visas begin increasing prior to 2017. This is consistent with same-sex coupled individuals on track to naturalization entering a same-sex marriage as legalization rolls out across states. Similarly, I estimate a 324.9% increase in the relative incidence of naturalizations possibly from a spousal visa (Table A7); this is consistent with both increased naturalizations from spousal visas and increased entry into same-sex marriage for those who later naturalize. Finally, dynamic estimates (Figure A3) show the increase occurs in 2017 not 2016, which is consistent with both increased naturalizations from spousal visas and increased entry into same-sex marriage for those who naturalize beginning in 2014 rather than 2013. Despite its ambiguity, the results indicate that the naturalized subpopulation also

D.   Heterogeneity

HETEROGENEITY BY SEX

To understand if there is heterogeneity by sex, I estimate equation (1) separately for women and men. Recall that the summary statistics in Table 1 show mixed-citizenship same-sex couples are disproportionately male. So we might expect differences, if at least due to sample sizes. To increase power I combine years such that $t \in \{2008, 2009/2010, 2011/2012, 2013/2014, 2015/2016, 2017/2018, 2019\}$. For women, the estimated effect is 21.3%, significant at the 5% level; for men, the estimated effect is 45.9%, significant at the 1% level (Table A8).

The estimates are statistically different at the 10% level but not at the 5% level[19]; and both specifications fail to reject parallel pre-trends. Therefore, it's not clear if there is heterogeneity by sex. Assuming heterogeneity, I speculate geographic sorting could explain it. Women in same-sex couples tend to live in lower-density areas than men in same-sex couples (Black, Sanders and Taylor, 2007); if non-citizens (seeking same-sex partners) tend to live in higher-density areas, then it could explain why mixed-citizenship same-sex couples are disproportionately male and why the effect is larger for men.

Heterogeneity by State

States legalized[20] same-sex marriage for non-residents from 2008-2015. So while same-sex couples could get married since 2008, until 2015 getting married required either: waiting to do it at home or traveling to another state. Ease of access to marriage could temper the effect of the policy change, so I estimate equation (1) separately for early legalizing states and late legalizing states[21]. For Early Legalizers the estimated effect is 26.4% and for Late Legalizers the estimated effect is 68.6%, both are statistically significant at the 5% level (Table A9); they are not statistically different from each other and both fail to reject parallel pre-trends.

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[19]Student's t-statistic is given by $(1.459 - 1.213)/\sqrt{0.101^2 + 0.092^2} = 0.246/0.1366 = 1.80$, where $t^*_{\alpha=0.1} = 1.645 < 1.8 < 1.96 = t^*_{\alpha=0.05}$.

[20]California re-legalized same-sex marriage in the summer of 2013. To examine this event's importance, I re-estimate the main specification omitting California and find a similar result: a 35% increase in the relative incidence of mixed-citizenship same-sex couples (Table A5). Hence, California is not driving the results.

[21]Early Legalizers are: Connecticut, District of Columbia, Iowa, Massachusetts, New Hampshire, New York, and Vermont; and Late Legalizers are: Alabama, Georgia, Kentucky, Louisiana, Michigan, Mississippi, Nebraska, North Dakota, Ohio, South Dakota, Tennessee, and Texas.

V. Conclusion

As a diverse nation of immigrants, the United States offers many avenues for immigration, which are also a perennial subject of political debate. Spousal visas are one such avenue, however, it is challenging to measure their impact because spousal visa policy has changed little since the Immigration Reform and Control Act of 1986. I overcome this challenge by leveraging the Supreme Court ruling in *United States v. Windsor* ending DOMA, a quasi-exogenous change ending over a decade of federal ignorance of same-sex marriages and immediately granting same-sex marriages the full federal benefits of marriage. Thus same-sex couples offer the opportunity to study the effects of unchanged federal marriage policy, because they gain access to the policy.

I find marriage policy impacts couple formation and assortative mating. In particular, federal immigration policy is hostile towards mixed-citizenship couples and spousal visas are essentially a stopgap preventing the dissolution of these couples. Same-sex couples were not afforded this benefit, causing their dissolution or preventing their formation until the end of DOMA in 2013. Ending DOMA resulted in an immediate 79% increase in the relative incidence of mixed-citizenship same-sex marriage, and a 36% increase in the relative incidence of mixed-citizenship couples over a seven year period. Back-of-the-envelope calculations suggest spousal visa policy enables a quarter[22] of all mixed-citizenship couples to form—about 1.5 million people. Importantly, the effect is not explained by other federal policies related to marriage (ie transfer benefits), by health insurance, by roommates relabel-

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[22]Taking the estimate in table 2 as the true population effect. The proportion of mixed-citizenship couples benefiting from a spousal visa = 0.36/1.36 = 0.26; and the number of mixed-citizenship coupled individuals = 5729983.

ing, or by aggregate changes in mixed-citizenship couples.

The couples that benefit from spousal visa policy are composed of a citizen and a non-citizen, that is they are disassortatively matched by citizenship status. This leads to a 36% increase in the relative incidence of disassortative mating by citizenship status (to restate the main result), a 10.8% increase in the relative incidence disassortative mating by birth country, and a 7% increase in disassortative mating by race (although this final estimate is statistically insignificant). While immigration may typically facilitate inter-household diversity, spousal visas also increase intra-household diversity by enabling mixed-citizenship couples to form and marry.

Since spousal visas require marriage, spousal visa policy offers some individuals not just a strong incentive to marry but, at times, constrains individuals to marry or leave the country. Visa policy also favors parental and other family relationships, however, it does not help citizen/non-citizen pairs (or groups) of individuals who do not want to marry. Absent greater reform, expanding visa access for other types of relationships (romantic or otherwise) could also generate surplus for citizens and non-citizens alike[23]. Indeed, if citizens had a fixed number of Green Cards to hand out, then the federal government would no longer need to determine if a relationship meets the normative standard of a *bona fide* marriage for immigration purposes.

Individuals with same-sex attraction are not fundamentally different from those with different-sex attraction, however, they face different constraints (Black, Sanders and Taylor, 2007). Biology constrains fertility; social stigma and discrimination shape labor force and education outcomes, family rela-

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[23]If a politician cares only for citizens, then supporting expanded visa policy requires merely that citizens capture most of the match surplus. Grossbard and Vernon (2020) show non-citizen partners do more housework, which could be a possible mechanism to transfer utility.

tions, and immigration outcomes. As a result, only relatively advantaged same-sex sex attracted individuals are observable as couples in the data. Hence, the summary statistics in Table 1 show mixed-citizenship same-sex couples are not as disadvantaged as mixed-citizenship different-sex couples. Therefore, it is unlikely that I estimate the true population effects, however, I quantify the impact of spousal visa policy and show its importance for assortative mating. If spousal visa policy has a greater impact for disadvantaged couples, then I may underestimate the true effect.

REFERENCES

Abramitzky, Ran, Adeline Delavande, and Luis Vasconcelos. 2011. "Marrying Up: The Role of Sex Ratio in Assortative Matching." *American Economic Journal: Applied Economics*, 3(3): 124–157.

Abramowitz, Joelle. 2016. "Saying, "I Don't": The Effect of the Affordable Care Act Young Adult Provision on Marriage." *Journal of Human Resources*, 51(4): 933–960.

Adserà, Alícia, and Ana Ferrer. 2015. "Immigrants and Demography: Marriage, Divorce, and Fertility." In *Handbook of the Economics of International Migration.* Vol. 1 of *Handbook of the Economics of International Migration*, , ed. Barry R. Chiswick and Paul W. Miller, 315–374. North-Holland.

Badgett, M. V. Lee, Christopher S. Carpenter, and Dario Sansone. 2021. "LGBTQ Economics." *Journal of Economic Perspectives*, 35(2): 141–170.

Bayer, Ronald. 1987. *Homosexuality and American Psychiatry: The Politics of Diagnosis.* Princeton University Press.

Becker, Gary S. 1991. *A Treatise on the Family.* Harvard University Press.

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan. 2004. "How Much Should We Trust Differences-In-Differences Estimates?" *The Quarterly Journal of Economics*, 119(1): 249–275.

Bitler, Marianne P., Jonah B. Gelbach, Hilary W. Hoynes, and Madeline Zavodny. 2004. "The impact of welfare reform on marriage and divorce." *Demography*, 41(2): 213–236.

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

Bobonis, Gustavo J. 2011. "The Impact of Conditional Cash Transfers on Marriage and Divorce." *Economic Development and Cultural Change*, 59(2): 281–312. Publisher: The University of Chicago Press.

Carpenter, Christopher, Samuel T Eppink, Jr. Gonzales, Gilbert, and Tara McKay. 2018. "Effects of Access to Legal Same-Sex Marriage on Marriage and Health: Evidence from BRFSS." National Bureau of Economic Research Working Paper 24651. Series: Working Paper Series.

Carron, Anna. 2014. "Marriage-Based Immigration for Same-Sex Couples after DOMA: Lingering Problems of Proof and Predjudice Notes and Comments." *Northwestern University Law Review*, 109(4): 1021–1052.

Chesnut, John. 2008. "Effects of Using a Grid versus a Sequential Form on the ACS Basic Demographic Data." US Census Bureau Decennial Statistical Studies Division.

Chetrit, Samantha L. 2011. "Surviving an Immigration Marriage Fraud Investigation: All You Need is Love, Luck, and Tight Privacy Controls Note." *Brooklyn Law Review*, 77(2): 709–744.

Chiappori, Pierre-André, Bernard Salanié, and Yoram Weiss. 2017. "Partner Choice, Investment in Children, and the Marital College Premium." *American Economic Review*, 107(8): 2109–2167.

Dziadula, Eva. 2020. "Marriage and Citizenship Among U.S. Immigrants: Who Marries Whom and Who Becomes a Citizen?" *Eastern Economic Journal*, 46(1): 34–52.

Edlund, Lena. 2013. "The Role of Paternity Presumption and Custodial Rights for Understanding Marriage Patterns." *Economica*, 80(320): 650–669. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/ecca.12035.

Francesconi, Marco, and Wilbert van der Klaauw. 2007. "The Socioeconomic Consequences of "In-Work" Benefit Reform for British Lone Mothers." *Journal of Human Resources*, XLII(1): 1–31. Publisher: University of Wisconsin Press.

Fryer Jr, Roland G. 2007. "Guess Who's Been Coming to Dinner? Trends in Interracial Marriage over the 20th Century." *Journal of Economic Perspectives*, 21(2): 71–90.

Gevrek, Deniz. 2014. "Interracial Marriage, Migration and Loving." *The Review of Black Political Economy*, 41(1): 25–60.

Gourieroux, C., A. Monfort, and A. Trognon. 1984. "Pseudo Maximum Likelihood Methods: Applications to Poisson Models." *Econometrica*, 52(3): 701–720.

Grossbard, Shoshana Amyra, and Victoria Vernon. 2020. "Do Immigrants Pay a Price When Marrying Natives? Lessons from the US Time Use Survey." *IZA Discussion Paper Series*, , (13340): 50.

Hansen, Mary Eschelbach, Michael E. Martell, and Leanne Roncolato. 2020. "A labor of love: The impact of same-sex marriage on labor supply." *Review of Economics of the Household*, 18(2): 265–283.

Hausman, Jerry, Bronwyn H. Hall, and Zvi Griliches. 1984. "Econometric Models for Count Data with an Application to the Patents-R & D Relationship." *Econometrica*, 52(4): 909–938.

Kawaguchi, Daiji, and Soohyung Lee. 2017. "Brides for Sale: Cross-Border Marriages and Female Immigration." *Economic Inquiry*, 55(2): 633–654. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/ecin.12411.

Kelly, Claudia Smith. 2010. "The Influence of a Change in Immigration Law on US Marriage Rates." *Eastern Economic Journal*, 36(4): 500–522.

Klerman, Jacob Alex. 2009. "Family Structure." In *Welfare Reform Effects of a Decade of Change*. 173–198. Harvard University Press.

Lafortune, Jeanne. 2013. "Making Yourself Attractive: Pre-marital Investments and the Returns to Education in the Marriage Market." *American Economic Journal: Applied Economics*, 5(2): 151–178.

Lafortune, Jeanne, and Corinne Low. 2020. "Collateralized Marriage." National Bureau of Economic Research Working Paper 27210.

Lundberg, Shelly, and Robert A. Pollak. 2007. "The American Family and Family Economics." *Journal of Economic Perspectives*, 21(2): 3–26.

Mansour, Hani, and Terra McKinnish. 2014. "Who Marries Differently Aged Spouses? Ability, Education, Occupation, Earnings, and Appearance." *The Review of Economics and Statistics*, 96(3): 577–580.

National Center for Lesbian Rights. 2018. "Marriage, Domestic Partnerships, and Civil Unions: An overview of relationship recognition for same-sex couples Within the United States." National Center for Lesbian Rights.

O'Connell, Martin, Daphne Lofquist, Tavia Simmons, and Terry Lugaila. 2010. "New Estimates of Same-Sex Couple Households from the American Community Survey." Dallas, Texas.

Smith, Kebharu H., and Suzanne Elmilady. 2014. "Prosecuting Marriage Fraud Conspiracies - Lifting the Veil of Sham Marriage Border Issues." *United States Attorneys' Bulletin*, 62(6): 44–48.

Steven Ruggles, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas, and Matthew Sobek. 2020. "IPUMS USA: Version 10.0 [dataset]." Vol. 2020. Minneapolis, MN:IPUMS.

Stevenson, Betsey, and Justin Wolfers. 2007. "Marriage and Divorce: Changes and their Driving Forces." *Journal of Economic Perspectives*, 21(2): 27–52.

United States Citizenship and Immigration Services. 2020. "Historical National Average Processing Time (in Months) for All USCIS Offices for Select Forms By Fiscal Year."

United States Customs and Border Protection. 2018. "Requirements for Immigrant and Nonimmigrant Visas."

Weiss, Yoram. 1997. "The formation and dissolution of families: Why marry? Who marries whom? And what happens upon divorce." In *Handbook of Population and Family Economics*. Vol. 1A, 81–123. Elsevier.

Wooldridge, Jeffrey M. 1999. "Quasi-Likelihood Methods for Count Data." In *Handbook of Applied Econometrics Volume 2: Microeconomics.* , ed. M. Hashem Pesaran and Peter Schmidt, 321–368. John Wiley & Sons, Ltd.

Table 1—: Individual-Level Summary Statistics

	MSS	NSS	MDS	NDS
	Mixed-Citizenship SS	Same-Citizenship SS	Mixed-Citizenship DS	Same-Citizenship DS
Both Citizens	0.00	0.98	0.00	0.93
	(0.00)	(0.13)	(0.00)	(0.25)
Married	0.53	0.33	0.91	0.88
	(0.50)	(0.47)	(0.29)	(0.32)
Age	40.76	43.27	41.36	44.83
	(10.55)	(11.62)	(10.70)	(11.51)
Male	0.66	0.47	0.50	0.49
	(0.48)	(0.50)	(0.50)	(0.50)
Transfers				
Foodstamps	0.08	0.10	0.13	0.08
	(0.26)	(0.29)	(0.33)	(0.28)
TANF	0.02	0.02	0.02	0.01
	(0.13)	(0.15)	(0.13)	(0.12)
Soc Sec	0.05	0.10	0.05	0.10
	(0.23)	(0.30)	(0.22)	(0.30)
Supp Sec Inc	0.02	0.03	0.02	0.02
	(0.13)	(0.18)	(0.13)	(0.15)
Any Transfer	0.13	0.20	0.18	0.18
	(0.34)	(0.40)	(0.38)	(0.39)
Health Insurance				
Employer Ins	0.77	0.82	0.63	0.78
	(0.42)	(0.39)	(0.48)	(0.42)
Private Ins	0.85	0.89	0.72	0.86
	(0.36)	(0.31)	(0.45)	(0.35)
Public Ins	0.16	0.21	0.20	0.18
	(0.37)	(0.41)	(0.40)	(0.38)
Purchased Ins	0.18	0.18	0.13	0.14
	(0.38)	(0.38)	(0.34)	(0.35)
Any Insurance	0.91	0.95	0.84	0.93
	(0.28)	(0.21)	(0.36)	(0.26)
Observations	8 344	142 703	606 650	11 155 752

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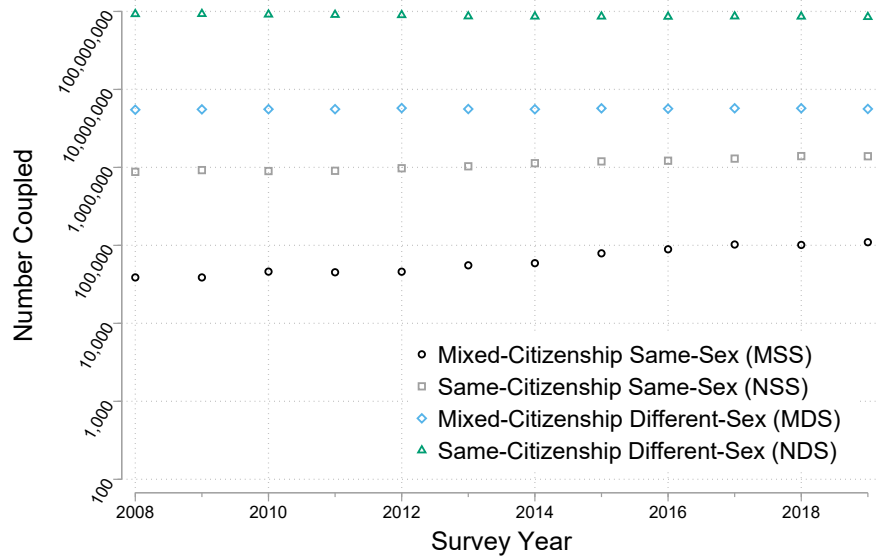
(a) by Survey Year
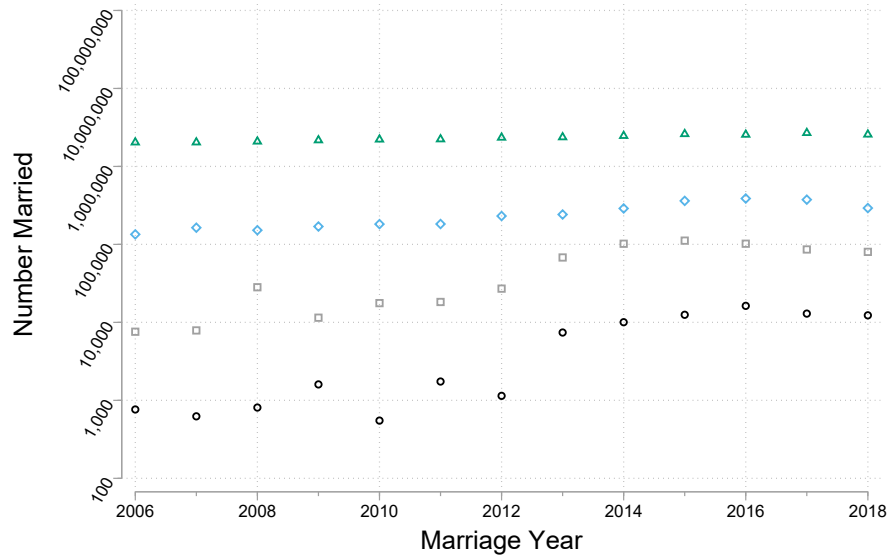
(b) by Marriage Year

Figure 1. : Number of Individuals by Couple Type

Note: Each point is the population estimate for the number of individuals in a given couple type and year. The vertical axes depict the number of individuals, on a logarithmic scale; and the horizontal axes depict years (Survey Year or Marriage Year). The four couple types are determined by the intersection of same- or mixed-sex and same- or mixed-citizenship. For survey years, each point is a population estimate, representing the United States population in a given survey year. For marriage year, each point represents the population married each year conditional on marriage surviving until 2019; and is representative of the 2019 population.

Source: Data are from the 2008 to 2019 rounds of the American Community Survey. Figure 1a uses all year; Firuge 1b uses 2019 only.

Table 2—: DDD Estimates For Coupled and Married Individuals

	Coupled Individuals by Survey Year	Married Individuals by Marriage Year
post×SS×M	0.309	0.583
	(0.059)	(0.189)
post×SS	0.362	1.404
	(0.019)	(0.155)
post×M	0.074	0.144
	(0.016)	(0.017)
post	-0.061	-0.748
	(0.006)	(0.006)
Observations	2448	2404
Log_Likelihood	-670,138	-14,550,000
Relative_IRR	1.363	1.791
Relative_IRR_se	0.080	0.339
IRR_pvalue	0.000	0.019
χ^2 pre-trend test	5.274	1.246
p_value	0.260	0.870

Note: This table reports the Poisson Conditional Fixed Effects estimates for equation (1), where time is either Survey Year or Marriage Year. SS refers to same-sex coupled individuals and M refers to mixed-citizenship coupled individuals. The coefficient of interest is post×SS×M and the Relative IRR (Incidence Rate Ratio) is the exponentiated coefficient of interest. The χ^2 pre-trend test reports the test statistic for the test of parallel pre-trends, described by equation (3). Standard errors in parentheses, clustered at the state×group level.
Source: Data are from the American Community Survey. The first column uses the 2008-2019 rounds; the second column uses the 2012-2019 rounds.
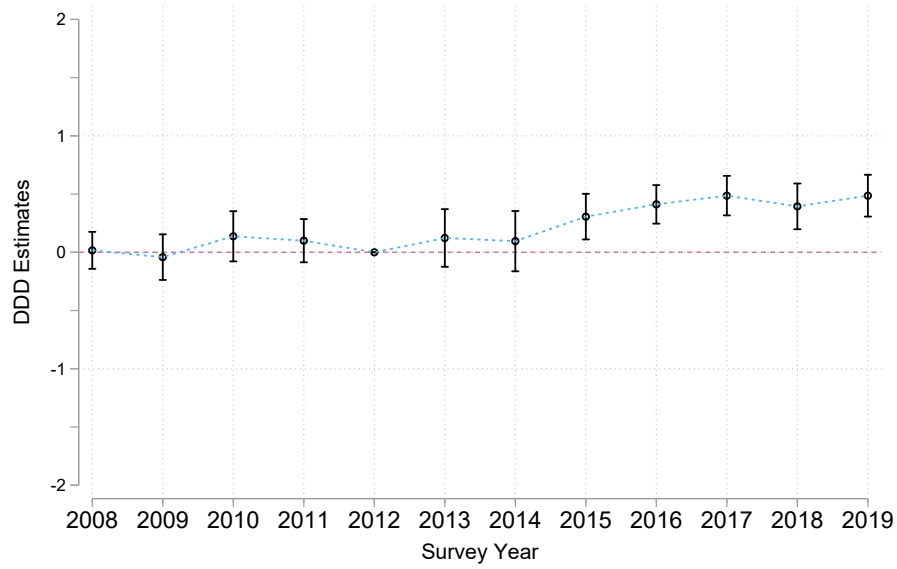
(a) Coupled Individuals by Survey Year
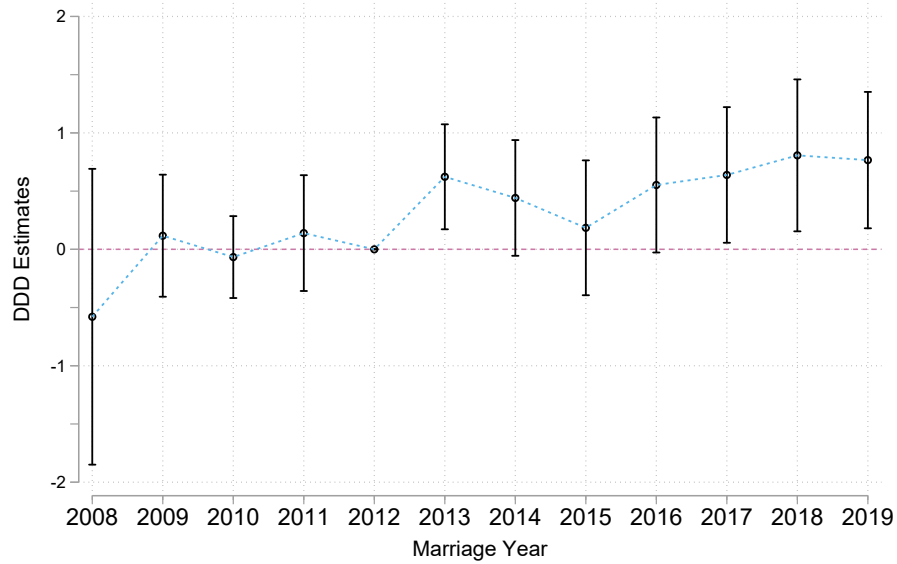
(b) Married Individuals by Marriage Year

Figure 2. : Dynamic DDD Estimates

Note: This figure plots the Poisson Conditional Fixed Effects estimates for equation (2), where time is either Survey Year or Marriage Year. Standard errors are clustered at the state×group level.
Source: Data are from the American Community Survey. The first subfigure uses the 2008-2019 rounds; the second subfigure uses the 2012-2019 rounds.

ONLINE APPENDIX

A1.   Robustness Checks

FEDERAL TRANSFER BENEFITS AND HEALTH INSURANCE

I estimate a model similar to Equation (1), where groups are based on transfer receipt (or health insurance) and same-sex partnership, as follows:

$$E[y_{gst}|\mathbf{x}_{gst}] = \exp(\beta_0 + \beta_1 post_t + \beta_2 transfer_g \times post_t + \beta_3 SS_g \times post_t$$
$$+ \beta_4 transfer_g \times SS_g \times post_t + \sigma_{gs} + \tau_t).$$

Where y_{gst} is the number of individuals in group g, in state s, in year t; $transfer_g$ is an indicator variable for transfer receipt (or health insurance); SS_g is an indicator variable for same-sex couples; $post_t$ is an indicator variable for the post-period, when married same-sex couples can access spousal visas; σ_{gs} are group×state fixed effects; τ_t are year fixed effects; t are survey years. β_4 is the coefficient of interest, representing the increase in the number of same-sex coupled individuals with transfer receipt net of increases in same-sex couples without transfer receipt and net of increases in different-sex couples with transfer receipt.

In Table A1, Column 1 reports estimates for changes in the number of same-sex couples with Food Stamps (or Supplemental Nutrition Assistance Program), Column 2 reports estimates for Welfare (or Temporary Assistance for Needy Families), Column 3 reports estimates for Social Security, Column 4 reports estimates for Supplemental Security Income, and Column 5 reports estimates for changes in the number of same-sex couples participating in any of these federal transfer programs. The estimates range from

-12.9% for Supplemental Security Income to 9.1% for Welfare, where none are statistically significant except for Supplemental Security Income at the 5% level. The χ^2 statistics for parallel pre-trends range from 0.258 for Any Transfer to 2.213 for Welfare, which fail to reject the assumption of parallel pre-trends; except for Supplemental Security Income which has a χ^2 statistic 8.417, rejecting the parallel pre-trends assumption at the 10% level.

The magnitudes of these changes are much smaller than the main result. Therefore, it does not appear these other federal programs drive the increases in mixed-citizenship couples. This is consistent with the summary statistics from Table 1, which do not show large differences in transfer program participation between mixed-citizenship and same-citizenship same-sex couples. Furthermore, it appears same-sex couples couples' participation in these transfer programs is unchanged from before to after the policy change.

In Table A2, Column 1 reports estimates for changes in the number of same-sex couples with employer health insurance, Column 2 reports estimates for private health insurance, Column 3 reports estimates for public health insurance, Column 4 reports estimates for purchased health insurance, and Column 5 reports estimates for changes in the number of same-sex couples with any health insurance. The estimates range from -7.8% for purchased health insurance to 12.1% for any health insurance, where none are statistically significant except for purchased insurance at the 5% level. The χ^2 statistics for parallel pre-trends range from 0.601 for employer health insurance to 5.913 for public health insurance, which all fail to reject the assumption of parallel pre-trends.

As above, the magnitudes of these changes are much smaller than the

main result. Therefore, it does not appear health insurance drives the increase in mixed-citizenship couples. This is consistent with the summary statistics from Table 1, which do not show large differences in health insurance between mixed-citizenship and same-citizenship same-sex couples. Furthermore, apart from less purchased insurance, it appears same-sex couples couples' health insurance types are unchanged from before to after the policy change.

Table A1—: DDD Estimates Where Groups are Based on Transfer Receipt

	Food Stamps	Welfare	Soc Sec	Supp Sec Inc	Any Transfer
post×SS×transfer	-0.062	0.087	0.048	-0.138	-0.012
	(0.050)	(0.067)	(0.036)	(0.065)	(0.033)
post×SS	0.384	0.378	0.374	0.381	0.381
	(0.022)	(0.020)	(0.021)	(0.020)	(0.022)
post×transfer	0.050	-0.181	0.013	0.178	0.024
	(0.029)	(0.025)	(0.009)	(0.015)	(0.014)
post	-0.061	-0.054	-0.058	-0.061	-0.061
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Observations	2448	2448	2448	2448	2448
Log_Likelihood	-2,435,552	-855,344	-724,118	-906,925	-1,930,314
Relative_IRR	0.940	1.091	1.050	0.871	0.988
Relative_IRR_se	0.047	0.073	0.038	0.057	0.032
IRR_pvalue	0.199	0.210	0.194	0.023	0.703
χ^2	1.918	2.213	0.836	8.417	0.258
p_value	0.751	0.697	0.934	0.077	0.992

Note: This table reports estimates for the effect of access to federal marriage benefits for same-sex couples on use of federal transfer benefits of same-sex couples. The benefits are are Food Stamps (SNAP), Welfare (TANF), Social Security, Supplemental Security Income, and Any Transfer (an indicator for any of the previous four). Relative IRR reports the relative incidence rate ratio, which is the exponentiated coefficient from the first row. The χ^2 statistic is for a test of parallel pre-trends. Standard errors are clustered at the state×group level.
Source: Created using the 2008-2019 round of the American Community Survey.

Table A2—: DDD Estimates Where Groups are Based on Health Insurance

	Employer	Private	Public	Purchased	Any
post×SS×insurance	-0.011	0.076	0.018	-0.082	0.114
	(0.033)	(0.046)	(0.042)	(0.038)	(0.099)
post×SS	0.387	0.306	0.370	0.391	0.261
	(0.024)	(0.040)	(0.026)	(0.019)	(0.097)
post×insurance	0.005	0.133	0.239	0.069	0.430
	(0.011)	(0.015)	(0.024)	(0.021)	(0.052)
post	-0.061	-0.170	-0.099	-0.067	-0.453
	(0.006)	(0.012)	(0.010)	(0.006)	(0.051)
Observations	2435	2412	2447	2448	2327
Log_Likelihood	-1,099,635	-1,478,041	-1,477,999	-1209871.692	-2,309,733
Relative_IRR	0.989	1.079	1.018	0.922	1.121
Relative_IRR_se	0.033	0.050	0.043	0.035	0.111
IRR_pvalue	0.749	0.114	0.681	0.026	0.278
χ^2	0.601	1.184	5.913	1.156	4.056
p_value	0.963	0.881	0.206	0.885	0.399

Note: This table reports estimates for the effect of access to federal marriage benefits for same-sex couples on the type of health insurance owned by a couple. Health insurance could be from an Employer, it could be Private or Public, it could be Purchased, or it could be any health insurance. Relative IRR reports the relative incidence rate ratio, which is the exponentiated coefficient from the first row. The χ^2 statistic is for a test of parallel pre-trends. Standard errors are clustered at the state×group level.
Source: Created using the 2008-2019 round of the American Community Survey.

Same-Sex Roommates

Figure A1 shows the number of individuals in two-roommate households, grouped by same-sex and mixed-citizenship. The numbers are stable over time, suggesting there is no relabeling from same-sex roommates to same-sex couples, and that relabeling does not explain the estimated effect size. Specifically, there are 123 695 mixed-citizenship same-sex roommates in 2008 and 128 823 in 2019, ranging between 115 524 and 135 070 across the twelve years. Whereas in Figure 1a, there are 38 819 mixed-citizenship same-sex couples in 2008 and 109 781 in 2019, an increase of nearly 70 000 for which roommate numbers cannot account.

Table A3 shows the number of mixed-citizenship same-sex roommates increased by 19% in the post period, rather than fell. However, the hypothesis of parallel pre-trends is rejected at the 5% level.
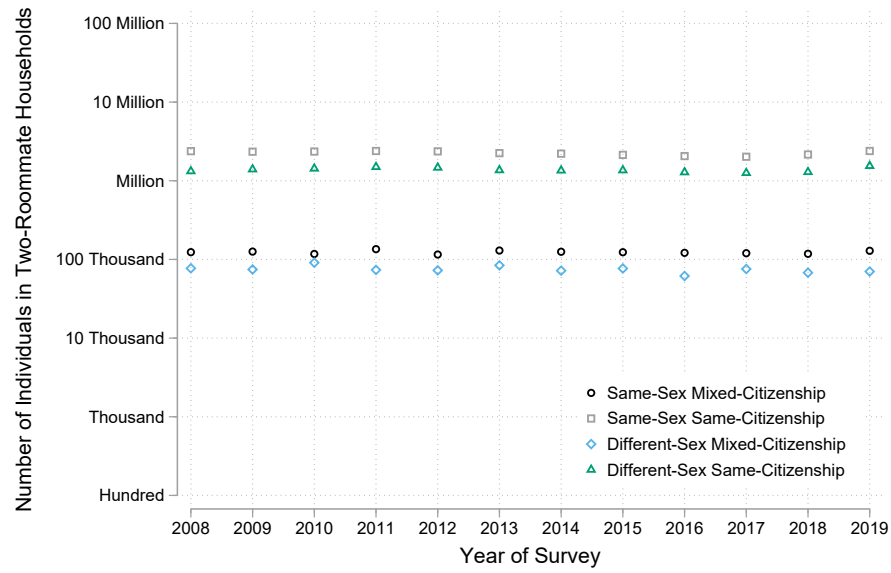
Figure A1. : Number of Individuals in a Two-Roommate Household, by Survey Year

Note:

Table A3—: DDD Estimates for Roommates

	Roommates
postSSCT	0.175
	(0.059)
postSSC	-0.046
	(0.025)
postCT	0.001
	(0.049)
post	-0.031
	(0.022)
Observations	2286
Log_Likelihood	-515,588
Relative_IRR	1.191
Relative_IRR_se	0.070
IRR_pvalue	0.006
Pre_Trend	10.499
p_value	0.033

Standard errors in parentheses

Note:

Other Robustness Checks

Table A4 reports results for changes in the number of same-sex couples with a given household attribute: above state-year median income (High Income), home ownership (Own Home), presence of children in the household (Has Kids), presence of additional adults in the household (Extra Adults), and having four or more bedrooms (Bedrooms). The estimates range from -0.121 for High Income to -0.017 for Extra Adults, representing -11.4% to -1.7% changes respectively. The estimate for Extra Adults is statistically insignificant; however, the estimate for Has Kids (-5.6%) is significant at the 10% level, the estimate for Own Home (-8.3%) is significant at the 5% level, and the estimates for High Income and Bedrooms are significant at the 1% level. The significant estimates also fail to reject the parallel pre-trends.

Table A4—: DDD Estimates Where Groups are Based on Household Characteristics

	High Income	Own Home	Has Kids	Extra Adults	Bedrooms
post×SSC×attribute	-0.121	-0.087	-0.057	-0.017	-0.106
	(0.031)	(0.037)	(0.035)	(0.041)	(0.033)
post×SSC	0.470	0.424	0.385	0.380	0.406
	(0.023)	(0.033)	(0.019)	(0.019)	(0.021)
post×attribute	0.010	-0.154	-0.018	0.030	0.054
	(0.011)	(0.011)	(0.010)	(0.011)	(0.013)
post	-0.064	0.057	-0.046	-0.060	-0.074
	(0.009)	(0.009)	(0.005)	(0.007)	(0.006)
Observations	2440	2440	2448	2448	2448
Log_Likelihood	-676,839.022	-970,015.584	-666,864.276	-691,460.415	-773,713.394
Relative_IRR	0.886	0.917	0.944	0.983	0.899
Relative_IRR_se	0.027	0.034	0.033	0.041	0.030
IRR_pvalue	0.000	0.015	0.089	0.673	0.001
Chi2_Stat	2.300	1.513	5.051	8.066	2.576
p_value	0.681	0.824	0.282	0.089	0.631

Standard errors in parentheses

Note:

Table A5—: DDD Estimates for the Main Specification without California

	M SS
outcome	
post	-0.063
	(0.007)
postSSCT	0.301
	(0.073)
postSSC	0.375
	(0.019)
postCT	0.087
	(0.016)
Observations	2400
Log_Likelihood	-641,623.446
Relative_IRR	1.352
Relative_IRR_se	0.098
IRR_pvalue	0.000
Pre_Trend	3.971
p_value	0.410

Standard errors in parentheses

Note:

A2.   Downstream Effects

DISASSORTATIVENESS

Table A6 reports results for changes in the number of same-sex couples with a given disassortativeness attribute: one partner is born domestically and the other is born abroad (Birthplace), interracial (Race), one partner is a student and the other is not (Student), a difference in education of three or more years (Education), and a difference in age of 5 or more years (Age). The estimates range from -0.072 for Age to 0.103 for Birthplace, representing -6.9% to 10.8% changes respectively. Both Age and Birthplace are statistically significant at the 5% level, although Age does not satisfy the parallel pre-trends assumption. The estimate for Race is 0.07, although it is not statistically significant at conventional levels (p-value is 0.16). The estimates for Student and Education are not significant. Therefore, Birthplace and possibly race appear to be the only downstream policy effects on assortativeness.

Table A6—: DDD Estimates Where Groups are Based on Disassortativeness Measures

	Birthplace	Race	Student	Education	Age
post×SSC×attribute	0.103	0.070	-0.049	-0.026	-0.072
	(0.049)	(0.048)	(0.041)	(0.031)	(0.031)
post×SSC	0.371	0.345	0.391	0.386	0.417
	(0.019)	(0.018)	(0.020)	(0.022)	(0.022)
post×attribute	0.116	0.180	-0.142	0.031	-0.027
	(0.011)	(0.017)	(0.013)	(0.010)	(0.010)
post	-0.062	-0.076	-0.046	-0.066	-0.049
	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)
Observations	2448	2448	2448	2448	2448
Log_Likelihood	-572,271.755	-850,403.831	-750,650.042	-675,341.784	-643,135.214
Relative_IRR	1.108	1.073	0.952	0.974	0.931
Relative_IRR_se	0.054	0.052	0.039	0.030	0.029
IRR_pvalue	0.047	0.160	0.223	0.385	0.016
Chi2_Stat	6.114	1.707	3.394	13.306	8.782
p_value	0.191	0.790	0.494	0.010	0.067

Standard errors in parentheses

Note:

NATURALIZATION
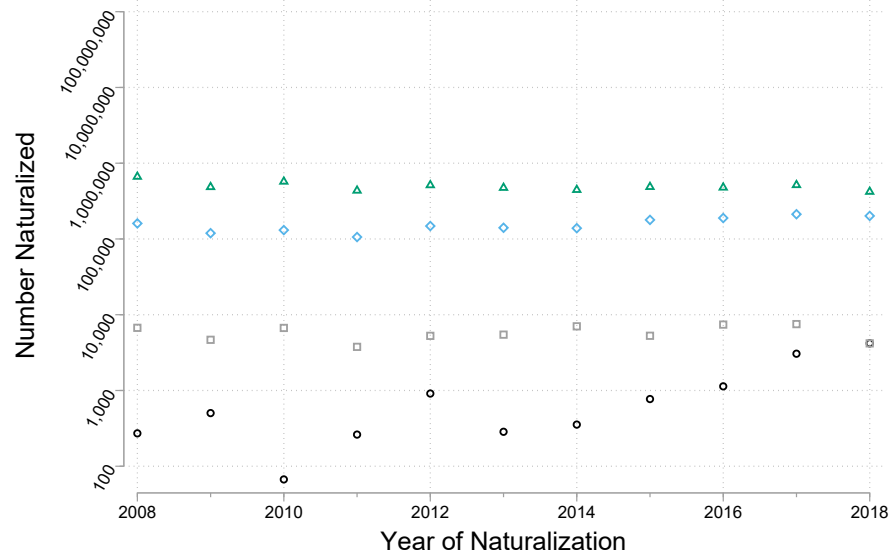
Figure A2. : Number of Naturalized Individuals by Naturalization Year

Note: "Possible" refers to possibly naturalized through marriage. This means a naturalized individual married a citizen three or more years before naturalization. "Not Possible" means the individual's naturalization is not due to their current marriage or they are unmarried.
Source:

Table A7—: DDD Estimates for Naturalized Coupled Individuals

	Naturalized Individuals by Naturalization Year
post×SSC×PNTM	1.447
	(0.232)
post×SSC	0.323
	(0.171)
post×PNTM	0.266
	(0.029)
post	-1.271
	(0.021)
Observations	1378
Log_Likelihood	-804,732.259
Relative_IRR	4.249
Relative_IRR_se	0.988
IRR_pvalue	0.001
Pre_Trend	8.731
p_value	0.120

Standard errors in parentheses, clustered at the state×group level.

Note:
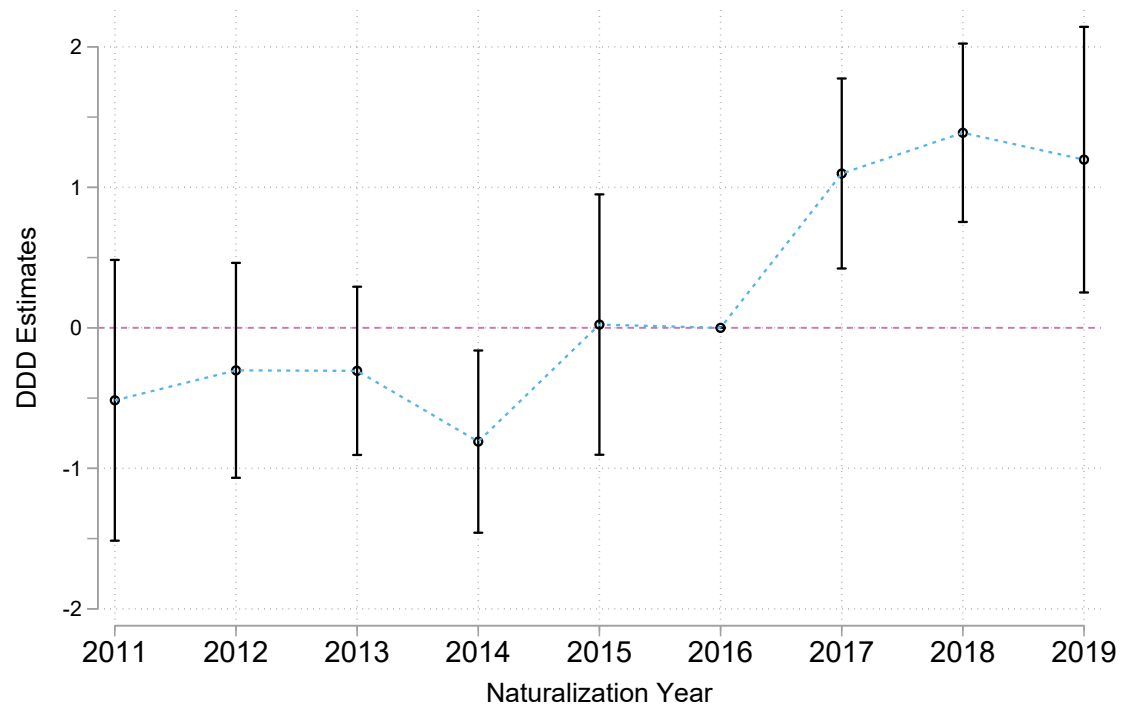
Figure A3. : Dynamic DDD Estimates For Naturalized Coupled Individuals
by Naturalization Year

Note:

A3. Heterogeneity

Table A8—: Heterogeneity by Sex - DDD Estimates Restricted by Sex

	Women	Men
postSSCT	0.193	0.378
	(0.076)	(0.069)
postSSC	0.371	0.353
	(0.026)	(0.018)
postCT	0.074	0.074
	(0.016)	(0.016)
post	-0.013	-0.013
	(0.006)	(0.006)
Observations	1414	1414
Log_Likelihood	-4.408e+07	-4.407e+07
Relative_IRR	1.213	1.459
Relative_IRR_se	0.092	0.101
IRR_pvalue	0.021	0.000
Pre_Trend	3.092	2.800
p_value	0.213	0.247

Standard errors in parentheses

Note:

Table A9—: Heterogeneity by State - DDD Estimates Restricted by State

	Early Legalizers	Late Legalizers
postSSCT	0.235	0.522
	(0.081)	(0.168)
postSSC	0.323	0.420
	(0.018)	(0.039)
postCT	0.050	0.122
	(0.012)	(0.019)
post	-0.041	-0.003
	(0.007)	(0.016)
Observations	196	336
Log_Likelihood	-4848555.621	-1.189e+07
Relative_IRR	1.264	1.686
Relative_IRR_se	0.103	0.284
IRR_pvalue	0.010	0.016
Pre_Trend	3.284	4.376
p_value	0.194	0.112

Standard errors in parentheses

Note:

A4. Timing of State-Level Same-Sex Marriage Laws

Table A10 lists states by their timing of same-sex marriage legalization, noting the method and existing alternatives to marriage.

Table A10—: Timing of Same-Sex Marriage Legalization

State	Effective	Granting Body	Alternatives
Massachusetts	May 17, 2004	State Court	
Connecticut	Nov 12, 2008	State Court	Civil Unions, 2005
Iowa	May 25, 2009	State Court	
Vermont	Sep 1, 2009	Legislature	Civil Unions, 2000
New Hampshire	Jan 1, 2010	Legislature	Civil Unions, 2008
Dist of Col	Mar 3, 2010	Legislature	Domestic Partnership, 2002
			Recognition of Marriages, 2009
New York	Jul 24, 2011	Legislature	Recognition of Marriages, 2010
Washington	Dec 9, 2012	Voters & Leg	Domestic Partnerships, 2007
Maine	Dec 29, 2012	Voters	Domestic Partnerships, 2004
Maryland	Jan 1, 2013	Voters & Leg	Domestic Partnerships, 2008
California	Jun 28, 2013	Federal Court	Domestic Partnerships, 2000/2005
		State Court	Legal from June 16-Nov 4, 2008
Delaware	Jul 1, 2013	Legislature	Civil Unions, 2012
Minnesota	Aug 1, 2013	Legislature	
Rhode Island	Aug 1, 2013	Legislature	Civil Unions, 2011
New Jersey	Oct 21, 2013	State Court	Civil Unions, 2007
Hawai'i	Dec 2, 2013	Legislature	Civil Unions, 2012
			Reciprocal Beneficiaries, 1997
New Mexico	Dec 19, 2013	State Court	
Oregon	May 19, 2014	Federal Court	Domestic Partnerships, 2008
Pennsylvania	May 20, 2014	Federal Court	
Illinois	Jun 1, 2014	Legislature	Civil Unions, 2011

Oklahoma	Oct 6, 2014	Federal Court	
Utah	Oct 6, 2014	Federal Court	
		Federal Court	Legal from Dec 20, 2013-Jan 6, 2014
Virginia	Oct 6, 2014	Federal Court	
Colorado	Oct 7, 2014	Federal Court	Designated Beneficiary, 2009
			Civil Unions, 2013
Indiana	Oct 7, 2014	Federal Court	
Wisconsin	Oct 7, 2014	Federal Court	Domestic Partnerships, 2009
		Federal Court	Legal from June 6-13, 2014
Nevada	Oct 9, 2014	Federal Court	Domestic Partnerships, 2009
West Virginia	Oct 9, 2014	Federal Court	
North Carolina	Oct 10, 2014	Federal Court	
Idaho	Oct 15, 2014	Federal Court	
Alaska	Oct 17, 2014	Federal Court	
Arizona	Oct 17, 2014	Federal Court	
Wyoming	Oct 21, 2014	Federal Court	
Montana	Nov 19, 2014	Federal Court	
South Carolina	Nov 19, 2014	Federal Court	
Florida	Jan 6, 2015	Federal Court	
Alabama	Jun 26, 2015	Federal Court	
		Federal Court	Legal from Feb 9-March 3, 2015
Arkansas	Jun 26, 2015	Federal Court	
		State Court	Legal from May 9-16, 2014
Georgia	Jun 26, 2015	Federal Court	
Kansas	Jun 26, 2015	Federal Court	
		County Courts	Up to counties since Nov 13, 2014
Kentucky	Jun 26, 2015	Federal Court	
Louisiana	Jun 26, 2015	Federal Court	
Michigan	Jun 26, 2015	Federal Court	
		Federal Court	Briefly legal on March 21, 2014
Mississippi	Jun 26, 2015	Federal Court	
Missouri	Jun 26, 2015	Federal Court	Recognition of Marriages Oct 3, 2014
		Federal Court	Legal since Nov 5, 2014 in St Louis
		Federal Court	Since Nov 7, 2014 in Jackson County
Nebraska	Jun 26, 2015	Federal Court	
North Dakota	Jun 26, 2015	Federal Court	
Ohio	Jun 26, 2015	Federal Court	
South Dakota	Jun 26, 2015	Federal Court	
Tennessee	Jun 26, 2015	Federal Court	
Texas	Jun 26, 2015	Federal Court	

Note: "Effective" refers to the effective date when same-sex marriage became permanently legal. Some indigenous tribes allow same-sex marriage before or after it is legalized elsewhere in the state. Massachusetts allows out-of-state same-sex couples to marry since July 31, 2008. Exceptions to the marriage laws are only listed for states forced to legalise same-sex marriage resulting from the Supreme Court ruling in *Obergefell v. Hodges*.
Source: Created using Table 1 from Hansen, Martell and Roncolato (2020), with additional information from the National Center for Lesbian Rights (2018).