

Meta-analysis of the Effects of Sexual Orientation on Earnings

Abstract:

A growing literature suggests that gay men earn significantly less and lesbians earn more than their heterosexual counterparts, but the size of the estimated sexual orientation differences vary greatly across studies. Meta-regression shows the gay sample size, sexual orientation measure, and controls for work intensity explain variation in estimates for men. While for women, the dataset and treatment of other characteristics influence the size of the lesbian earnings premium. The results show much stronger evidence of discrimination for gay men than for lesbians, but intrahousehold decision-making and human capital accumulation are important for both men and women.

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Introduction

In 1995, Badgett published the first econometric study of the effects of sexual orientation on earnings. The work followed a body of literature estimating similar models for differences by race and gender (Altonji and Blank 1999) using traditional regression techniques. Badgett's study was made possible by the confluence of data on sexual orientation and earnings, a researcher willing to work on a stigmatized subpopulation, and an economics journal willing to publish the results—all elements that were rare or nonexistent prior to that time (Klawitter 1998).

Since Badgett's first article appeared, researchers have used a growing number of datasets and models to explore sexual orientation earnings differences and to assess the extent of labor market discrimination. The body of work addresses the key scientific questions with timely policy implications: Do earnings show evidence of labor market discrimination on the basis of sexual orientation?; What other factors interact with sexual orientation in determining earnings?; and, in particular, what are the contributions of human capital and intra-household influences?

However, the answers to these questions are less than uniform across studies suggesting the merits of a systematic assessment of the literature. Differences in the measures of earnings and sexual orientation, choice of data set, sample limitations, control variables, and modeling choices might all explain the variation in estimates and conclusions about how sexual orientation affects earnings. Although the number of published studies is still relatively small at 26, a meta-analysis will provide much needed summary of the patterns and timely guidance for researchers and those interested in collecting new data.

While most studies find that gay men earn significantly less and lesbians earn more than their heterosexual counterparts, there is enormous variation across studies. Here, I use meta-regression to better understand that variation. For men, the number of gays in the sample, the type of sexual orientation measure, and controls for work intensity all explain significant variation in estimates of the impact of sexual orientation. For women, the choice of the dataset is critical, but work intensity controls and treatment of other characteristics also explain variation in the size of the lesbian earnings premium. The studies used in the meta-analysis along with the broader literature show strong evidence of the importance of partner gender and intrahousehold decision-making to sexual orientation differences in the labor market. Human capital investments also contribute greatly to sexual orientation earnings differences, especially among women. Finally, the results of the meta-analysis and other studies show much stronger evidence of labor market discrimination for gay men than for lesbians.

Sexual Orientation and Earnings

Currently, about 3.5 percent of American adults (8.8 million) identify as lesbian, gay, or bisexual (Gates 2011) and they form almost 600,000 same-sex couples (Gates 2006). While public opinion about homosexuality has become more positive over time and Americans have become less willing to restrict civil liberties of gays and lesbians, negative attitudes about homosexuality remain high (Herek 2000b, n.d.; Loftus 2001). Studies of public opinion and psychological studies point to on-going prejudice against gays and lesbians (Herek 2000b; Loftus 2001; Yang 1997); studies of employers and audit studies show evidence of willingness to discriminate; and studies of employees show perceptions of past discrimination (summarized in Badgett et al. 2007).

Prejudice could result in lower earnings for gay men and lesbians through differential treatment in hiring, firing, pay, and promotion processes. Becker (1971) provided early models of how employer, employee, and customer “tastes” for sex and racial/ethnic discrimination could drive labor market outcomes. Later researchers using job search models added, differing levels of uncertainty about worker productivity (statistical discrimination), and occupational crowding which helped to explain why discrimination might be unlikely to disappear even in a competitive market (Altonji and Blank 1999). These models might equally apply to sexual orientation discrimination.

In addition to discrimination, sexual minorities might have different preferences than heterosexuals, could face different motivations and incentives in accumulation of human capital, and might organize home life differently than heterosexuals—all of which could affect work time, productivity, and earnings. Gay men and lesbians might also attempt to avoid or offset discrimination and its impacts by attaining higher levels of education, choosing gay-friendly occupations, living in gay-friendly locations, or accepting or staying in supportive work environments. In many ways, these are the same entanglements of discrimination and choice that arise in trying to account for wage gaps by race, ethnicity, and gender (Altonji and Blank 1999).

Sexual orientation may also affect labor markets in ways more distinct from race and gender. Gay men and lesbians can choose whether or not to disclose their sexual orientation or others may mistakenly assume someone is gay or lesbian and these might muddle the effects of sexual

orientation (Badgett 1995a). Disclosure options and misidentification are not unheard of in cases of sex or race, but are much less common. Also, issues of differential outcomes by sexual orientation get mixed with issues of gender because the sex of one's partner is inherently tied to sexual orientation and gender norms and discrimination could affect intrahousehold constraints and decisions. For example, lesbians may choose to invest more in human capital and work more hours than do heterosexual women in order to offset current or future lower earnings from a female (rather than male) partner.

Recent studies have found that, before controlling for any explanatory factors, lesbians earn significantly more than do heterosexual women and gay men earn less than heterosexual men. For example, Cushing-Daniels and Yeung (2009) show earnings differences equal to a 26 percentage premium for lesbians over heterosexual women and a -7 percent penalty for gay men compared to heterosexual men using GSS data.¹ The gender gaps are also large with lesbians and heterosexual women earning 13 and 38 percent less respectively than do heterosexual men. The gender differences in earnings explain the household income patterns: lesbian couples which combine two women's earnings have incomes lower than those of married heterosexual couples, while gay male couples have incomes similar despite having earnings lower than those of married men.

¹ Author calculations using figures from (Cushing-Daniels and Yeung 2009). Similarly, Antecol et al (2008) used 2000 US Census data to find lower hourly earnings by 4.6 percent for men in gay couples compared to married couples and 18 percent higher for women in same-sex couples compared to women in married different-sex couples. However, both gay men and lesbians have earnings higher by about 25 percent compared to those in unmarried different-sex couples.

Following earlier studies of labor market discrimination on the basis of gender or race, researchers have used multivariate analysis to parcel out variation in earnings levels to that related to expected productivity (through education and experience, occupation, industry, geographic location), other observed characteristics, and the unexplained component that could be attributable to discrimination.

In a simple model of individual earnings, the outcome is the natural log of annual earnings and the focus is on the coefficient on an indicator of sexual orientation (β_{gay}). Most models are run separately for men and women and, at a minimum, also control for age, education, race, and geographic location--variables that might affect other sources of discrimination, productivity, or the value of that production.

$$\log(\text{earnings}) = \beta_0 + \beta_{gay}GAY + \beta_x X + \varepsilon_i$$

The coefficient on the indicator of being gay or lesbian β_{gay} shows the gap in average log earnings associated with being a sexual minority which could reflect discrimination as well as other differences correlated with sexual orientation. Alternatively, some researchers use “decompositions” which allow the coefficients on all explanatory variables to differ by sexual orientation (most often education and “potential experience”).² These models parcel out the total sexual orientation difference to that attributable to observed characteristics (other than sexual orientation) and to the unexplained portion (due to differences in the coefficients or the intercept). Coefficients from the models pooling gay and heterosexual samples and the unexplained portion of variance from the decompositions can be converted to a percentage difference in earnings by sexual orientation.

² The decomposition approach was developed by (Oaxaca 1973) and (Blinder 1973).

The unexplained portion of variance in a decomposition or the coefficient on a gay indicator is usually taken as resulting from discrimination though, as Altonji and Blank (1999) note, this could overestimate discrimination due to systematic differences not captured by the observed characteristics or underestimate the impact of discrimination because of the impact of discrimination on worker choices of explanatory factors like education or occupation. The challenge with either a simple model or decomposition is to control for as many factors as possible that might affect productivity without controlling for factors that are themselves the product of discrimination. Many researchers discuss this difficulty and use sensitivity analyses to assess the sensitivity of conclusions about discrimination to inclusion of characteristics such as occupation or industry of employment or hours of works given that these may be affected by discrimination.

Researchers have found significant unexplained variation in earnings or hourly pay by gender and race (Altonji and Blank 1999; Jarrell and Stanley 2004). Recently, Jarrell and Stanley (2004) and Weichselbaumer and Winter-Ebmer (2005) used meta-regression, meta-analysis summarizing multiple studies using regression methods, to assess the econometric studies of gender and earnings. Both papers found evidence of decreasing but persistent gender discrimination in earnings over time. My paper follows similar methods in summarizing the recent literature on earnings differences based on sexual orientation.

Until the 1990s, datasets combining a measure of sexual orientation and information on wages, earnings, or income for more than a local convenience sample were not available. Badgett's

1995 paper used data from the General Social Survey (GSS) which had very small samples of sexual minorities based on questions first added in 1989 (M. V. Lee Badgett 1995a) . Other early studies used US Census data for same-sex couples after respondents were allowed to choose “unmarried partner” as a relationship option starting in 1990 (Allegretto and Arthur 2001; Klawitter and Flatt 1998; Black et al. 2000; Clain and Leppel 2001). Since then, other US national datasets have added questions on sexual orientation and new datasets have been more likely to include them based on the successful experiences of earlier adopters (Sexual Minority Assessment Research Team 2009).

Datasets for the earnings studies have included one of three types of sexual orientation questions: 1) questions on the gender of past sex partners (sexual behavior), 2) questions on gender of married or unmarried partners (couple status), or 3) questions on sexual identity (self identification as heterosexual, gay or lesbian, or bisexual).³ These questions point to overlapping but distinct constructs of sexual orientation that can be used to identify a subsample of sexual minorities and non-minorities (Sexual Minority Assessment Research Team 2009). For example, the GSS has questions on the gender of past sex partners and the US Census data allow identification of individuals in same-sex couples. A few studies have used datasets that allow comparison of these constructs and found significant but incomplete overlap (Sexual Minority Assessment Research Team 2009) and the choices here might affect estimates of sexual orientation differences (Black et al. 2000; Carpenter 2008).

³ Studies sometimes also ask about sexual attraction, but those questions have not been used as the primary identifier for sexual minorities in economic studies. Questions on gender identity or transgendered status are also asked on some surveys, but constitute a separate dimension of sex and sexuality than does sexual orientation.

In addition to variation in the measures of sexual orientation, datasets provide various measures of earnings (annual or weekly; continuous or categorical), and sets of control variables for individual or family characteristics (e.g., presence of children, health or disability measures), geographic location (none, region, city), or job characteristics (occupation, industry, hours or weeks of employment).

Together, the choice of dataset with its specific sample, earnings or income measure, sexual orientation measure, and potential control variables, along with methods and modeling choices made by researchers, could explain variation in the size and significance of the findings from studies of sexual orientation differences.

Meta-Regression Sample and Methodology

Meta-analysis provides a framework for modeling the effects of dataset attributes and researcher choices of variables and models on the estimated sexual orientation differences (Stanley 2001). More specifically, meta-regression uses multivariate analysis to estimate the size of a parameter (here the effect of sexual orientation on earnings) and how it varies systematically with characteristics of the data and methods of studies.

The sample for this meta-regression includes all English-language journal articles using multivariate analysis of earnings or wages to assess the effects of sexual orientation published prior to April 2011. I began with a literature review by Badgett et al (2007), then used Google Scholar to identify any additional studies that cite Badgett (1995), the first study, or other early studies including Klawitter and Flatt (1998), Blandford (2000), Allegretto and Arthur (2001),

Black et al. (2003), and Carpenter (2005). I also reviewed citations in these and other identified studies for any additional works. This search process yielded published 26 articles using 14 different datasets, several of which provided multiple estimates. Appendix A lists the studies used for this paper.

I include only published articles to better define the population of studies and to capitalize on the peer review process, though it could introduce bias towards larger and more significant estimates. In general, I chose only one estimate from each study so as to not give more weight to studies that used many models or subsamples, though I did include multiple estimates from articles estimating results for both men and women (most studies), using multiple datasets, separate models comparing to gays to married and unmarried heterosexuals, or for mutually exclusive subsamples of gays and lesbians (e.g., those married and unmarried or partnered and unpartnered). In general, I chose estimates from the regression or decomposition model that included the largest set of covariates unless those results were not fully reported in the article. The main findings of this paper and the meta-regressions are limited to studies of individual earnings, though I also report and briefly discuss average estimates of household earnings or income.

For each of the studies, I identified the percentage difference in earnings for gay men or lesbians relative to the heterosexual comparison group.⁴ I also coded variables to assess the effects of

⁴ I converted coefficients to percentage differences. Where models included continuous variables interacted with sexual orientation, I added in the interaction term multiplied by the mean level for the sexual minority group to get an overall difference in earnings. I did not add in interaction terms for indicators of discrete variables. For decompositions, I used the unexplained percentage of the earnings difference associated with sexual minority status.

dataset, sample restrictions, regression methods, outcome and sexual orientation definitions, and control variables on the estimated impact. These variables form the data for the meta-regression analysis with the outcome of a study's estimate of the percentage difference in earnings (*Gay% diff*) and the study and design characteristics as the explanatory factors (*Z*).

$$Gay\% diff_s = \delta_0 + \delta_z Z + \varepsilon_s$$

In the simplest model, I use only indicators of which dataset was used: US Census 2000, GSS, other US dataset, or non-US dataset, with US Census 1990 serving as the reference category.

This model provides a baseline estimate of how much variation in estimates of sexual orientation differences is driven by the choice of dataset. Estimates for these and all models include robust standard errors and, except for those for this first model with dummies for dataset, the standard errors are clustered by dataset to account for correlation across studies using the same dataset.

In models without clustered standard errors, tests showed no evidence of heteroskedasticity for any of the specifications in Tables 3 and 4.

Appendix B includes descriptive statistics for all study characteristics separately for studies of men and women.

In all other models, key among the characteristics in *Z* is the type of sexual orientation measure: same-sex couple status (the reference category), sexual behavior, or sexual identity which is dictated by the choice of dataset. Workplace discrimination may be more likely when gay men or lesbians are more visible and those with a same-sex partner or willing to identify as gay might therefore have lower earnings than those with more hidden sexual behaviors. So studies using sexual behavior measures might find smaller sexual orientation differences. Also, most but not

all studies using couple status as the indicator of sexual orientation limit their comparison samples to those in married or unmarried different-sex couples and some evidence suggests that sexual orientation differences might be larger among those in couples (Carpenter 2008).⁵ Also, many researchers use married couples as the comparison group for those in same-sex couples and this may magnify differences given more intensive household specialization and the possible male “marriage bonus” for married heterosexual couples (Antecol and Steinberger 2009; Zavodny 2007).

Other explanatory variables describe basic dataset characteristics including the year of the outcome data (the midpoint if a range of survey dates was used), size of the gay sample, and an indicator of whether or not the data are from the US.⁶ Discrimination might be decreasing over time mirroring the patterns in public opinion on homosexuality or in response to the increasing number of state and local policies prohibiting sexual orientation discrimination (Klawitter 2011; Loftus 2001). Larger samples of sexual minorities are likely to result in more stable estimates of sexual orientation differences but might also be associated with changes the size of estimates. Survey methods or other factors could affect willingness to identify as having same-sex partners or a gay identity on surveys and this might result in a changing mix of who is identified as a sexual minority in ways associated with earnings.

⁵ Some researchers include all or a subset of unpartnered people treating them all as a single comparison group (along with married and unmarried heterosexual couples) without distinguishing by sexual orientation.

⁶ I also tried models that included both the sample size for sexual minorities and the overall sample size. The results are very similar to those presented here and the overall sample size was almost always statistically insignificant.

It's unclear whether sexual orientation differences are likely to be higher or lower in other developed countries than in the US and the mix of non-US studies here includes some with more regulated labor markets and less discrimination (Sweden and Canada) and some with more market-based policies (Australia and U.K.) (Kelly 2001).

In additional models, I add variables describing the study's treatment of work intensity: an indicator of the outcome being hourly earnings constructed by dividing annual earnings by hours worked (rather than annual or monthly earnings), an indicator of whether the sample was limited to full-time workers, and whether control variables accounted for hours worked. These variables are important to understanding the role work choices and intrahousehold time allocation might play in sexual orientation differences, but could themselves partly capture effects of discrimination. I expected these to be most important in studies of women given greater hours worked for lesbians than for heterosexual women, especially among those who are partnered (Antecol and Steinberger 2009; Black, Sanders, and Taylor 2007). Gay men have somewhat lower work hours and weeks than do heterosexual men, though the differences are smaller than those among women (Black et al. 2007). For both men and women, controlling for work intensity might decrease the size of the sexual orientation differences.

Other models include indicators for whether the study included controls for occupation or industry, presence of children in the household, and urban location. Sexual minorities might try to minimize exposure to discrimination by choosing occupations or industries that are more gay-friendly which means that controlling for these lead to an underestimate of the effects of discrimination on earnings. However, other influences might also lead to gays and lesbians

making different occupational choices, on average, than do heterosexuals and we would like to parse out any earnings effects due to different choices that are not driven by discrimination.

Although many same-sex couples are raising children, they do so less often than do heterosexual couples, and those raising children may make different work choices that could affect earnings differences (Black et al. 2000). For example, not accounting for child-rearing in estimates for women might result in estimating higher premiums for lesbians because of less influence on their work life (Jepsen 2007). Wages tend to be higher in urban areas and sexual minorities are more likely to live in those places. Controlling for being in a urban setting is thus likely to decrease the size of the sexual minority difference.

Finally, I explore the effects of using a Heckman selection model or an Oaxaca-Blinder decomposition model. The selection correction might be important in accounting for the endogenous decision of labor market participation especially among women. Lesbians are less likely than are heterosexual women to work part-time or to drop out of the labor market (Antecol and Steinberger 2009) and that selection process might decrease the sexual orientation gap. Allowing for differential influence of worker characteristics by sexual orientation with a decomposition might inflate or deflate the estimated differences by more carefully parceling out the variation in earnings to that associated with the levels of observed characteristics and their pay-offs.

Some explanatory factors were included in all or nearly all studies so are not included as explanations for the size of estimated of sexual orientation differences: education, race, and gender are most important here. Also, Jarrell and Stanley (2004) found that male researchers

estimated larger gender wage gaps than did females. Many but not all of the studies here have at least one sexual minority researcher, but I do not know the sexual orientation of researchers on all studies so cannot include it here.

Results

Table 1 summarizes 30 separate estimates of sexual orientation differences each for men and women.⁷ The multivariate regression studies, on average, found that gay men earned 12 percent less than did heterosexual men (both mean and median) though the range was from 31 percent less to 4 percent more across studies. Most studies found that lesbians earned more than did heterosexual women: a mean of 12 percent more and median of 6 percent more. The range for studies of women was much wider: from 25 percent less to 54 percent more and a standard deviation of 16 percentage points (compared to only 10 percentage points for men).

Table 1: Summary Statistics for Meta-Regression Samples

	Men	Women
Number of Studies	30	30
Mean	-12%	12%
Median	-12%	6%
Standard Deviation	10%	16%
Range	-31% to +4%	-25% to +54%

Figure 1 is a scatter plot showing the variation in estimates of sexual orientation differences over time from 1989 to 2006. The simple regression line shows how estimates from studies of both

⁷ The sample sizes are coincidentally the same for men and women; some studies use only women and some only men.

men and women have converged towards 0 over time though significant variation remains even in more recent studies. As discussed above, this convergence might be explained by decreasing discrimination or increasing disclosure changing samples of sexual minorities, but might also be attributable to changing study designs or modeling choices over time.

Figure 1: Estimates for Sexual orientation difference for men and women over time

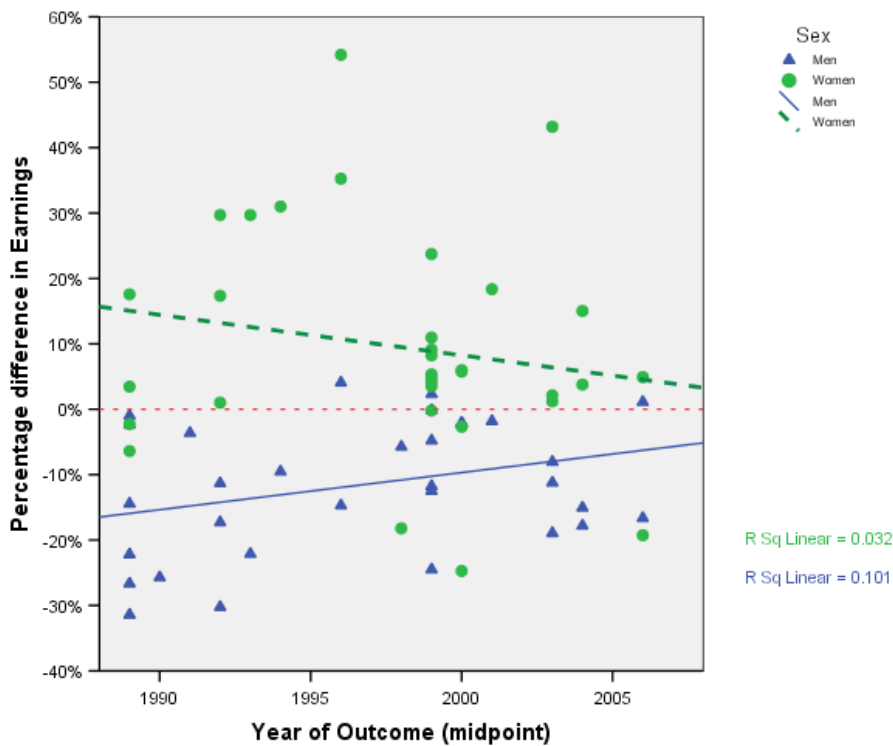


Table 2 explores the influence of key study characteristics on median estimates of the sexual orientation differences. Again, the estimates for women demonstrate much greater variation across study characteristics than do those for men.

Thirty percent of the studies used the US Census data with slightly more using the 2000 data than the 1990 data. Another 30 percent of studies used data from the General Social Survey

(GSS) and the remaining studies used a mix of other US datasets or data from other developed countries.⁸ Among men, the smallest estimates of the impact of sexual orientation come from countries other than the US and the US datasets show a relatively narrow range of median estimates of earnings penalties for gay men from -12 to -18 percentage points. The estimates of the gap for women are also relatively small for other countries (6 percentage point premium for lesbians), but range from 4 percentage points (other US datasets) to 30 percentage points for the GSS. The large premium for lesbians in GSS studies will show up again below as these studies share other characteristics including a sexual behavior measure for sexual orientation and an annual measure of earnings.

About half the studies, including the US Censuses and many of the non-US datasets, use couple status (being in a same-sex couple) to identify people as gay, lesbian, or bisexual. The 30 percent of studies that use sexual behavior to categorize individuals are almost entirely made up of studies using the GSS.⁹ Other US and non-US studies used an explicit question on sexual orientation identity and these studies estimated the smallest effects of sexual orientation for men (-2 percent) and at the bottom of the range for women as well (6 percent). Contrary to the theory about sexual behaviors being less overt than couple status or identity, the studies using sexual behavior measures, primarily the GSS, find the largest earnings differences: -16 percent for gay men and +30 percent for lesbians. These large differences for GSS could result from the studies

⁸ Other US datasets include Current Population Survey, Behavioral Risk Factor Surveillance System, National Health and Nutrition Examination Surveys, and California Health Interview Survey. Data from other countries are from Canada, Australia, United Kingdom, Netherlands, and Sweden.

⁹ The one other study with a sexual behavior measure used the National Health and Nutrition Examination Survey (Carpenter 2007). That survey asked about household income, but Carpenter limited his sample to men living alone to get individual income.

including as sexual minorities those who have had same-sex sexual partners in the past who might not be in a same-sex partnership or identify as gay or lesbian. The smaller differences found in studies using couple status is somewhat surprising given that many of these studies compare those in same-sex couples to those in married different-sex couples which generally gives larger gaps than when comparing to cohabitating different-sex couples.

As expected, studies using annual or monthly earnings (most of the studies) estimate larger sexual orientation differences than do hourly earnings studies given the effects of fewer hours of work for gay men and more for lesbians than for their heterosexual counterparts. Limiting the sample to full time workers has a greater impact on estimates among women than among men, though the direction of the impact is unexpected. The unexpected result for women is likely explained by GSS studies which use a categorical question on annual earnings, but which uniformly limit samples to full-time workers.¹⁰ Studies estimating differences in household income find that, despite sizable individual earnings penalties, gay male couples have incomes similar to those of heterosexual married couples (-1 percent) while incomes for lesbian couples are significantly lower (-18 percent). The household income differences point back to the influence of gender wage differentials as a key driver of sexual orientation differences.

Overall, these cross tabulations highlight some of the key influences on estimated impacts of sexual orientation and multivariate analysis will help to disentangle at least some of them.

¹⁰ The GSS includes a question about whether workers are working full or part time, but has no more specific question on the number of hours worked.

Table 2: Median Differences by Study Characteristics

Characteristics of Study	Percent of studies	Median difference in earnings or income by sexual orientation	
		MEN	WOMEN
Data Set			
U.S. Census data 1990	13%	-18%	8%
U.S. Census data 2000	17%	-12%	5%
General Social Survey data	30%	-15%	30%
Other US study	13%	-16%	4%
Non US study	27%	-6%	6%
	100%		
Sexual Orientation Measure			
Couple status	48%	-13%	5%
Self Identity	22%	-2%	6%
Sexual Behavior	30%	-16%	30%
	100%		
Earning or Income measure			
Annual or monthly (Individual)	73%	-15%	13%
Hourly (Individual)	27%	-4%	4%
Household total*	(n=6)	-1%	-18%
	100%		
Sample limited to Full time workers			
Yes	47%	-15%	13%
No	53%	-11%	5%
Method			
Heckman Selection correction	13%	-16%	4%
Decomposition	15%	-5%	5%
Neither	72%	-13%	10%
* Household income models (n=3) are not included in the other calculations in this table.			

Meta-regressions of studies of men

Tables 3 and 4 shows meta-regression results for men and women, respectively.

Column 1 in Table 3 shows results for the model with only indicators for the dataset used: US Census for 1990 (the reference category), 2000 US Census, GSS, other US dataset, or non-US dataset. On average, studies using the 1990 US Census estimated an earnings penalty of -17.6 percent for gay men (the constant); studies using other datasets estimated slightly smaller penalties, though none of the dataset differences were statistically significant. These dataset indicators capture about 13 percent of the variation in estimates of sexual orientation differences ($R^2 = .13$).

Model 2 substitutes the basic dataset characteristics of year of outcome (base=1989), gay sample size (divided by 1000) and an indicator of US data. Together these explain about the same proportion of variation in estimates for men ($R^2 = .16$). Only the constant and gay sample size coefficients are significantly different than 0, with larger samples associated with smaller penalties (more positive estimates). This positive effect of sample size on estimates for men is generally consistent across models with additional control variables. After controlling for other characteristics, estimates do not vary significantly over time in most models, though all coefficients are positive and one is significant.

Model 3 adds indicators for the type of sexual orientation measure. These coefficients suggest that the earnings penalty for gay men is about 8 percentage points smaller (more positive) for studies using a measure of sexual identity than for studies using a couples status measure (the reference category). Studies using sexual behavior measures have impacts insignificantly larger than do those using couple status. This, like the cross-tabulation results, is consistent with identity being less associated with discrimination than sexual behavior or couple status.

Controls for labor market time are added in Model 4 showing that studies that use hourly earnings, limit samples to full-time workers, or control for hours worked find smaller earnings penalties (more positive earnings estimates) for gay men by 8, 12 and 8 percentage points, respectively. This result is consistent with studies finding fewer hours and less full-time work for gay men than for other heterosexual men (Elmslie and Tebaldi 2007; Klawitter 2011). As discussed above, gender wage gaps could be the key influence here in that earnings for a male partner could encourage gay men to choose more leisure, but discrimination could also limit available work hours. The proportion of variation explained for men jumps considerably after adding the work effort variables from $R^2=.23$ to $.57$ ($F=5.53$).

Finally, the last model adds controls for occupation or industry of employment, urban location, and whether children are present. None of these are significant, though the group adds somewhat to model predictive power, the difference is not significantly more than Model 4 ($R^2=.65$, $F=1.37$). In models not shown, I find no significant differences in the earnings estimates depending on whether the study controls for health or disability limitation and whether the model is a decomposition or uses a Heckman selection correction. None of these factors were significant for studies of men whether entered as a group or singly.

On the whole, the results suggest that characteristics of the studies of men explain a hefty proportion of the variation in the estimates of sexual orientation differences—much beyond identification of the dataset. Gay sample size, whether the data come from the US, the type of sexual orientation measure, and controls for work intensity all contribute to variation across studies.

Table 3: Meta-Regression Results for Men

	(1)	(2)	(3)	(4)	(5)
U.S. Census data 2000	0.083	(0.075)			
General Social Survey data	0.030	(0.069)			
Other US study	0.025	(0.075)			
Non US study	0.094	(0.063)			
Year of outcome (midpoint less 1989)		0.003 (0.003)	0.003 (0.003)	0.006* (0.003)	0.004 (0.003)
Sample size/1000 (gay)		0.004* (0.001)	0.006*** (0.001)	0.008** (0.002)	0.006 (0.003)
USA data		-0.047 (0.031)	-0.018 (0.032)	-0.091** (0.024)	-0.113** (0.035)
Sexual Behavior Measure			0.030 (0.024)	0.056 (0.027)	0.046 (0.040)
Sexual Identity Measure			0.082* (0.035)	0.049** (0.011)	0.057 (0.027)
Hourly earnings measure (not Annual or Monthly)				0.080* (0.032)	0.113 (0.056)
Full time workers only				0.123*** (0.019)	0.182* (0.072)
Controls for Hours worked				0.081** (0.025)	0.153* (0.071)
Controls for Occupation or Industry					-0.084 (0.087)
Controls for Urban location					0.021 (0.017)
Controls for Children present					0.076 (0.073)
Constant	-0.176*** (0.058)	-0.128* (0.039)	-0.181** (0.056)	-0.255*** (0.034)	-0.254*** (0.012)
N	30	30	30	30	30
R-squared	0.13	0.16	0.23	0.57	0.65
Robust Standard errors in parentheses; Standard Errors are clustered by data set categories except in Model 1.					
Sample includes all studies using individual level outcomes. Reference categories are US Census data 1990 and Couples status measure.					
* p<0.10 ** p<.05 *** p<.01					

Table 4: Meta-Regression Results for Women

	(1)	(2)	(3)	(4)	(5)					
U.S. Census data 2000	0.0002	(0.081)								
General Social Survey data	0.176*	(0.100)								
Other US study	-0.023	(0.090)								
Non US study	-0.004	(0.098)								
Year of outcome (midpoint less 1989)		-0.0004	(0.008)	0.010	(0.011)	0.009	(0.011)	0.012*	(0.006)	
Sample size/1000 (gay)		-0.006	(0.006)	0.0002	(0.002)	0.001	(0.004)	-0.004	(0.004)	
USA data		0.090	(0.100)	0.026	(0.071)	0.065	(0.080)	0.095	(0.086)	
Sexual Behavior Measure				0.233**	(0.074)	0.234**	(0.056)	0.280**	(0.080)	
Sexual Identity Measure				-0.007	(0.059)	0.024	(0.064)	0.019	(0.052)	
Hourly earnings measure (not Annual or Monthly)						-0.045	(0.087)	-0.048	(0.082)	
Full time workers only						-0.083	(0.060)	-0.051	(0.085)	
Controls for Hours worked						-0.087	(0.065)	0.031	(0.096)	
Controls for Occupation or Industry								-0.143	(0.091)	
Controls for Urban location								-0.096	(0.062)	
Controls for Children present								0.103	(0.116)	
Constant	0.077	(0.077)	0.081	(0.098)	-0.045	(0.153)	0.000	(0.150)	0.061	(0.137)
N	30	30	30	30	30	30	30	30		
R-squared	0.26	0.09	0.30	0.37	0.48					
Robust Standard errors in parentheses; Standard Errors are clustered by data set categories except in Model 1.										
Sample includes all studies using individual level outcomes. Reference categories are US Census data 1990 and Couples status measure.										
* p<0.10 ** p<.05 *** p<.01										

Meta-regressions of studies of women

Model 1 in Table 4 shows that a much larger proportion of the variation in estimates of women's sexual orientation differences is explained by which dataset is used than for men ($R^2 = .26$ vs. $.13$). Estimates from studies using the GSS are almost 18 percentage points higher than those from the 1990 US Census which average a 7.7 percent advantage for lesbians over heterosexual women (shown by the constant term). Estimates from studies using other datasets did not differ significantly from the 1990 census.

In contrast to Model 2 for studies of men, for women the year of outcome, gay sample size, and country did not explain nearly as much of the variation in estimates as did the dataset indicators ($R^2 = .09$). However, once indicators of the type of sexual orientation measure were included (Model 3), much more of the variance was accounted for ($R^2 = .30$; $F=3,6$) because of how closely tied the type of measure is to specific datasets. Studies using sexual behavior measures (primarily the GSS) had estimates of the lesbian earnings premium 23 percentage points higher than those using couple status and this effect persists even after adding additional study characteristics to the model (in Models 4 and 5).

Model 4 adds variables that account for the amount of time worked and, as expected, using an hourly earnings measure (rather than annual), limiting the sample to full-time workers, or controlling for hours worked all decrease the estimated lesbian advantage. None of the coefficients are statistically significant, and as a group, they add modestly, but not significantly to predictive power ($R^2 = .37$; $F=.78$).

Additional controls for occupation or industry, urban location, and presence of children are not statistically significant when entered as a group or, in results not shown, individually. These boost the proportion of variance explained to .48, though the difference is not statistically significant ($F=1.27$). I also tried models that added indicators of whether the study controlled for health or disability and whether it used decomposition or Heckman selection methods; these were not significant when added as a group or individually and did not result in large changes in the size or significance of other coefficients.

In sum, for women the dataset used (and its associated measure of sexual orientation) clearly drives much more of the variation in estimates of sexual orientation differences than for men. Surprisingly, the work intensity variables explain less variation within studies of women than of men.

Discussion and Conclusions

The 26 studies of sexual orientation show an average earnings penalty of 12 percent for gay men and an earnings premium of 12 percent for lesbians, but also a wide range of estimates. The meta-regression results show strong relationships between study characteristics and the estimated effects of sexual orientation for men and less so for women. For women, choice of dataset makes the largest contribution to our ability to explain variation in estimates of sexual orientation differences.

Here I want to return to discussion of the roles of discrimination, human capital, and intrahousehold factors and the lingering questions of whether the conflicting findings for gay

men and lesbians are consistent with discrimination, whether human capital or intrahousehold influences can explain the lesbian earnings premium.

Discrimination

The meta-analysis shows evidence consistent with discrimination for gay men, but not for lesbians. Almost all studies have found an earnings penalty for gay men using a wide variety of methods; only a few studies found an earnings penalty for lesbians and most found a significant earnings premium even after controlling for many observable characteristics.

The meta-regression results for men from Model 4 suggest that a U.S. study in the middle of the period (1999) with a sample of 3000 gay men and using a couples status measure would find a gay penalty of about -26 percentage points ($-.255 + .006*10 + .008*3 - .091$). Using hourly earnings or limiting the sample to fulltime workers would decrease that to a 14 to 18 percentage point penalty. By 2009, we would expect that estimate to drop by another 6 percentage points, resulting in a penalty of 8 to 12 percentage points--smaller than estimated in many studies, but still sizeable and consistent with significant labor market discrimination.

In contrast, there is not much evidence of an impact of discrimination on earnings for lesbians, despite the other types of discrimination studies mentioned in the introduction. A similar hypothetical study using a couple status measure as described in the prior paragraph might find a lesbian premium of 16 percentage points. Using hourly earnings, limiting the sample to full-time workers, or controlling for work hours would cut the estimate by 5 to 9 percentage points to 7 to 11 percentage points—still a hefty premium and a GSS study would be predicted to result in a 31

percentage point premium. Ten years later, in 2009, the meta-regression suggests the estimate would be higher by 9 percentage points, in contrast to the fall for men. There is little here to suggest discrimination unless there are large off-setting positive influences on lesbians' earnings that studies have not accounted for.

The conflicting findings for gay men and women raise the question of whether sexual orientation discrimination is the explanation for the results for gay men. Is there evidence that would support the hypothesis that discrimination affects earnings for gay men, if not for lesbians? Among American men, attitudes towards gay men are less positive than those towards lesbians and, if men are more likely than women to hire, fire, or promote workers, that could result in more labor market discrimination against gay men, but not women (Herek 2000a).

Consistent with the hypothesis of discrimination for gay men, jobs in the private sector show larger earnings penalties for gay men than in government sector jobs (Klawitter 2011). Again, the pattern for lesbians is different—significant earnings premiums in the private and nonprofit sectors, none in government employment.¹¹

A few studies have tried to assess the importance of discrimination through a proxy for whether people were openly gay. These studies used current marital status and a sexual behavior measure to assess the earnings influence of openly living as gay (“unmasked”) versus having same-sex sexual partners but being married (“masked”) (Blandford 2003; Cushing-Daniels and Yeung 2009). These studies have found greater earnings penalties for gay men who were unmarried

¹¹ The lesbian pattern is, however, consistent with lesbians choosing to work more combined with greater flexibility in hours of work in non-governmental jobs.

than those who were married suggestive of potential discrimination for those who are more visibly gay¹². The results for lesbians were mixed, but the most recent study found greater earnings premiums for married lesbians than for unmarried lesbians (inconsistent with both the discrimination story and an intrahousehold story) (Cushing-Daniels and Yeung 2009). These results are consistent with more discrimination for gay men than for lesbians.

Finally, if discrimination is driving earnings differences, especially for gay men, then policies designed to limit discrimination could be effective. Two studies found evidence that state antidiscrimination policies significantly increased earnings for gay men: Baumle and Poston (2011) found a significant impact of state antidiscrimination policies on annual earnings and Klawitter (2011) found evidence that state antidiscrimination policies were associated with greater weeks worked for gay men especially in private sector jobs. However, Klawitter did not find significant impacts on hourly earnings or hours worked for gay men and that weakens the support for the discrimination explanation.¹³ Neither study found similar evidence of policy impacts for lesbians.

Human capital

Many authors have suggested that the explanation for the lesbian advantage found in the meta-analysis lies in greater accumulation of human capital, especially work experience. Both gay men and lesbians have more education, on average, than do heterosexuals (Antecol et al. 2008; Black et al. 2000; Carpenter 2004; Elmslie and Tebaldi 2007; Zavodny 2007) and results from

¹² The studies found the rates of being “masked” (married) were roughly similar for men and women (between 20 and 26 percent of gay or bisexual men or women).

¹³ Antidiscrimination policies may be more effective in hiring or firing than in internal promotion, work time, or pay policies and that could explain the pattern for men.

decomposition studies show that education contributes the most to earnings differences by sexual orientation (Antecol et al. 2008; Daneshvary et al. 2007). All studies in the meta-regression include measures of education and age—both important albeit imperfect proxies for human capital, but as the meta-regression shows, these controls do not eliminate the estimated lesbian earnings premium.

One explanation might be differences in work experience, not captured even in studies including measures of “potential experience”. Unfortunately, none of the major datasets has information on actual cumulative work experience and the proxy normally used of potential experience (age less years of education minus 5) will likely miss key differences in work history for lesbians and heterosexual women given patterns of work force attachment. The use of potential experience rather than actual experience could lead to an underestimate of the role of experience in explaining sexual orientation differences as it has with gender differences (Regan and Oaxaca 2008) and that might partly explain the lesbian earnings premiums.

Potential experience pay-offs at a higher rate for lesbians than for heterosexual women, perhaps because of the greater actual experience for lesbians at each level of potential experience (Daneshvary et al. 2007). Also, Daneshvary, Waddoups, and Wimmer (2009) compared lesbians who had been previously married with those never married and found greater lesbian wage premiums for those never married, consistent with differences in human capital accumulation because of differing expectations of future work. Expectations about future household roles could have suppressed both experience and the quality of human capital for previously married lesbians relative to those who presumably expected to be with female partners in the future.

On the whole, human capital differences, in particular the intensity of work experience, might explain the lesbian earnings premiums. This issue could be examined in future data sets if actual work experience data were available along with information on sexual orientation.

Gender and Intrahousehold decisions

The earnings premiums for lesbians and many of the patterns in the meta-analysis for both men and women point to the importance of gender and intrahousehold decision-making in explaining sexual orientation differences.

The meta-regressions show that controlling for work effort somewhat offsets the negative earnings penalty for gay men and the earnings premium for lesbians. This is consistent with studies showing fewer hours and weeks of work for gay men and greater work effort for lesbians relative to heterosexuals (Baumle and Poston 2011; Antecol and Steinberger 2011; Tebaldi and Elmslie 2006). As noted above, work intensity could decrease as discriminatory actions create fewer opportunities for jobs or work hours, but work hours are also a critical outcome in intrahousehold decisions about income and home work (especially child-rearing). Again, the pattern for gay men is more consistent with an effect of discrimination on job availability than that for lesbians.

The level of expected earnings from a same-sex partner could account for these gender patterns and unlike the differential discrimination hypothesis, would explain the lesbian premium as well as the gay male penalty. Lesbians expecting their own female-sized earnings not to be balanced

by higher earnings from a male partner might work more, work in more intensive jobs, and might invest in more human capital. In contrast, gay men might worry less about their own earnings and human capital because of expectations of earnings from a male partner.

In addition to the influence of potential earnings from a partner, cultural differences or norms might affect how gay and lesbians families organize home life. Same-sex couples are less likely to specialize in market and home work and more likely to have both partners in the labor market even when children are present (Antecol and Steinberger 2009; Black et al. 2007). Same-sex couples are also less likely to be raising children than are different-sex couples (Black et al. 2007), however, controlling for child-rearing does not explain the largest differences across studies (as the meta-regression shows) and earnings premiums are found for lesbians with and without children (Jepsen 2007). A few studies have also suggested that same-sex couples may make decisions differently than do married and cohabitating different-sex couples (Blumstein and Schwartz 1983; Burns et al 2008; Klawitter 2008; Kurdek 2005). However, there is also evidence of specialization and inequality within same-sex couples, especially among those with children at home (Antecol and Steinberger 2011; Carrington 2000).

These intrahousehold patterns could lead to larger estimates of sexual orientation effects using couples than among all adults. In one of the few studies able to assess that, Carpenter (2008) did find much larger gaps for samples of couples in Canadian data. Here, the meta-regression did show evidence that studies using couple status measures for sexual orientation found larger earnings penalties for gay men but not for lesbians. Selection into couple membership could also influence earnings gaps as gay men and lesbians in couples are more likely to have

characteristics associated with higher incomes than are single gay men and lesbians (Carpenter and Gates 2008; Klawitter 2011).

Implications for researchers

The research on the influence of sexual orientation on labor market outcomes has blossomed over the last 15 years and is likely to become larger and richer as new data sets collect information on sexual orientation. The results here suggest a number of important lessons for researchers looking at earnings.

The meta-regression results show that the choice of dataset is critical for the size of estimates of sexual orientation differences, especially for women. For both men and women, the dataset dictates the researcher's ability to control for factors critical to parceling out contributions to earnings differences such as information on work intensity, occupation or industry, local labor market characteristics, and household membership. Perhaps most importantly, almost all datasets have only one measure of sexual orientation and that has a large effect on the estimates of sexual orientation differences, especially among women. Models and hypotheses are becoming more complex and will require more careful matching to datasets with appropriate measures and control variables.

All researchers need to consider the importance of work intensity in estimates of sexual orientation differences as these modeling choices have large effects for both men and women. Here, as with most other modeling choices, there are arguments both for and against adding

additional controls, so careful use of sensitivity analysis and interpretation are important to a fuller understanding of the model implications.

New data collection is critical to our ability to further understand sexual orientations among single and partnered adults—few data sets have information on both. And data sets sizable enough to support econometric analysis and including information on partnership, sexual identity, and sexual behavior are needed for to better understand the pathways of influence on labor market outcomes. Over-sampling of sexual minority populations would go a long way to getting better estimates of earnings differences in national data sets.

The rapid maturing of the economics literature addressing issues of sexual orientation has quickly created a more nuanced understanding of the complexities of differences in labor market outcomes as well as a broader set of topics. How much differences are driven by discrimination is still debatable, but the critical importance of intrahousehold influences has been thrown into relief.

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APPENDIX A: Studies in Meta-Analysis

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Appendix B: Descriptive Statistics for Studies of Men and Women

Variable	Men				Women			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Percentage difference (Straight less gay)	-12%	10%	-31%	4%	12%	16%	-25%	54%
Year of outcome (midpoint)	1997	5	1989	2006	1998	5	1989	2006
Sample size (total)	198955	479018	150	1898657	132134	327176	716	1515206
Sample size (gay)	2905	5524	18	20694	3351	6023	15	21797
US study indicator	0.73	0.45	0	1	0.70	0.47	0	1
Sexual Behavior Measure	0.33	0.48	0	1	0.27	0.45	0	1
Sexual Identity Measure	0.20	0.41	0	1	0.23	0.43	0	1
Couple status Measure	0.47	0.51	0	1	0.50	0.51	0	1
Hourly earnings measure (not Annual or Monthly)	0.27	0.45	0	1	0.27	0.45	0	1
Sample limited to Full time workers	0.47	0.51	0	1	0.47	0.51	0	1
Controls for Hours worked	0.27	0.45	0	1	0.30	0.47	0	1
Controls for Occupation or Industry	0.80	0.41	0	1	0.83	0.38	0	1
Controls for Urban residence	0.93	0.25	0	1	0.90	0.31	0	1
Controls for Children in Household	0.37	0.49	0	1	0.47	0.51	0	1
Controls for Health or Disability	0.07	0.25	0	1	0.20	0.41	0	1
Decomposition analysis	0.10	0.31	0	1	0.17	0.38	0	1
Heckman selection correction	0.13	0.35	0	1	0.17	0.38	0	1
Observations		30				30		