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Assessing the Geographic Distribution of Same Sex and Opposite Sex Couples across the United States: Implications for Claims of Causality between Traditional Marriage and Same Sex Unions

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Abstract

The percent of households headed by married couples has recently fallen below 50 percent while the percent of unmarried couples (both heterosexual and homosexual) continues to rise. Nationally-representative estimates of unmarried couples which first appeared in the 1990 and 2000 decennial Censuses are now available on an annual basis through the American Community Survey. In this paper we use state-level panel data from 2000-2006 on the percent of households headed by married couples, same sex couples and opposite sex unmarried couples to assess widespread claims in the popular press of causality across living arrangements. Based on Granger causality tests we can reject claims that an increase in same sex couples has caused a decline in marriage and/or an increase in non-marital cohabitation; we can also reject counter-claims that changes in marriage and cohabitation behavior have caused more same sex unions.

JEL Classification: J120, J150,

I. Introduction

As recently as 1970, more than 70 percent of all households in the United States were headed by married couples; by 2000 less than 52 percent were married couples, and by 2005 this percentage appears to have fallen below 50 percent. While a large portion of this decline can be attributed to the growth in one-person households and single-parent families, another contributing factor is likely to be the growing number of households headed by unmarried couples, both opposite sex and same sex. Until recently, however, the direct causal relationship (if any) between married and unmarried couples could not be studied in any detail because there was no national count of the number of unmarried couples until the 1990 Census (Casper et al, 1999). Since then, social scientists, political pundits and even the general public have speculated about potential causal links between the decline in marriage and the growth in the number of both heterosexual couples who choose not to marry and homosexual couples who cannot marry.

The most dramatic example of the belief that marriage has suffered directly from a growing presence of unmarried couples—in this case, same sex couples—has been the debate surrounding recent federal and state efforts to define and defend marriage. In response to a ruling by the Supreme Court of Hawaii favorable to gay couples, Congress passed and President Clinton signed the Defense of Marriage Act (DOMA) in September 1996. DOMA defines marriage as a legal union between one man and one woman for purposes of all federal law and further decrees that states need not recognize a marriage from another state if it is between persons of the same sex. To date, 44 states have enacted their own DOMA laws, and 26 states have gone even further by amending their state constitutions to prohibit same sex marriage.[1]

Behind this marriage protection legislation is the widespread but often unstated belief that allowing same sex couples to marry would undermine traditional marriage. Perhaps surprisingly, there is no peer-reviewed social science evidence either for or against this belief. What little evidence does exist comes mostly from political pundits and journalists such as Maggie Gallagher (2004) and Stanley Kurtz (2004). Kurtz has argued that demographic data from Scandinavia "prove the case" that extending marriage-like benefits to same sex couples has *caused* a decline in marriage rates and marital fertility. Responding to Kurtz, William Eskridge and Darren Spedale (2006) examine in detail the legislative history of same sex registered partnerships in northern Europe and argue that marriage in Nordic countries has not suffered from the legalization of same sex unions. M. V. Lee Badgett (2004) also uses European data to refute Kurtz and goes even further by arguing the direction of causation may actually be in the other direction, concluding: "changes in heterosexual marriage made the recognition of gay couples more likely."

To date, no advocate on either side of this debate has used US data to examine potential causality between same sex unions and traditional marriage. One reason for this omission has been (until recently) a lack of consistent, nationally-representative data over time on unmarried couples in general and on same sex couples in particular who, due to social stigma and their small numbers, are difficult to count. The annual March Current Population Survey has been counting both opposite sex and same sex couples since 1996, but it does not report the number of same sex couples in any of its official publications (presumably because there are so few).[2] The 2000 Census revised the methodology by which it counts same sex couples, which makes direct comparisons with 1990 difficult.

Fortunately, a new large-scale annual Census Bureau survey known as the American Community Survey (ACS) has been counting unmarried couples on a consistent basis since the late 1990s.

In this paper we use state-level data from the 2000 Census along with ACS data from 2000 to 2006 to study changes over time and space in the geographic distribution of married and unmarried same sex and opposite sex couples. We test one specific measure of causality across couples known as Granger Causality (Clive Granger (1969)) extended to use with panel data (see William Greene (2003), pp. 551-5). Our main finding is that same sex couples do not "Granger cause" opposite sex couples (married or unmarried) nor do opposite sex couples "Granger cause" same sex couples.

The results of our statistical analysis do not address the marriage debate head on, since no state permitted same sex couples to marry until Massachusetts did so in 2004. Even still, we believe our analysis advances the debate to the extent that the presence of more same sex unmarried couples, whose relationships have been found to be similar to heterosexual couples (Lawrence Kurdek (2004) and Christopher Jepsen and Lisa Jepsen (2006)), represent many of the same threats to traditional marriage, real or imagined by opponents of homosexual marriage. Furthermore, states with more same sex couples are likely to exhibit greater tolerance toward gays and lesbians generally and to experience greater political pressures in favor of the legal recognition of their relationships.[3] At least one writer (Jonathan Rauch (2004)) has argued that the secular decline in marriage in the United States has been caused not by same sex *marriage*, but by the increased presence of same sex *unmarried* couples, whose successful efforts to obtain domestic partner benefits in the workplace have reduced the incentives of opposite sex cohabiting couples to marry. Thus, at a minimum, our statistical analysis can be viewed as a direct test of the Rauch hypothesis, and our results offer little support for it.

The plan of the paper is as follows. Section 2 reviews the decennial Census and annual ACS data on couples. Section 3 speculates on possible reasons why homosexual and heterosexual living arrangements might be related. Section 4 exploits the time series dimension of the panel data to test whether the presence of same sex couples can be said to be the cause or the effect of the living arrangements of opposite sex couples. Section 5 summaries our findings and suggests avenues for future research.

II. Census and ACS Data on Married and Unmarried Couples

Counting the number of married and unmarried couples in the United States has never been easy. Since 1880 the decennial Census has provided counts of married couple based on a "relationship to household head" question.   From a given list of relationship responses, the selection of "husband/wife" would identify the household as a family unit headed by a married couple. Starting in 1990, the Census Bureau added "unmarried partner" as another possible relationship response "to measure the growing complexity of American households and the tendency for couples to live together before getting married" (Tavia Simmons and Martin O'Connell (2003)). Individuals who selected this response are classified as non-family households headed by an unmarried couple, which can be further divided into "opposite sex" and "same sex" couples since gender is also ascertained.[4] One obvious limitation of this approach to counting all couples is that if neither individual is the household head, then the couple (married or unmarried) will not be counted.

Beyond this limitation, it is likely that unmarried partner households in general and same sex couples in particular are undercounted for at least two reasons. First, some unmarried partners are likely to have selected "husband/wife" as their relationship response. Opposite sex unmarried partners who did so would be misclassified as married couples. Same sex partners who did so were "flagged for further review and allocation" (Census Bureau (2001)). In 2000, most of these cases were changed to "unmarried partner" but in 1990 a complex statistical procedure reallocated them to any relationship response "consistent with the age/sex/marital status profile of the respondent."[5] As a result of this reallocation, the undercount of same sex couples is known to be much greater in the 1990 Census (and makes a direct comparison with 2000 impossible). A second reason unmarried partners would be undercounted is if (out of concern for their privacy) they selected "housemate/roommate" as their relationship status. One recent study (M. V. Lee Badgett and Marc Rogers (2003)) estimates an undercount of same sex couples in 2000 of at least 16 percent on this basis alone.

Despite these limitations, Census data remain the most reliable national estimates of married and unmarried couples available. In 2000 the Census Bureau counted a total of 54,493,232 households headed by married couples, 5,475,768 headed by opposite sex unmarried couples and 594,391 headed by same sex couples, of which 301,026 were male partners and 293,265 female partners. Married couples were 51.66 percent of all households; opposite sex unmarried couples were 4.63 percent and same sex couples 0.56 percent (see Table 1). Census data also showed that couples were unequally distributed across the states. Vermont and California reported the highest incidence of same sex couples at 0.80 percent; North Dakota had lowest at 0.27 percent. Alaska had the highest incidence of opposite sex *unmarried* couples at 6.9 percent; Alabama had the lowest at 2.9 percent. Utah had the highest percentage of *married* couples at 63.2 percent; New York State was lowest at 46.6 percent (see Table 2).

Until recently, researchers interested in national estimates of unmarried couples have had to rely upon just the 1990 and 2000 Censuses and faced the inevitable problem of reconciling the two counts. Fortunately, this situation has begun to change. In the late 1990s the Census Bureau developed and began to implement a new large-scale annual survey modeled on Census questionnaires. Now called the American Community Survey (ACS), its two purposes are to provide up-to-date household information of the type that until now has only been available every 10 years and to save money by eliminating the need for the costly Census long-form. Like the Census, the ACS asks a basic relationship to household head question which can generate estimates of same sex couples and opposite sex unmarried and married couples both nationally and by geographic regions (states, counties, congressional districts and urban areas). In 2000, the ACS was based on 587,519 completed interviews; by 2006 its sample size had grown to 1,968,362 completed interviews, making it by far the largest household survey in a non-Census year. Even still, the Census Bureau cautions that it may be necessary to average several years of ACS data to obtain greater reliability for smaller populations in specific geographic areas. Diana Elliott and Jane Dye (2005), for example, averaged ACS data over 2000 to 2003 to get city-level estimates of same sex couples. In this paper all estimates shown in Tables 1 and 2 are based on three-year moving averages.[6]

Table 1 shows national estimates of the number and percent of households headed by couples, married couples, unmarried couples, opposite sex unmarried couples, same sex couples, male couples and female couples for each year from 2000 to 2005. As can be seen there, the percent of households headed by couples declined from 56.85 in 2000 to 55.26 in 2005. All of the decline can be attributed to a drop in married couples which fell from 51.66 percent in 2000 to 49.90 percent in 2005. Meanwhile, the percent of households headed by unmarried opposite sex couples remained fairly constant (rising from 4.63 to 4.68), while the percent headed by same sex couples, although quite low, rose somewhat more, from 0.56 percent in 2000 to 0.68 in 2005.

Table 2 lists the five states with the highest and lowest percentages of married couples, same sex couples and opposite sex unmarried couples in 2000 and 2005. It shows that unmarried couples are more unequally distributed across the 50 states than are married couples. Except for Utah and Idaho (with their large Mormon populations), the percent of households headed by married couple in the other 48 states is always within 10 percent of the 50-state average.[7] By contrast, the percent of households headed by same sex couples and by opposite sex unmarried couples are often more than 20 percent above (or below) the average state. For example, in 2005, 9 (7) states had at least 20 percent more same sex (opposite sex) couples and 10 (5) states at least 20 percent fewer than did the average state. State rankings of couples have remained fairly stable between 2000 and 2005, although year by year, rankings of same sex couples display somewhat greater volatility than do rankings of opposite sex couples. This may reflect a greater difficulty counting same-sex couples. It may also be due to recent accelerated changes state by state in laws and attitudes towards same sex unions.

With a few notable exceptions, a comparison of the top and bottom ranked states by types of couples suggests that states with a higher (lower) incidence of same sex couples also have a higher (lower) incidence of opposite sex unmarried couples and a lower (higher) incidence of married couples. This perception is reinforced by calculating the Spearman correlations between state rankings of couples: the correlation between same sex and opposite sex unmarried couples in 2000 is positive and statistically significant at 0.54; and the correlation between same sex and married couples in 2000 is significantly negative at -0.57.[8] These correlations are consistent with the conservative view expressed by Kurtz (2004) that same sex couples reduce the propensity of opposite sex couples to marry and increase the likelihood of cohabitation. On the other hand, they are also consistent with the liberal view expressed by Badgett (2004) that it is the decline in marriage and the rise in heterosexual cohabitation that have allowed for an increase in the presence of same sex couples. Clearly, correlation alone does not imply causation. Can economic models of the family provide some guidance?

III. Some Hypotheses about Correlations and Causation in Living Arrangements

At first glance, economic theory might seem to have little to contribute to the debate over the direction of causality (if any) between same sex unions and traditional marriage. Assuming sexual orientation is largely immutable (and dichotomous), a secular increase in the number of same sex couples (drawn from an exclusively homosexual population) would not seem to diminish the pool of potential marriage partners among heterosexuals nor alter their incentives to marry.[9] In this section we argue that in looking for a link between the behaviors of these two populations, it is important to recognize the role played by heterosexual cohabitation. First generation models of marriage (Gary Becker (1973, 1974)) ignored cohabitation, limiting an individual's utility-maximizing lifestyle choices to either marrying or remaining single. In response to widely-publicized estimates of the growth in the number of unmarried couples (Larry Bumpus and James Sweet (1989)), a new generation of family formation models (Lee Lillard, Michael Brien and Linda Waite (1995); Michael Brien, Lee Lillard and Steven Stern (1999); Padma Rao Sahib and Xinhua Gu (2002)) enlarged the choice set to include cohabitation as a third option, viewing it largely as an intermediate step towards marriage used by some risk-averse individuals to acquire more information about potential mates.

Suppose a couple is trying to decide whether to begin their new life together by marrying now or simply living together. They know that formal marriage offers some distinct advantages over cohabitation (such as greater access to employer and government provided spousal benefits), but marriage is also more costly to dissolve if something goes wrong.[10] In addition, marriage confers Society's blessings upon them, while cohabitation may stigmatize them as "living in sin." Couples weigh the expected costs and benefits of marriage against those of cohabitation and select the lifestyle which offers greater net benefits. The outcome of this calculation might be expected to vary by geographic region and over time if the economic and social costs and benefits of marriage and cohabitation differ across space and time.

One obvious explanation for the secular decline in marriage is simply that the social cost (or moral stigma) of cohabitation declined in the United States and many other western countries. What caused this change to occur? In part it was surely the result of changing values and social norms brought on by a decline in the impact of religion in everyday life. The introduction of the birth control pill (Claudia Goldin and Lawrence Katz (2000)) along with a marked shift in the sex ratio at marriageable age (David Heer and Amyra Grossbard-Shechtman (1981)), both factors which helped to spawn the

Women's Liberation Movement, clearly played a key role as well. In addition, important legal changes should be noted such as the right to privacy established by the Supreme Court in 1965 in Giswold v. Connecticut.[11] While all of these external factors played a contributing role, it is also likely that the increasing presence of unmarried couples (both opposite sex and same sex) was itself a further stimulus to the decline in moral stigma associated with both heterosexual and homosexual cohabitation. Both Kurtz (2004) and Gallagher (2004) appear to subscribe to this reduced stigma hypothesis and assert without proof that the growing visibility of same sex couples played a leading role in contributing to a moral climate of "anything goes." Badgett (2004) also invokes a reduced stigma hypothesis, but argues that the direction of causality runs from declining marriage rates and increasing heterosexual cohabitation to more same sex unions.

Rauch (2004) offers an alternative explanation for the secular decline in marriage at the expense of non-marital cohabitation which depends less on moral stigma and more on changing economic incentives. Because gay and lesbian couples cannot marry, they do not generally have access to government and employer-provided spousal benefits such as pensions and health insurance. Understandably, this has given rise to a demand for "domestic partner" benefits in the workplace. As of 2007, more than half of all "Fortune 500" companies offered such benefits according to the Human Rights Campaign, as did a growing number of state and local governments.[12] But for reasons of equity, many employers have felt compelled to extend these benefits to the long-term partners of their unmarried heterosexual employees as well (Badgett (2001, ch. 4)). As a result, this has altered the choice calculus of heterosexual couples who now realize they no longer need to marry to have access to job-related spousal benefits. This argument suggests that it is the rising incidence and political power of same sex couples (who cannot marry) that has eroded some of the traditional benefits of marriage for opposite sex couples. Indeed, as Rauch argues, it is precisely because same sex couples cannot marry that this change has occurred. He goes on to speculate that allowing same sex couples to marry would reduce the push for domestic partner benefits and thus increase the incentives for cohabiting heterosexuals to marry as well

IV. Testing Causality between Married and Unmarried Couples

In analyzing causal links between variables, most observers agree that prior beliefs and a plausible theory are the strongest foundations upon which to argue that *X* does or does not cause *Y*. In the absence of theory, Clive Granger (1969) proposed a simple statistical test, now widely referred to as Granger Causality or Predictability. To say that *X Granger causes Y*, two conditions need to be met, according to Robert Pindyck and Daniel Rubinfeld (1998, page 243): "First, *X* should help to predict *Y*; i.e., in a regression of *Y* against past values of *Y*, the addition of past values of *X* as independent variables should contribute significantly to the explanatory power of the regression. Second, *Y* should not help to predict *X*." The reason for this second condition is that "if *X* helps to predict *Y* and *Y* helps to predict *X*, [then] it is likely that one or more other variables are in fact 'causing' the observed changes in both *X* and *Y*."

We test whether the percent of households that are headed by same sex couples causes either the percent that are opposite sex unmarried couples or the percent that are married couples (and vice-versa). Let X_{it} be the percent of households that are headed by same sex couples in year *t* and state *i*, and Y_{it} be the percent headed by married couples (or opposite sex unmarried couples). The complete test has two parts. First, we test the null hypothesis "*X* does not predict (or explain) *Y*" by running two regressions:

$$(1)\quad Y_{it} = \alpha_0 + \sum_{\tau=1}^{m} \alpha_\tau Y_{it-\tau} + \sum_{\tau=1}^{m} \beta_\tau X_{it-\tau} + \lambda_t + \nu_i + \varepsilon_{it}$$

$$(2)\quad Y_{it} = \alpha_0 + \sum_{\tau=1}^{m} \alpha_\tau Y_{it-\tau} + \lambda_t + \nu_i + \varepsilon_{it},$$

where λ_t is a year dummy variable, v_i is a state fixed-effect and ε_{it} is the random error term. Based on equations (1) and (2), we can use a Wald test to see whether the group of coefficients β_1 to β_m is significantly different from zero. (If they are, we can reject the null hypothesis of no effect for these variables.) In addition, we test the null hypothesis "*Y* does not predict *X*" by running the same two regressions above, but reversing *X* and *Y*. Finally, to conclude that "*X* Granger causes *Y*," we need to be able to reject the first hypothesis but not the second one. As Pindyck and Rubinfeld note, the number of lagged terms (*m*) on the right hand side of the regressions is arbitrary, but it is best to run the tests for several values to make sure the results are not sensitive to the choice of *m*.

A note about estimation is in order. The regressions are run with panel data from the 50 states from 2000 to 2006. Given the presence of lagged dependent variables on the right hand side, an ordinary least squares regression with dummy variables for each state can produce biased coefficient estimates for the α's (Hsiao, 1986); as a result, an alternative estimation procedure is required. For this reason, we use the procedure developed by Arellano and Bond (1991). First the variables are differenced to remove the fixed-effects. However, differencing then creates the problem that the lag dependent variable is correlated with the error term (since now $Cov(Y_{it-1}, \varepsilon_{it-1}) \neq 0$). Thus to estimate the coefficients, the higher order lags of the dependent variables (and the exogenous variables) are used as instrumental variables, since these lagged variables are uncorrelated with the error term.[13]

Table 3 summarizes the results of the χ^2-tests (based on the Wald statistic) with right hand variable lags of 1, 2, 3 and 4 years. The table gives the probability values for hypothesis tests. A probability value, for example, less than or equal to 0.1 indicates a rejection of the null hypothesis (which then implies possible Granger Causality). For each selection of lag lengths, the results of two regressions are given. The first equation does not include the lags of the third variable, while the second equation does. For example, in the first row of the table, when the dependent variable is married couples and the causal variable is same sex couples, the third variable is opposite sex unmarried couples. The second version of the equation is included to see if the results change with the inclusion of additional control variables.

In short, there is no systematic evidence that same sex couples either cause or are caused by married couples and/or opposite sex unmarried couples. In particular, there is no evidence to support the view that same sex couples cause (a decline in) marriage: taking account of a time-series of married couples across the states, a time-series of same sex couples adds no predictive power to any of the eight regressions explaining the cross-state distribution of married couples. Similarly, there is little evidence to support Rauch's hypothesis that same sex couples cause (an increase in) heterosexual cohabitation: taking account of a time series of opposite sex unmarried couples, a time series of same sex couples adds nothing to seven out of eight regressions explaining the cross-state distribution of heterosexual cohabiting couples. Finally, there is little evidence that causality runs in the other direction either: controlling for a time series of same sex couples, our ability to explain the current cross-state distribution of same sex couples is not improved by adding a time series of unmarried opposite sex couples (in seven out of eight cases); nor is it improved by adding a time series of married couples (in six out of eight regressions).[14]

V. Summary and Conclusions

Nationally-representative estimates of the number and geographic location of unmarried opposite sex and same sex couples which first appeared in the 1990 and 2000 Censuses are now available on an annual basis in the American Community Survey. In this paper we used 2000 Census and 2000-2006 ACS data by state on the percent of households headed by married and unmarried couples to investigate claims of causality across living arrangements. From a statistical point of view, we can reject the hypothesis that an increase in the presence of same sex couples has Granger caused either a decline in traditional marriage or an increase in heterosexual cohabitation; we can also reject the hypothesis that either the decline in marriage or increase in cohabitation has Granger caused more same sex unions. Thus, our findings give no support to Rauch's hypothesis that *unmarried* same sex couples caused marriage behavior to change. Our findings also provide some caution for the recent political debate over same sex marriage, suggesting that all claims and counter-claims of causality need to be viewed with skepticism. Of course, our statistical results cannot rule out the possibility of other forms of causality such as contemporaneous or forward-looking causality.

ACS data show that unmarried couples are more unequally distributed across states than are married couples and that the distribution of same sex couples has been changing more rapidly than that of other couples. Our conclusion that the cross-state distribution of unmarried couples is not related to the evolution of the distribution of married couples is notable, but it leaves unexplained what *does* account for the highly uneven cross-state distribution of these couples. To what extent does the distribution of unmarried couples, particularly same sex couples, depend upon historical accident, state laws, social and religious attitudes or perhaps economic factors? Dan Black et al. (2002) showed that the Census 2000 distribution of same-sex couples across large metropolitan areas depended positively on the cost of housing, but that the distribution of opposite-sex unmarried couples did not. Beyond housing costs, their analysis was unable to uncover other significant determinants of location. Identifying the economic, social, religious, cultural and political factors which underlie the location decisions of unmarried couples is an intriguing and unfinished project for social scientists.

Endnotes

[1] This count, accurate as of May 2008, is based on data compiled by the Human Rights Campaign (http://www.hrc.org/documents/marriage_prohibitions.pdf).

[2] Michael Ash and M.V. Lee Badgett (2006) found only 482 same sex couples across 9 years of CPS data.

[3] Political science literature on the impact of gay populations is mixed. Scott Barclay and Shauna Fisher (2003) find that a higher state prevalence of same sex couples increases the probability of gay-negative legislation, while Donald Haider-Markel, Marc Joslyn and Chad Kniss (2000) find just the opposite result.

[4]Response errors to the gender question can result in an incorrect allocation of unmarried couples between same sex and opposite sex. This problem is judged to be potentially significant in Census data, but less so in the ACS data where many interviews are conducted by telephone, and thus gender can be ascertained directly. See Martin O'Connell and Gretchen Gooding (2007).

[5] In theory, "unmarried partner" is one of the possible reallocations, but given the small number of such aggregate responses, it is unlikely many same sex "husband/wife" couples were so reallocated in 1990.

[6] In other words, the 2005 estimates shown in Tables 1 and 2 are the average of 2004-2006 ACS data. Individual year ACS data are used only in the Granger causality tests in Table 3 since a moving average would change the time-series structure of the data on which the test depends. Granger tests using moving average data produced similar results and are available from the authors upon request.

[7]The 50-state average shown in Table 2 differs from the national average in Table 1 for two reasons. First, the national average includes Washington D.C.; second, the national average, unlike the state average, takes account of unequal populations across states.

[8] State rankings of married couples and opposite sex unmarried couples are not highly correlated: the Spearman correlation is -0.31 for 2000, which is not statistically significant.

[9] Some homosexuals have married a partner of the opposite sex, but it is hoped that few observers would want to argue this practice is good either for the institution of marriage or for the individuals involved.

[10] The GAO has identified 1,138 federal statutory provisions in the United States Code as of December 31, 2003 in which marital status is a factor in determining or receiving benefits, rights and privileges (http://www.gao.gov/docdblite/details.php?rptno=GAO-04-353R%20).

[11] Legal scholars argue this precedent led to the decision in Eisenstadt v. Baird (1972) which struck down a ban on the sale of contraceptives to unmarried couples and to Lawrence v. Texas (2003) which struck down state sodomy laws. Although no longer enforced, seven states (North Carolina, Virginia, West Virginia, Florida, Michigan, Mississippi and North Dakota) still have anti-cohabitation laws on their books.

[12]As of 2007, the website of the Human Rights Campaign lists 270 "Fortune 500" companies, 13 state governments and 144 cities and counties that provide health benefits to domestic partners. (http://w3.hrc.org/Template.cfm?Section=Search_the_Database&Template=/CustomSource/WorkNet/srch.cfm&searchtypeid=3&searchSubTypeID=1)

[13] Estimation was done using the *xtabond* command in Stata 9.2. Also note that Arellano-Bond procedure is valid when there is no second order autocorrelation of the error terms and the instruments are strictly exogenous. In all of the regressions we ran (whose results are given in Table 3), hypothesis tests indicate that the above two assumptions are valid. These results are available upon request. Note that Table 3 presents the results for annual data; results for the moving average data are available upon request. They are generally similar to the annual data results.

[14] For completeness, we also note that in six out of eight regressions, the inclusion of a times series of opposite sex unmarried couples does not help predict the cross-state distribution of married couples; and in four cases out of eight a time series of married couples help predict the distribution of opposite sex unmarried couples.

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Table 1

Number and Percent of Households Headed by Couples, Married Couples and Unmarried Partners

	2000	2001*	2002*	2003*	2004*	2005*
Number of Households						
Headed by Couples	59,969,000	59,066,563	59,701,488	60,343,109	60,838,243	61,264,872
Married Couples	54,493,232	53,818,873	54,333,014	54,778,298	55,045,452	55,323,405
Unmarried Partners	5,475,768	5,247,690	5,368,475	5,564,811	5,792,792	5,941,467
Opposite Sex	4,881,377	4,634,652	4,740,542	4,901,160	5,064,168	5,186,798
Same Sex	594,391	613,038	627,933	663,651	728,624	754,669
Male-Male	301,026	326,894	331,274	351,264	383,521	401,512
Female-Female	293,365	286,144	296,660	312,387	345,103	353,157
Total Households	105,480,101	106,204,912	107,405,080	108,562,825	109,804,071	110,870,036
Percent of Total Households						
Headed by Couples	56.85	55.62	55.59	55.58	55.41	55.26
Married Couples	51.66	50.67	50.59	50.46	50.13	49.90
Unmarried Partners	5.19	4.94	5.00	5.13	5.28	5.36
Opposite Sex	4.63	4.36	4.41	4.51	4.61	4.68
Same Sex	0.56	0.58	0.58	0.61	0.68	0.68
Male-Male	0.29	0.31	0.31	0.32	0.35	0.36
Female-Female	0.28	0.27	0.28	0.29	0.31	0.32

*Based on 3-year moving average data.

Source: 2000 are from the 2000 Census. 2001-2005 are from the 2000-2006 American Community Survey.

Table 2

Ranking of States with the Highest and Lowest Percentages of Households Headed by Married Couples, Same Sex Couples and Opposite Sex Unmarried Couples: 2000 and 2005

Married Couples				Same Sex Couples				Opposite Sex Unmarried Couples			
2000		**2005**		**2000**		**2005**		**2000**		**2005**	
Highest		Highest		Highest		Highest		Highest		Highest	
Utah	63.2	Utah	62.1	Vermont	0.80	Vermont	0.97	Alaska	6.9	Maine	7.1
Idaho	58.9	Idaho	57.1	California	0.80	New Mexico	0.90	Vermont	6.7	Alaska	7.0
N Hampshire	55.3	N Hampshire	54.0	Washington	0.70	Massachusetts	0.90	Maine	6.7	Vermont	6.7
Iowa	55.1	Iowa	53.3	Massachusetts	0.70	Washington	0.89	Nevada	6.5	N Hampshire	6.4
Wyoming	54.8	Wyoming	53.2	Oregon	0.67	Oregon	0.87	N Hampshire	6.3	Oregon	6.3
State average	52.6	State average	50.7	State average	0.52	State average	0.65	State average	4.7	State average	4.8
	(2.6)		(2.7)		(0.13)		(0.14)		(0.9)		(0.9)
Lowest		Lowest		Lowest		Lowest		Lowest		Lowest	
New York	46.6	New York	45.3	N Dakota	0.27	S Dakota	0.34	Alabama	2.9	Alabama	2.9
Rhode Island	48.2	Mississippi	46.7	S Dakota	0.29	N Dakota	0.39	Utah	3.0	Utah	3.1
Louisiana	48.9	Louisiana	46.8	Iowa	0.32	W Virginia	0.42	Arkansas	3.5	Mississippi	3.9
Massachusetts	49.0	Rhode Island	46.8	Montana	0.34	Mississippi	0.44	Oklahoma	3.5	Oklahoma	3.9
Nevada	49.7	New Mexico	47.1	Nebraska	0.35	Idaho	0.46	Kansas	3.7	Kansas	3.9

Source: 2000 data are from the 2000 Census. 2005 is a 3-year average of 2004-2006 data from the American Community Survey.
Note: State average represents the mean of the 50 individual states values. Standard deviations are shown in parentheses.

Table 3

Granger Causality Tests Between Same Sex (SS) and Opposite Sex Married (MC) and Unmarried (OS) Couples:

χ^2-Tests on the Omission of Lagged Values of the Potentially Causal Variable.
Probability Values Reported (results in bold mean a rejection of the null hypothesis). All regressions contain year dummy variables.

Null Hypothesis	Prior 1 yr w/o other vars.	Prior 1 yr with other vars.	Prior 2 yrs w/o other vars.	Prior 2 yrs with other vars.	Prior 3 yrs w/o other vars.	Prior 3 yrs with other vars.	Prior 4 yrs w/o other vars.	Prior 4 yrs with other vars.
%SS does not predict %MC	0.314	0.313	0.647	0.597	0.620	0.694	0.592	0.431
%MC does not predict %SS	0.896	0.966	***0.036***	***0.051***	0.307	0.484	0.763	0.781
%SS does not predict %OS	0.726	0.454	0.147	0.126	***0.024***	0.128	0.241	0.324
%OS does not predict %SS	0.454	0.454	0.597	0.856	***0.077***	0.270	0.406	0.405
%OS does not predict %MC	***0.047***	***0.050***	0.172	0.180	0.134	0.117	0.272	0.199
%MC does not predict %OS	***0.030***	***0.024***	***0.044***	***0.039***	0.236	0.694	0.630	0.909
# **obs.**	250	250	200	200	150	150	100	100

Appendix: Regression Results Tables

Table A1: Dependent Variable: %SS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ΔSS_{t-1}	-0.149	-0.143	-0.15	-0.467	-0.487	-0.493	-0.245	0.057	-0.025	0.086	0.085	0.158
	(1.73)	*(1.65)*	*(1.73)*	*(3.47)***	*(3.82)***	*(3.84)***	*(0.58)*	*(0.09)*	*(0.04)*	*(0.09)*	*(0.11)*	*(0.17)*
ΔSS_{t-2}				-0.36	-0.348	-0.35	-0.188	0.038	0.002	0.089	0.032	0.111
				*(3.52)***	*(3.55)***	*(3.54)***	*(0.60)*	*(0.08)*	*0.00*	*(0.11)*	*(0.05)*	*(0.14)*
ΔSS_{t-3}							0.129	0.27	0.249	0.347	0.317	0.377
							(0.63)	*(0.91)*	*(0.87)*	*(0.65)*	*(0.71)*	*(0.69)*
ΔSS_{t-4}										0.036	0.068	0.048
										(0.28)	*(0.48)*	*(0.30)*
ΔOS_{t-1}	0.014		0.014	0.004		0.005	0.002		0.009	0.021		0.043
	(0.75)		*(0.75)*	*(0.18)*		*(0.25)*	*(0.08)*		*(0.31)*	*(0.53)*		*(0.84)*
ΔOS_{t-2}				-0.017		-0.007	-0.052		-0.033	-0.054		-0.026
				(0.89)		*(0.39)*	*(2.09)**		*(1.11)*	*(1.43)*		*(0.59)*
ΔOS_{t-3}							-0.042		-0.043	-0.013		-0.017
							(1.89)		*(1.67)*	*(0.27)*		*(0.33)*
ΔOS_{t-4}										0.038		0.044
										(0.78)		*(0.82)*
ΔMC_{t-1}		-0.001	.0004		0.003	0.004		0.017	0.015		0.03	0.032
		(0.13)	*(0.04)*		*(0.35)*	*(0.42)*		*(0.77)*	*(0.70)*		*(1.30)*	*(1.12)*
ΔMC_{t-2}					0.022	0.022		0.035	0.03		0.035	0.029
					*(2.54)**	*(2.42)**		*(1.73)*	*(1.43)*		*(1.13)*	*(0.76)*
ΔMC_{t-3}								-0.003	-0.005		-0.001	-0.011
								(0.23)	*(0.37)*		*(0.06)*	*(0.55)*
ΔMC_{t-4}											0.006	0.004
											(0.37)	*(0.24)*
Const.				0.063	0.057	0.076	0.037	0.021	0.027	0.003	0.027	0.013
				*(8.88)***	*(9.51)***	*(4.46)***	*(1.23)*	*(0.53)*	*(0.73)*	*(0.03)*	*(0.53)*	*(0.19)*
# Obs.	250	250	250	200	200	200	150	150	150	100	100	100

Absolute value of z statistics in parentheses, Year dummies included in all regs., coeffs. not shown.

* significant at 5%; ** significant at 1%

Table A2 : Dependent Variable: %OS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ΔSS_{t-1}	0.083		0.181	-0.025		0.11	-0.188		-0.245	-0.23		-0.316
	(0.35)		*(0.75)*	*(0.09)*		*(0.40)*	*(0.70)*		*(0.89)*	*(0.59)*		*(0.71)*
ΔSS_{t-2}				-0.486		-0.466	-0.585		-0.604	-0.475		-0.578
				(1.86)		*(1.73)*	*(2.14)**		*(2.09)**	*(1.12)*		*(1.17)*
ΔSS_{t-3}							-0.713		-0.588	-0.974		-1.085
							*(2.70)***		*(1.84)*	*(1.44)*		*(1.27)*
ΔSS_{t-4}										-0.012		-0.064
										(0.02)		*(0.11)*
ΔOS_{t-1}	-0.011	0.034	0.033	-0.111	-0.026	-0.042	-0.563	-0.352	-0.46	-0.789	-0.232	-0.849
	(0.11)	*(0.31)*	*(0.31)*	*(0.76)*	*(0.17)*	*(0.27)*	*(2.65)***	*(1.58)*	*(1.88)*	*(0.96)*	*(0.50)*	*(1.16)*
ΔOS_{t-2}				-0.077	-0.067	-0.064	-0.346	-0.232	-0.295	-0.497	-0.226	-0.555
				(0.78)	*(0.66)*	*(0.64)*	*(2.50)**	*(1.59)*	*(1.89)*	*(1.09)*	*(0.76)*	*(1.17)*
ΔOS_{t-3}							-0.222	-0.15	-0.179	-0.294	-0.107	-0.298
							*(2.33)**	*(1.49)*	*(1.72)*	*(1.08)*	*(0.58)*	*(1.06)*
ΔOS_{t-4}										-0.027	0.055	-0.029
										(0.15)	*(0.50)*	*(0.20)*
ΔMC_{t-1}		0.075	0.079		0.106	0.108		0.074	0.032		0.078	-0.038
		*(2.17)**	*(2.25)**		*(2.48)**	*(2.54)**		*(1.43)*	*(0.54)*		*(0.85)*	*(0.25)*
ΔMC_{t-2}					0.045	0.034		0.052	0.006		0.058	-0.042
					(1.24)	*(0.94)*		*(1.22)*	*(0.14)*		*(0.82)*	*(0.33)*
ΔMC_{t-3}								0.059	0.036		0.081	0.01
								(1.80)	*(1.01)*		*(1.55)*	*(0.11)*
ΔMC_{t-4}											0.04	0.016
											(0.85)	*(0.24)*
Const.	0.086	0.10296	0.102	0.157	0.118	0.098	0.275	0.317	0.294	0.324	0.188	0.324
	*(5.36)***	*(6.04)***	*(5.94)***	*(5.38)***	*(1.91)*	*(1.54)*	*(4.59)***	*(5.73)***	*(4.91)***	*(1.37)*	*(2.23)**	*(2.51)**
# Obs.	250	250	250	200	200	200	150	150	150	100	100	100

Absolute value of z statistics in parentheses, Year dummies included in all regs., coeffs. not shown.

* significant at 5%; ** significant at 1%

Table A3: Dependent Variable: %MC

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ΔSS_{t-1}		0.537	0.545	0.035		0.067	0.833		0.666	0.999		0.698
		(1.01)	*(1.01)*	*(0.06)*		*(0.10)*	*(1.13)*		*(0.94)*	*(0.99)*		*(0.67)*
ΔSS_{t-2}				-0.505		-0.553	0.558		0.307	0.48		0.389
				(0.84)		*(0.90)*	*(0.72)*		*(0.41)*	*(0.43)*		*(0.34)*
ΔSS_{t-3}							0.839		0.764	1.7		2.334
							(1.11)		*(0.98)*	*(1.52)*		*(1.81)*
ΔSS_{t-4}										0.516		0.955
										(0.56)		*(0.94)*
ΔOS_{t-1}	0.314		0.313		0.393	0.39		0.317	0.375		0.558	0.686
	*(1.98)**		*(1.96)**		*(1.78)*	*(1.79)*		*(1.35)*	*(1.45)*		*(1.44)*	*(1.63)*
ΔOS_{t-2}					0.008	0.019		0.463	0.506		0.317	0.404
					(0.04)	*(0.11)*		*(2.14)**	*(2.22)**		*(0.92)*	*(1.06)*
ΔOS_{t-3}								0.34	0.353		-0.07	-0.013
								(1.95)	*(1.97)**		*(0.25)*	*(0.04)*
ΔOS_{t-4}											-0.382	-0.403
											(1.64)	*(1.72)*
ΔMC_{t-1}	-0.002	-0.038	0.011	-0.024	0.079	0.05	0.003	-0.054	-0.003	0.169	0.285	0.278
	(0.02)	*(0.39)*	*(0.11)*	*(0.17)*	*(0.47)*	*(0.29)*	*(0.02)*	*(0.29)*	*(0.01)*	*(0.43)*	*(0.65)*	*(0.63)*
ΔMC_{t-2}				0.048	0.098	0.065	0.132	0.131	0.171	0.296	0.319	0.374
				(0.44)	*(0.84)*	*(0.55)*	*(0.84)*	*(0.90)*	*(0.99)*	*(1.07)*	*(1.09)*	*(1.16)*
ΔMC_{t-3}							-0.023	-0.015	-0.003	0.133	0.102	0.193
							(0.25)	*(0.17)*	*(0.03)*	*(0.82)*	*(0.63)*	*(1.01)*
ΔMC_{t-4}										0.187	0.163	0.187
										(1.17)	*(1.06)*	*(1.11)*
Const.	-0.253	-0.242	-0.256	-0.307	-0.311	-0.323	-0.316	-0.364	-0.374	-0.122	-0.106	-0.193
	*(6.64)***	*(6.41)***	*(6.70)***	*(4.63)***	*(4.58)***	*(4.91)***	*(1.89)*	*(2.62)***	*(2.35)**	*(0.44)*	*(0.44)*	*(0.82)*
# Obs.	250	250	250	200	200	200	150	150	150	100	100	100

Absolute value of z statistics in parentheses, Year dummies included in all regs., coeffs. not shown.

* significant at 5%; ** significant at 1%