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ABSTRACT

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This paper examines whether gay and lesbian workers sort into tolerant occupations. With information on sexual orientation, prejudice and occupational choice taken from Australian Twin Registers, we find that gays and lesbians shy away from prejudiced occupations. We show that our segregation results are largely driven by those gay and lesbian workers with disclosed identities, and robust to the inclusion of unobserved factors that are inherited and observed factors that strongly correlate with productive skills and vocational preferences. Our segregation estimates are generally large and consistent with prejudice based theories of employer and employee discrimination against gay and lesbian workers.

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I Introduction

In this paper we examine how gay and lesbian workers fare in the labor market from a discrimination perspective laid out in Becker's 1957 book *The Economics of Discrimination*. Specifically, we test whether gay and lesbian workers avoid contact with prejudiced workers by estimating the relationship between sexual orientation, sexual prejudice and occupational segregation. In addition, our empirical strategy takes into account some of the selectivity effects that typically hinder studies on discrimination against gays and lesbians: the observability of the workers' sexual orientation, the share of prejudiced workers at the workplace, and differences in productivity and vocational taste that may exist between gay, lesbian and straight workers.

The data we use come from the Australian Twin Registers and contain detailed information on a large sample of identical and fraternal twins. In particular, we focus our attention on a 1992 sex survey in which twins were asked about their sexual orientation, the sexual orientation of their twin sibling, attitudes that touch upon various aspects of homophobic sentiments and the type of occupation in which they were employed.

The results indicate that gay and lesbian workers choose to work in less prejudiced occupations. In a series of estimations, we find that occupational segregation is (*a*) largely driven by those gay and lesbian workers with disclosed identities; (*b*) not driven by unobserved factors that gay and lesbian workers share with their twin and observed factors that strongly relate to productive skills and vocational preferences; and (*c*) cannot be explained by information based discrimination (where gays and lesbians are statistically discriminated against), positive discrimination (where gays and lesbians favor working alongside other gays and lesbians) and reverse causation (where workplace contact raises tolerance). Our findings are consistent with Becker's model of employer and employee prejudice and suggest that discriminatory tastes are to a large degree responsible for workplace segregation between gay and lesbian workers on the one hand and prejudiced straight workers on the other hand.

The remainder of the paper proceeds as follows. Section II provides the background and motivation behind this study. Section III describes our empirical strategy to estimate prejudiced based occupational segregation. After a description of the Australian Twin Registers in Section IV, the main parameter estimates are presented in Section V. In Sections VI and VII we are concerned with the internal and external validity of our findings. Section VIII highlights the implications and conclusions of this study.

II Background and Motivation

Much of the empirical research on discrimination against gays and lesbians has concentrated on prejudice based discrimination models taken from Becker's

(1957) seminal work on labor market discrimination. In there Becker formalized how equally productive workers are treated differently because of differences in discriminatory tastes of, among others, employees and employers. In case of gay and lesbian workers, for example, Becker's discrimination model would predict that in (the short run) equilibrium prejudice leads certainly to segregation and possibly to earnings differentials, where gay and lesbian workers end up earning less than heterosexual workers.

These prejudice predictions have a strong intuitive appeal. If employees are prejudiced and demand compensation to work alongside gay and lesbian workers, unprejudiced and optimizing employers will find it too expensive to simultaneously hire gay, lesbian and prejudiced straight workers, which in equilibrium leads to segregation. And similarly, if employers are prejudiced and perceive gay and lesbian workers as more expensive than they actually are, gays and lesbians will face the incentive to sort away from prejudiced employers and look for work at unprejudiced (or lesser prejudiced) employers. In equilibrium there is again market segregation where equilibrium wages of gay and lesbian workers are set by those employers that hire them. Market segregation occurs with earnings discrimination if there are not enough unprejudiced employers to hire all gay and lesbian workers. Since the gay and lesbian workforce is fairly small, it is not clear whether we should observe earnings discrimination against gay and lesbian workers.[1]

In the long run it is not clear whether prejudice models of employer discrimination can explain segregation and differences in earnings. Some have argued that employer prejudice cannot be held accountable for any labor market differences because discriminating employers cannot survive in a competitive labor market (Arrow 1973). Others have argued that prejudice may survive and cause structural segregation and differences in earnings because discriminating employers operate under market imperfections, because employers do not discriminate against gay and lesbian workers but discriminate in favor of straight workers, and because discriminating employers who go bankrupt under perfect competition return to the labor market as discriminating employees (Goldberg 1982; Black 1995; Charles and Guryan 2008).

Researchers have attempted to test these prejudice predictions by comparing the labor market earnings and occupational choices of gay, lesbian and heterosexual workers. Evidence of this kind appears ambiguous (at best). On one hand, the empirical studies on earnings differentials between gay and heterosexual men typically find that gay workers earn less then heterosexual workers,

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[1]In the Becker model minority workers are exposed to the discriminatory tastes of majority employers and employees. This does not imply that minority workers do not discriminate. If minority employers and employees discriminate against prejudiced majority workers, their tastes will likely lead to segregation between prejudiced minority workers and prejudiced majority workers. We do not expect, however, that discriminatory tastes of minority employers and employees will cause any observable difference in earnings between prejudiced and unprejudiced majority workers because there are too few gay and lesbian employers.

which is consistent with Becker's prejudice model of labor market discrimination (Badgett 1995; Klawitter and Flatt 1998; Clain and Leppel 2001; Berg and Lien 2002; Black, Makar, Sanders and Taylor 2003; Blandford 2003; Plug and Berkhout 2004 2008; Frank 2006; Carpenter 2007; Elmsie and Tebaldi 2007; Ahmed and Hammarstedt 2010). On the other hand, results taken from similar earnings studies on lesbian and heterosexual women often indicate that lesbian workers earn more, and not less, than other female workers, which goes against prejudice based models of discrimination (Klawitter and Flatt 1998; Clain and Leppel 2002; Berg and Lien 2002; Black, Makar, Sanders and Taylor 2003; Blandford 2003; Plug and Berkhout 2004; Arabsheibani, Marin and Wadsworth 2005; Elmsie and Tebaldi 2007; Ahmed and Hammerstedt 2010). To a lesser degree, researchers have looked at the relationship between sexual orientation and occupational segregation. These segregation studies generally find comparable results. That is, gay men are more likely to work in lower-ranked, more female-orientated occupations than other men, whereas lesbian women are more likely to work in higher-ranked, less female-orientated occupations than other women (Frank 2006; Black, Sanders and Taylor 2007; Elmsie and Tebaldi 2007; Antecol, Jong and Steinberger 2008).

Of course, there is serious concern that findings based on simple comparisons may not accurately reflect the sexual prejudices held by employers and employees. Possible productivity and taste differences between gay, lesbian and straight workers, the difficulty to observe and measure the discriminatory intentions of employers and employees, and the option gay and lesbian workers have to hide their identity are among the main reasons for concern. We will discuss each of these concerns in turn.

The first difficulty in detecting prejudice based segregation is that unobservable productivity and taste factors that affect the labor market decisions of workers may also be correlated with the workers' sexual orientation. In fact, there are strong theoretical reasons to believe that such omitted factors exist and drive the labor market outcomes as observed among gay and lesbian workers (Becker 1981). Since many gays and lesbians have no children and less likely gain from specialization, leading models of household specialization predict that gays are more likely to work in more female-orientated lower-paid occupations, and reversely that lesbians are more likely to work in more male-orientated higher-paid occupations.[2]

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[2]In light of this difficulty, there have been some recent field experiments that estimate the effect of sexual orientation on hiring probabilities using correspondence test data (Weichselbauer 2003; Drydakis 2009). The idea is to send out multiple fake resumes to real position ads and measure corresponding call-back rates. Sexual orientation is identified by means of a randomized resume entry on volunteering for the local gay and lesbian community. While these studies find some evidence of labor market discrimination against gay and lesbian applicants, they do not proof that it is prejudice driven. In line with the omitted factors argument, if some employers expect the productive skills among gay, lesbian and heterosexual workers to differ, correspondence experiments cannot make a distinction between prejudice based and information based discrimination models.

The second difficulty is that tests of prejudice models typically ignore direct measures of discriminatory attitudes. Without information on discriminatory intentions of employers and employees, however, it is theoretically possible to attribute any observed difference in occupational outcomes of lesbian, gay and straight workers to sexual prejudices held by employers and employees. So if, for example, discrimination by men against gays is more pervasive than discrimination by men against lesbians, and there are some reasons to believe that this is the case (Raja and Stokes 1998), we may consequently find that only gays are discriminated against and end up working in more female-orientated occupations with lower market earnings.

The third and final difficulty we consider is that prejudice tests should recognize that a worker's sexual orientation is not always apparent to employers and employees. Some gay and lesbian workers may fear the consequences of a discriminating labor market and hide their sexual orientation from their employer and fellow employees. If the workers' sexual orientation is known to us researchers but unknown to some employers, self-reported data on sexual orientation may not always be the relevant margin on which prejudiced employers and employees discriminate against. Instead a variable measuring the extent of workplace disclosure would be more appropriate to test Becker's prejudice predictions (Badgett 1995; Plug and Berkhout 2008).

Our empirical strategy overcomes at least some of the difficulties of earlier discrimination studies on sexual orientation and occupational choice. First, our statistical models include twin fixed effects and therefore control for all observed and unobserved characteristics that twins share. To the extent that twins with different orientation are identical in all their occupational preferences and productive skills, our estimated sexual orientation effects identify prejudice based segregation. Second, we use self-reported measures of prejudicial attitudes at the occupational level to explore Becker's prediction that gays and lesbians sort into less prejudiced occupations.[3] And third, we collected multiple measures of sexual orientation by asking each twin to report on their own and their twin's sexual orientation. If sibling disclosure is positively related to workplace disclosure, we can estimate the impact of sexual orientation on occupational choice within a disclosure framework and assess the role of disclosure in our estimates of prejudice based segregation.

Economists rarely make use of subjective attitude questions on prejudice. Much of the neglect, we believe, can be attributed to limited data availability and a general distrust. Information on prejudice in combination with labor market outcomes is rarely collected. Moreover, information on prejudice is possibly misleading. If people systematically underreport their prejudice, which goes under the name of social response bias, we would be more inclined to wrongfully dismiss prejudice based discrimination as one of the causes of the

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[3]In addition, we may use the same attitude measures to check whether the fraction of prejudiced employers (and employees) is large enough to potentially affect the wages of gay and lesbian workers.

observed wage differentials among gay, lesbian and straight workers. This does not mean, however, that it is impossible to obtain meaningful estimates from misleading prejudice measures. In our case, for example, we can still detect prejudice based segregation with systematic underreporting if we assume rank-order stability across tolerant and intolerant occupations.

There are a handful of studies that recognize the advantages of using data on prejudice attitudes and began to examine the relationship between racial prejudice, residential segregation or earnings directly (Cutler, Gleaser and Vigdor 1999; Dustmann and Preston 2001; Card, Mass and Rothstein 2008; Charles and Guryan 2008). As far as we know, there is one sexual prejudice study by Badgett and King (1997) that is closely related to the approach we take in this paper. They use information on sexual orientation, occupation and anti-gay attitudes from the General Social Survey and calculate the fraction of gay, lesbian and unprejudiced workers within five broadly defined occupational categories. They find that gay workers tend to work in more tolerant occupations, whereas lesbian workers seem to concentrate in lesser tolerant occupations. Badgett and King acknowledge, however, that their analysis is merely descriptive and that the combination of more specifically defined occupations with more sophisticated statistical strategies would help them to better understand how gay, lesbian and straight workers are distributed among different occupations. This is exactly what we set out to do in this paper. In a related fashion, we analyze how gay and lesbian workers choose their occupations. That is, we assess self-reported measures of sexual intolerance to test whether the labor market segregates gay and lesbian workers from prejudiced workers. In view of the sparse literature, we consider it useful to have more than one study using comparable methodologies with different data. In addition, we complement the work of Badgett and King in at least two other directions, of which we have already made mention.

III   Modeling Prejudice Based Segregation

In this Section, we formally define prejudice based segregation, introduce a methodological framework to arrive at regression equations, and propose our empirical strategy to test directly for prejudice based segregation.

A   Theoretical framework

We define prejudice based segregation to occur when gay and lesbian workers are less likely to choose to work in occupations where they expect to experience sexual intolerance. We model occupational choice akin to a standard selection model where workers (including gay, lesbian and straight workers) can choose one of two possible occupations: intolerant occupation and tolerant occupation. Workers get utility from working and choose to work in that occupation with

the highest utility. We model prejudice based segregation via the intolerant occupation, where exposure to the discriminatory tastes of employers and fellow workers causes disutility to gay and lesbian workers.

Let us start with defining the following variables: V^D and V^{ND} represent the utility the workers get from being employed in either intolerant or tolerant occupations, X and U represent the observable and unobservable productivity and occupational taste factors, and H denotes the workers' sexual orientation and equals 1 for gay and lesbian workers and 0 otherwise. If we specify utility by occupation to consist of observable and unobservable factors, and assume that the same attributes may impact utility differently in the two occupations, we may write

$$V_i^D = \alpha^D H_i + \beta^D X_i + \gamma^D U_i + \epsilon_i^D, \tag{1}$$

and

$$V_i^{ND} = \beta^{ND} X_i + \gamma^{ND} U_i + \epsilon_i^{ND}, \tag{2}$$

where i indicates workers, and where ϵ^D and ϵ^{ND} represent the stochastic error terms (that are uncorrelated with each other and with X_i and U_i). If we further assume that X and U fully determine the workers' main occupation, then prejudice based segregation occurs with a negative α^D. The reduced form of this model is obtained by taking the difference between (1) and (2); that is,

$$v_i^D = \alpha H_i + \beta X_i + \gamma U_i + \epsilon_i, \tag{3}$$

where a higher v^D signals that workers are more likely to choose to work in intolerant occupations, and where a negative α indicates prejudice based segregation. This result captures the spirit of Becker's segregation model: gay and lesbian workers get disutility from contact with discriminatory employers and fellow workers and therefore face the incentive to sort into more tolerant occupations.[4]

B Empirical Framework

A test for prejudice based segregation requires prior determination of tolerant and intolerant occupations. In our empirical model, we take the observed fraction of prejudiced straight workers by occupation as the relevant measure of intolerance F^D and let it depend on observable and unobservable productivity and taste factors

$$F_{ij}^D = \alpha_1 H_{ij} + \beta_1 X_{ij} + \gamma_1 U_{ij} + \epsilon_{ij}, \tag{4}$$

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[4]It is possible to reformulate Becker's theory on prejudice based discrimination (with identical segregation predictions) in terms of utility gains in tolerant occupations, where gay and lesbian workers get positive utility from contact with non-discriminatory employers and fellow workers. This will lead to a reduced from model identical to the one we present in equation (3).

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where indices i and j stand for worker i born in family j. The remaining error ϵ is uncorrelated with the unobserved components in U. Prejudiced based segregation is identified (by means of a negative α_1) if we either assume that all relevant productive skills and occupational tastes are related to variables we observe and control for, or that unobserved productivity and taste factors are not related to the workers' sexual orientation. In practice, however, these assumptions seem implausible.

We next consider whether we can identify α_1 if the worker is an identical twin and we have information for each twin pair on their sexual orientation and main occupation. If we suppress subscripts for notational convenience, and take the difference of equation (1) across workers who are identical twins we get

$$\Delta F^D = \alpha_1 \Delta H + \beta_1 \Delta X + \gamma_1 \Delta U + \Delta \epsilon. \tag{5}$$

Prejudiced based segregation is now identified if we assume that identical twins, albeit different in orientation, are identical in their unobservable productivity and taste factors ($\Delta U = 0$). While it seems plausible to impose similarity in productivity and taste factors among identical twins with similar genetic makeup and family background, not everyone is convinced that twin fixed effect estimation will give us unbiased estimates of prejudice based segregation. There are two main concerns, being (a) classification error in sexual orientation measures, and (b) the twins we use to identify prejudiced based segregation are almost but not fully identical. In what follows, we discuss each concern in more detail and explore possible routes to circumvent these concerns.

C   Measurement error

One of the fundamental problems that has received much attention in twin studies is measurement error. It is by now well known that measurement error leads to a bias towards zero, and that within twin differencing likely amplifies the downward bias. In our empirical analysis, in particular, we should be concerned about measurement error, for two reasons. First, information on sensitive issues such as the sexual orientation of twins may be more prone to measurement error. Second, measurement error in case of misclassified binary variables such as sexual orientation will never lead to classical measurement error, for which standard twin solutions are available (Ashenfelter and Krueger 1994). Instead, we follow Black, Berger and Scott (2000) who offer solutions to bound the parameter of interest if there are two noisy measures of the same binary variable. In our data we measure the respondents sexual orientation twice: respondents are asked to report on their own and their twins' sexual orientation. We combine these potentially noisy reports to construct lower and upper bounds on the sexual orientation effect, as in Black, Berger and Scott.[5]

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[5]This particular strategy to correct for measurement error is conceptually similar to the strategy we propose to test for disclosure effects. That is, Black, Berger and Scott would

D Sexual orientation differences among identical twins

The other problem we face is that identical twins with different sexual orientations are not fully identical. While prejudiced based segregation can still be identified if we assume that those unobservable twin differences in productivity and taste factors are unrelated to observable twin differences in sexual orientation, there is little empirical work documenting the extent to which unobserved heterogeneity among identical twins is actually random or not. To get some indication about the exogeneity of unobserved heterogeneity within twin pairs, we turn to possible confounding causes and consequences of sexual orientation differences among identical twins.

Gays and lesbians may be inherently different from heterosexuals. Dawood, Bailey and Martin (2009) have recently summarized those twin studies that estimate the heritability of sexual orientation by comparing similarity in sexual orientation among monozygotic and dizygotic twin pairs. The two most common findings are that monozygotic twins often differ in their sexual orientation, but that monozygotic twins (who share all genes) differ less in their sexual orientation than dizygotic twins (who share some but not all genes). They therefore conclude that sexual orientation must have genetic and environmental origins. In equation (4) it is easy to see that the influence of genetic and environmental factors that monozygotic twins share are eliminated by differencing. Environmental factors that are not shared, however, are still there and need to be taken into account. Dawood, Bailey and Martin report that these nonshared environmental factors explain about 30 to 70 percent of all the variation in sexual orientation. What it is that is causing these environmental differences among monozygotic twins is still unresolved. Among the possible early childhood causes, prenatal variation in hormonal intake and epigenetic variation in the on/off switching of genes are often mentioned as likely explanations for within-twin-pair sexual orientation differences (Bogaert 2006; Oates et al. 2006). To the extent that these prenatal hormonal and epigenetic differences also lead to differences in productivity and occupational preferences, it is possible that our estimates of prejudice based segregation are biased.

Gays, lesbians and heterosexuals may also face different constraints. In particular, we think of fertility differences where gays and lesbians express a lower demand for children because of biological (and legal) constraints. If children influence where people work, the sexual orientation effect as estimated in (5) will not only capture the impact of prejudice based segregation but also the way in which children (or absence of children) affect the occupational choice of gay and lesbian workers.

In an attempt to assess the empirical importance of unobserved heterogeneity within twin pairs, we check how our estimates change when we include measures that arguably correlate with sexual orientation *and* with skills and occupational

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interpret similarity in twin reports as an accuracy measure of sexual orientation, whereas we interpret similarity in twin reports as a measure of disclosure.

preferences. Small changes would indicate a marginal role of unobserved heterogeneity. In our data we propose various education and personality measures to quantify the influence of unobserved heterogeneity. Years of schooling is an obvious skill measure which has been shown to correlate with sexual orientation. As noted by Black, Sanders and Taylor (2007), the average years of schooling is generally higher for gay and lesbian workers than for heterosexual workers. Personality measures which we take from validated personality questionnaires have also been shown to vary with occupational choice as well as with sexual orientation (see the work of Mueller and Plug (2006), Borghans et al (2008) and Lippa (2005) on personality, labor market outcomes and sexual orientation).

IV Data

The data used in this study have started with a mail health and lifetime survey undertaken between 1988 and 1990 among twins enrolled in the Australian National Health and Medical Research Council Twin Registry (ATR). Joining the registry and responding to the survey are both voluntary. In 1992 those responding twins between ages 17 and 50 were contacted again and asked about their willingness to receive a questionnaire regarding sex.[6] Of the 9,112 twins that were contacted, 6,561 said yes, and 4,904 of them returned the questionnaire.

As our main datasource we thus use the 1992 sex survey held under a subset of twins. We focus our attention on those variables that are most relevant to an empirical analysis of sexual orientation, sexual prejudice and occupational segregation. We discuss each variable in turn, and report non-response rates for those sex questions we consider sensitive.

First, the questionnaire collects information on sexual orientation. Twins are asked whether they consider themselves as heterosexual (straight), bisexual, gay or lesbian. Those twins who reported to be gay, lesbian or bisexual are recoded such that they form one minority group. Of the 4,835 twins who responded to the sexual orientation question, we find that 215 of them are gay, lesbian or bisexual.[7]

Second, the sex questionnaire gathers implicit information on workplace disclosure. Twins are not only asked about their own sexual orientation but also about the sexual orientation of their twin sibling. We are therefore able to construct two measures for each twin's sexual orientation: one taken from the report of the twin, and the other one taken from the report by the respondent's twin on the respondent's sexual orientation. In much of our analysis we will interpret the degree of concordance between both measures within a disclosure

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[6]Specifically, they were asked the following question: We have applied for funding to carry out an *anonymous* study of sexual behavior and attitudes. Would you be willing to receive a questionnaire with explicit questions on these topics?

[7]In our empirical analysis, we pool gay, lesbian and bisexual workers to form sexual minority samples that are large enough to conduct sensible statistical analysis. In our discussions, however, we will mostly refer to gay and lesbian workers as sexual minority workers.

framework and assume that sexual minorities who come out to their twin siblings are also more likely to come out to their employers and fellow workers. The question about the siblings' sexual orientation has lead to some non-response. There are 3,637 twins for whom we have two sexual orientation measures. In this restricted sample 147 twins indicate that they are gay, lesbian or bisexual, of whom 57 have siblings who know their sexual orientation.[8]

Third, the questionnaire includes a set of attitude questions that touch upon various aspects of homophobic sentiments. That is, twins are confronted with 10 different sexual prejudice statements and are asked to answer yes if they agree with the statement, but answer no if they disagree. Statements are phrased within negative (discriminatory) and positive (nondiscriminatory) contexts and therefore vary in response format. A list of the sexual prejudice statements, together with a summary of the responses, are provided in Table 1. Assuming that respondents without homophobic sentiments always answer in a nondiscriminatory way, we define twin respondents as prejudiced respondents when they answer no to one of the positive statements (i.e., homosexuals should be allowed to dance with each other in public places) or yes to one of the negative statements (i.e., homosexuality is obscene and vulgar). At the outset we were concerned that many respondents would refuse to respond to questions involving homophobic sentiments. This is not the case. We are able to create a prejudice indicator for almost all twins. If we select those twins who gave at least two complete answers to ten separate statements, we lose only 16 observations.

Fourth, the sex survey collects labor market information on the twin's occupation. Answers are transformed according to Australian Standard Classification of Occupations (first edition). In anticipation of selective non-response because women do not always work during their working lives, twins are asked about their usual and regular lifetime occupation, rather than the occupation held in the year prior to the survey. If we exclude those twins who did not answer the lifetime occupation question, we are left with a sample of 3,746 twins.

And finally, the questionnaire also collects information on schooling and personality, which are two other explanatory variables that we will often use in our analysis. Schooling is measured in seven categories and equals the number of years nominally required for the highest level of schooling the twin completed. Personality traits are based on the Revised Eysenck Personality Questionnaire (REPQ) which has been designed to measure four personality dimensions in surveys using relatively short test instruments (Eysenck, Eysenck and Barrett 1985). The four personality traits in the REPQ are psychoticism, extraversion,

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[8]Our sibling disclosure rate of 40 percent appears low compared to previous estimates. Bell and Weinberg (1978) for example report that about 50 percent of the gays and about 70 percent of the lesbians have told their siblings about their homosexuality. This does not mean that disclosure patterns among gay, lesbian and bisexual twins in the ATR are necessarily different. Our disclosure estimate includes bisexual respondents, who are more easily perceived as straight. If we restrict our sample to gay and lesbian respondents, as Bell and Weinberg do, our two sexual orientation measures indicate that about 80 percent come out to their sibling.

neuroticism, and lying.

One of the key dependent variable in our analysis is the concentration of prejudiced workers who are straight calculated for each occupation where twin respondents are employed. To create this variable we exploit the cross sectional structure of the ATR and focus on those twins for whom we have complete information on occupation, prejudicial attitude and sexual orientation. The occupations we consider are two-digit occupational groups with more than 10 workers. Within each occupation we concentrate on straight workers only. We first calculate the share of male and female workers who are prejudiced and straight, and then compute weighted prejudice averages using representative occupation shares of male and female fulltime workers taken from the 1986 Census of Population and Housing. By the same token, we generate the concentration of sexual minority workers by occupation. We compute worker shares of gay and bisexual male workers and of lesbian and bisexual female workers, and then take a weighted occupation average. The twin sample we use to create these sexual prejudice and minority concentration variables consists of 3,731 workers, of whom 158 are gay, lesbian or bisexual. Of the 3,573 straight workers 2,474 are sexually prejudiced.

In our empirical analysis, however, we explore the twin structure of the ATR and focus on twin pairs and the differences between them. We therefore select those twin pairs for which we have complete information on occupation, sexual prejudice, their own and twin sibling's sexual orientation, schooling and personality (measured by at least two complete answers to the separate items that correspond to each personality trait). The number of twin pairs who returned the sex survey equals 1,908. But in the main empirical analysis we work with a subsample of 1,071 pairs of twins, where the reduction in sample size is largely due to incomplete occupational records (703 pairs) and incomplete records on the sibling's sexual orientation (107 pairs). Table 2 presents summary statistics for the main variables we study below.

V   Results

Before presenting our empirical estimates, we look at occupations in which prejudiced workers and gay and lesbian workers end up working, along with the total number of twins working across the two-digit occupations. In the first column of Table 3 we see that the majority of the straight workforce is prejudiced. When we concentrate on our sample of straight twins only, we find that about 75 percent is prejudiced. There is substantial variation in prejudicial attitudes across occupations, where prejudice patterns accord reasonably well with common perceptions of sexually tolerant and intolerant occupations. In the least prejudiced occupations –the 5 most tolerant occupations can be found among professionals including librarians, artists, medical practitioners and teachers– about 50 percent of the straight workers is prejudiced. In the most prejudiced occupa-

tions –the 5 most intolerant occupations can be found among plant operators and tradespersons including carpenters, motor mechanics, printing machinists and gardeners– more than 95 percent of the workforce is prejudiced. In the second column we see that about 5 percent of the workforce is gay or lesbian. Although the sample size is small –we work with 158 gay and lesbian workers across 51 different occupations– we find that gay and lesbian workers tend to work in more tolerant occupations. The raw correlation between the fraction of prejudiced workers and fraction of gay and lesbian workers is –0.204 and the raw correlation between the prejudice ranking and sexual minority ranking is –0.173. These numbers indicate that there is labor market segregation and that gays and lesbians sort into less prejudiced occupations. These numbers, however, represent associations and do not necessarily ensure that occupational segregation is prejudice driven.

To quantify more precisely the extent to which occupational segregation is prejudice driven, we estimate a variety of regression models as set out in equations (4) and (5). Table 4 reports these results. We begin with the estimates in panel A which are based on a sample of identical twins. In column (1) we regress occupational prejudice, as measured by the fraction of prejudiced workers among straight workers in each occupation, on whether a worker is lesbian or gay using the worker's own report on sexual orientation with additional controls for those demographic variables that are arguably exogenous (age, age squared and gender). The estimated effect is negative and statistically significant confirming previous associations that gay and lesbian workers tend to work in more tolerant occupations. With a standard deviation of occupational prejudice of 0.12, the least square estimate of -0.04 implies that segregation is sizable and represents a 30 percent of a one-standard-deviation decrease in the fraction of prejudiced fellow workers for gay and lesbian workers relative to straight workers.

In column (3) we run the same regression but replace the sexual orientation dummy with one dummy that equals one if worker and worker's twin sibling agree on whether the worker is gay or lesbian, as well as another dummy that equals one if the worker reports to be gay or lesbian, but the twin sibling believes the worker is straight. The estimates indicate that in particular gay and lesbian workers whose sexuality is accurately perceived by the worker's twin sibling end up working in more tolerant occupations. The estimate is negative, statistically significant and much larger than the estimate we find for disagreeing twins. If we interpret these estimated coefficients within a disclosure framework and recognize that prejudice based segregation depends on the ability of employers and fellow employees to distinguish the workers' sexual orientation, our results indicate that occupational segregation is indeed driven by those gay and lesbian workers with disclosed identities (assuming that sibling disclosure is informative about workplace disclosure). If we interpret these estimates within a measurement error framework and recognize that classification error will attenuate any sexual orientation estimate, our results indicate that classification error has a substantial impact on our sexual orientation estimates with fewer misclassified

observations among those gay and lesbian workers with concordant twin reports. In column (5) we allow for misclassification in the worker's sexual orientation report and make use of the cross-twin report as an instrument to eliminate the downward bias caused by classification error. The sexual orientation estimate is negative, statistically significant and substantial.[9] According to Black, Berger and Scott (2001), the estimates in columns (3) and (5) represent lower and upper bounds on the degree to which gay and lesbian workers avoid workplace contact with prejudiced colleagues; that is, gay and lesbian workers have between 7 and 9 percentage points fewer prejudiced colleagues.

Our primary concern in interpreting these cross-sectional estimates is that there may be important differences in productivity and occupational tastes between straight, gay and lesbian workers, and that these differences may drive gay and lesbian workers into more tolerant occupations, regardless the fraction of prejudiced fellow workers. We apply two empirical strategies to check whether gay and lesbian workers choose to work in more tolerant occupations because of higher fractions of tolerant fellow workers or because of something else. As a first strategy, we remove the influence of those observed and unobserved characteristics that identical twins share by adding twin fixed-effects to the previous three specifications. In columns (7), (9) and (11) we see that all the estimated sexual orientation effects are statistically significant, negative and comparable to, if not slightly larger than, the cross-sectional sexual orientation estimates.[10] As a second strategy, we run the same regressions except that variables measuring years of schooling and four personality traits (including psychoticism, extraversion, neuroticism, and lying) have been added. We choose these variables because they likely differ between straight, gay and lesbian workers and potentially correlate with productivity and vocational tastes. In the even columns (2) to (12) we obtain similar cross-sectional and twin fixed-effects estimates of sexual orientation when years of schooling and personality variables are included as additional controls.[11] Some estimates are less precise, however. In panel B we therefore report estimates using an extended sample of all twins, including identical and non-identical twins. Most of the sexual orientation results are comparable to those found for the sample restricted to identical twins, but with larger samples the estimates are now obtained with more precision.

In sum, our results indicate that gays and lesbians sort themselves into occupations which are perceived as tolerant, that the sorting effect is very significant,

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[9]Possible weak instruments concerns raised by among others Staiger and Stock (1997) do not apply. In our application the F-statistic from the first-stage regression equals 115.56.

[10]In columns (11) and (12) we allow for correlated measurement errors between the twins' reports of their own sexual orientation and of their siblings' sexual orientation. We follow Ashenfelter and Krueger (1994) and instrument the twins' self-reported twin difference in sexual orientation with the co-twin's reported twin difference in sexual orientation.

[11]It is worth noting that the inclusion of years of schooling and personality adds explanatory power to our model. In all our least squares specifications the R^2 improves with at least 20 percentage points.

and that there is little evidence of any strong impact from either observable variables that arguably correlate with productive skills and vocational preferences or unobservable variables that strongly correlate with genetic and family background factors.

VI Fact or Fiction?

While the estimates mentioned above suggest that there is prejudice based segregation, we should treat the segregation results with care. In this Section we introduce alternative mechanisms that possibly interfere with our pattern of results. We discuss each mechanism in turn, and try to test whether our interpretation of prejudiced based segregation is robust to these alternative (and perhaps competing) mechanisms.

A Occupational choice of straight workers

Thus far, we have ignored the behavior of prejudiced workers and interpreted the occupational segregation estimates reported above in terms of behavioral responses of gay and lesbian workers. Since prejudice based segregation could just as easily originate from straight workers who do not want to work alongside gay and lesbian workers, we also run a variety of regression models to see whether prejudiced workers actively avoid workplace contact with gay and lesbian workers. Analogue to equation (4), we take the fraction of gay and lesbian workers by occupation as the relevant measure of sexual composition and let it depend on worker's tolerance and (observable and unobservable) productivity and taste factors

$$F_{ij}^H = \alpha_2 D_{ij} + \beta_2 X_{ij} + \gamma_2 U_{ij} + \varepsilon_{ij}, \tag{6}$$

where F^H represents the occupational fraction of gay and lesbian workers, where D denotes the workers' intolerance to work alongside gay and lesbian workers and equals 1 for workers who are prejudiced and 0 otherwise, and where the error ε is assumed to be uncorrelated with U.

Table 5 contains the estimates based on equation (6). We concentrate only on straight twin pairs. In panel A we report estimates based on identical twins. In panel B we report estimates based on identical and fraternal twins. With prejudiced worker defined as a worker with at least one prejudiced response to the ten different prejudice statements, we find in column (1) a negative prejudice effect confirming that the labor market tends to segregate prejudiced workers from gay and lesbian workers. In column (3) we report the difference in the fraction of gay and lesbian workers for unprejudiced workers (no prejudiced response), workers who are a little prejudiced (one to four prejudiced responses) and those workers who are much prejudiced (at least five prejudiced responses). We find that the negative impact on the fraction of gay and lesbian fellow

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workers is considerably higher for those workers who are more prejudiced. The estimate of -0.007 is associated with a 20 percent of a one-standard-deviation decrease in the fraction of minority workers. Interestingly, we find that the cross-sectional estimates do not change much when we include variables measuring the worker's years of schooling and personality (columns (2) and (4) in panel A) or extend the sample with non-identical twins (columns (1) and (3) in panel B). In columns (5) to (8) we report the twin fixed-effects estimates which are intended to correct for the potential influence of the workers' unobservable and inherited characteristics that may be correlated with their attitudes towards gay and lesbian workers. All the estimated effects are no longer statistically significant and very close to zero. Comparison between the cross-sectional and fixed-effects estimates suggests that the negative relationship between the share of minority workers and prejudice are fully driven by the unobserved endowments that twins share and possibly relate to differences in productivity and taste.

B   Reverse causation: Exposure weakens prejudice

Another mechanism to explain why sexually prejudiced majority workers do not work alongside sexual minority workers is that minority exposure weakens majority prejudice. If prejudiced workers get to know gay and lesbian workers sufficiently well, it is possible that closer contact creates empathy (or reduces ignorance, when prejudice is caused by ignorance) and weakens the discriminatory attitudes held by prejudiced workers. This is an example of reverse causation, with important consequences. If prejudice is not the cause of little exposure, it may very well be that exposure is the cure for prejudice. There is some recent evidence on the prejudice relationship between exposure, race and gender suggesting that more minority exposure indeed leads to lesser discrimination among majority members (Boisjoly et al. 2006; Beaman et al 2009). These studies, however, do not examine the relationship between prejudice and majority exposure to sexual minorities.

To let this reverse causation story be consistent with our pattern of results, we should find that prejudiced straight workers when exposed are more likely to sympathize with gay and lesbian workers. In twin samples where we examine how gay and lesbian workers sort themselves into more tolerant occupations using twin fixed-effects regressions, this might be a possible explanation. However, in twin samples where we examine why prejudiced workers do not seem to work in gay and lesbian concentrated occupations, it is not. All the fixed-effects estimates in Table 5 are very close to zero and indicate that straight workers who are prejudiced are not affected by their gay and lesbian fellow workers, neither in the way they choose occupations, nor in the (reverse) way they express their homophobic attitudes.

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C Information based segregation

The economics literature distinguishes two competing discrimination models. One model is based on the prejudices held by employers and employees against minority groups. The other model is based on incomplete information about the skills of minority groups (Phelps 1972; Arrow 1973). In case of gay and lesbian workers, information based segregation occurs when unprejudiced employers find it difficult to monitor the worker's productivity, have some prior beliefs about the average productivity of straight, gay and lesbian workers, and as a consequence make their hiring and promotion decisions dependent on the worker's sexual orientation.

Can these information based discrimination models explain our findings? Tests for information based discrimination require information about the prior productivity beliefs of employers. We do not have such information. Instead, we speculate about employer beliefs. If we assume that employers believe that lesbians experience productivity advantages over other women, as specialization models predict, we expect to find less prejudice based segregation when our models are estimated on a sample of female workers. And reversely, if employers believe that gays have productivity disadvantages against other men, we expect prejudice based segregation to increase when estimated on a sample restricted to male workers. In Table 6 we reestimate the least-squares and twin fixed-effects specifications in equations (1) and (2) on samples of men and women separately. Panel A contains estimates for male twins. Panel B contains the estimates for female twins. We rely on samples of identical and fraternal twins for sample size considerations. In all specifications we find that the segregation estimates are at least as large, if not larger, for sexual minority women than for sexual minority men (even though the differences are seldomly statistically significant). Because lesbian workers seem to be more, and not less, concentrated in more tolerant occupations than gay workers, statistical discrimination does not appear to be driving our results, at least not when employers expect the productivity of workers to depend on gender and sexual orientation.

Our findings are dramatically different from those obtained by Badgett and King (1997). In their study Badgett and King present descriptive statistics from which they (tentatively) conclude that lesbian workers cluster in less tolerant occupations whereas gay workers cluster in more tolerant occupations. Our results portray the opposite pattern. That is, we find that lesbian workers concentrate in more tolerant occupations, much more so than gay workers.

D It is love not hate

Prejudice based segregation may also be observed if gay and lesbian workers have favorable attitudes towards other gay and lesbian workers. The latter appears particularly relevant when we consider the social networks of gays and lesbians as one of the common search channels through which gay and lesbian

workers find their jobs.

To establish taste based segregation, which is the main focus in this paper, it does not really matter whether we rely on discrimination models based on the hate of the majority group or on discrimination models based on the love of the minority group. Both models are based on taste and produce similar segregation predictions. To establish economic reasons to fight taste based segregation, however, it does matter whether segregation is love or hate driven. That is, both models have very different welfare implications. If it is love, segregation likely implies a welfare gain for gay and lesbian workers. But if it is hate, segregation could easily lead to a welfare loss experienced by gay and lesbian workers.

Without information on the favorable attitudes of gay and lesbian workers we cannot say much about whether segregation is driven by hate or love. What we can do is to include the share of gay and lesbian workers by occupation as additional covariate in our workplace intolerance regressions.[12] If gay and lesbian workers indeed prefer to work alongside other gay and lesbian workers, we expect that part of the estimated sexual orientation impact will load upon the estimate attached to the minority worker share. In panel C of Table 6 we have included the minority worker share as additional covariate. Although these models show a sizable impact of the minority share, we are primarily interested in how the sexual orientation estimates respond. We find that the prejudice segregation parameters fall, but not by much, and remain negative, sizable and statistically significant.

E   Twin spill-overs

One of the complications in twin fixed-effects estimation is the possible influence of twin spill-overs. Given the close relationship that typically exists between twins, it is possible that straight twins with gay or lesbian siblings are different than straight twins with straight siblings. If the occupational choice of straight twins somehow depends on the sexual orientation of his or her twin sibling, we should be concerned that spill-overs lead to biased estimates of prejudice based segregation. As it turns out, our spill-over concerns are misplaced. When we add an indicator for being a straight worker with gay/lesbian sibling as covariate, we do not find much. Point estimates reported in panel D of Table 6 are small

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[12] While a preference for working alongside other gay and lesbian workers is the main motivation for including the share of gay and lesbian workers as additional regressor, the fact that one regressor (F^D) represents an occupational average of another regressor (D) could possibly complicate the interpretation of our estimates. The reason that we can still estimate these models is that our twin sample is a restricted sample of twins for which we have complete twin pair information on occupation, sexual prejudice, own and twin sibling's sexual orientation, schooling and personality. Our minority share measure, on the other hand, is a weighted measure taken from an unrestricted sample of twins for which we have information on sexual prejudice, sexual orientation and occupation and the 1986 Census of Population and Housing.

and statistically insignificant suggesting that the confounding effects that run through twin interactions are small.

VII   Prejudice trends

In the previous sections we have tentatively established that in Australia during the early nineties sexual prejudices were in a non-trivial way responsible for labor market segregation between gay and lesbian workers, on the one side, and prejudiced straight workers, on the other side. Of course, this leaves open important questions on whether our segregation findings have broader predictive power. We present some fragmented evidence on sexual prejudice patterns as it is observed in other countries in the early nineties, and as it is observed in Australia in more recent years.

Evidence is taken from the World Value Survey (WVS) which is a public survey data source with, among others, information on discriminatory attitudes against gays and lesbians collected in different countries across different times. In particular, we examine the attitude towards having homosexual neighbors and use a question the World Value Survey asks respondents: "On this list are various groups of people. Could you please mention any that you would not like to have as neighbors?" If we make a comparison between 51 different countries within the years 1995 and 1998, we find that about 50 percent of all respondents say they do not like to have homosexuals as neighbors. Intolerance seems most severe in Turkey, Azerbaijan and Armenia (80-90 percent). Tolerance is high in Sweden, Norway and Germany (10-15 percent). Australia is ranked among the more tolerant countries (25 percent) and comparable to the United Kingdom (22 percent) and United States (30 percent). In addition, if we make a comparison between the years 1995 and 2005 within Australia, we find that measured levels of intolerance, or tolerance for that matter, are remarkably stable across time (25 versus 22 percent).

VIII   Concluding remarks

In this paper we present direct evidence that prejudiced straight workers and gay and lesbian workers choose different occupations, consistent with models of prejudiced based segregation. All our cross-sectional specifications show negative and almost always significant associations between concentrations of sexually prejudiced workers and concentrations of sexual minority workers. The partial impacts we estimate for gay and lesbian workers are particularly large in size; that is, gay and lesbian workers have on average about 6 percentage point fewer prejudiced colleagues, which corresponds with a 50 percent of a one-standard-deviation decrease in the fraction of intolerant colleagues. In addition, these partial impacts are more pronounced for gay and lesbian workers with disclosed

identities, robust to the inclusion of unobserved factors that are inherited and observed factors that strongly correlate with productive skills and vocational preferences, and hard to reconcile with alternative interpretations where gays and lesbians are statistically discriminated against, where gays and lesbians prefer to work alongside other gays and lesbians, and where workplace contact weakens the prejudice of straight workers.

Interestingly, we show that the observed degree of prejudiced based segregation is entirely driven by the behavioral responses of gay and lesbian workers who plausibly prefer to work in unprejudiced occupations. Our twin fixed-effects specifications show that prejudiced workers choose to work in those occupations, not because of lower fractions of gay and lesbian workers, but because of something else. One possible explanation for this pattern is that it does not make much sense for straight workers to act upon their prejudicial urges when workplace contact with gay and lesbian workers is mostly indirect. And reversely, it does make sense for gay and lesbian workers to act upon their taste for tolerant occupations when workplace contact with less tolerant workers in any randomly chosen occupation is almost unavoidable.

While the evidence we present in this paper clearly suggests that the sexual prejudices held by employers and employees play an important role in the occupational choices of gay and lesbian workers, we know fairly little about the discriminatory practices of prejudiced employers and their impact on the labor market earnings of gay and lesbian workers. Of course, we could argue that some gay and lesbian workers likely end up working for prejudiced employers, and as a consequence receive lower earnings—that is, the estimated fractions of prejudiced employers and employees we find in this paper appear large enough to potentially affect the earnings of gay and lesbian workers. But this would be merely speculation. It is our hope that improved data availability with information on sexual orientation, sexual prejudice, occupational choice and earnings will allow us to study the role of sexual prejudice on the earnings of gay and lesbian workers in our future work.

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Table 1
Variables used to measure Sexual Prejudice in Australian Twin Registry

Variable	Description	Agree	Not Agree
NOTIMMOR	Homosexuality is merely a different kind of sexuality and is not immoral		0.398
	Homosexual men should be allowed to work in the following professions:		
TEACHER	Schoolteachers		0.362
JUDGES	Court Judges		0.259
MINISTER	Ministers		0.355
MEDDOC	Medical Doctors		0.338
GVOFFICE	Government Officials		0.218
HOMODANG	Homosexuals are dangerous as teachers or youth leaders, because they try to get sexually involved with children	0.254	
OBSCENE	Homosexuality is obscene and vulgar	0.368	
SOCIOCORR	Homosexuality is a social corruption and can cause the downfall of civilization	0.235	
HOMDANCE	Homosexuals should be allowed to dance with each other in public places		0.406

In total 4,904 respondents were asked to answer yes if they agreed with the statement, but answer no if they disagreed. We use these answers to construct a sexual prejudice index. In case of NOTIMMOR, TEACHER, JUDGES, MINISTER, MEDDOC, GVOFFICE and HOMDANCE we sum the no answers. In case of HOMODANG, OBSCENE and SOCIOCORR we sum the yes answers. The prejudice index is the total score. A prejudiced worker is defined to score 1 or higher on this index. The variable names are taken from the ATR codebooks.

Table 2
Means and Standard Deviations of Selected Variables in Australian Twin Registry

	Identical twins	All twins	Heterosexual		Homosexual	
			Males	Females	Gays	Lesbians
Sexual orientation:						
Worker is gay or lesbian, self-reported	0.031	0.034	0.000	0.000	1.000	1.000
Worker is gay or lesbian, sibling-reported	0.014	0.014	0.001	0.001	0.432	0.324
Concordant pairs	0.951	0.942	0.962	0.974	0.081	0.243
Sexual prejudice:						
Worker is sexual prejudiced	0.636	0.654	0.775	0.607	0.324	0.243
Concordant pairs	0.685	0.670	0.718	0.645	0.675	0.567
Individual characteristics:						
Female	0.678	0.634	0.000	1.000	0.000	1.000
Age	31.833 *8.206*	31.376 *7.984*	31.977 *8.067*	31.050 *7.921*	31.351 *8.360*	30.972 *7.794*
Years of schooling	12.550 *2.321*	12.498 *2.273*	12.845 *2.264*	12.278 *2.249*	13.148 *2.516*	12.729 *2.123*
Psychoticism	0.155 *0.134*	0.163 *0.138*	0.200 *0.146*	0.137 *0.124*	0.296 *0.148*	0.248 *0.169*
Neuroticism	0.395 *0.264*	0.406 *0.269*	0.332 *0.264*	0.445 *0.263*	0.516 *0.252*	0.418 *0.288*
Extraverion	0.633 *0.296*	0.626 *0.299*	0.621 *0.298*	0.628 *0.300*	0.632 *0.303*	0.643 *0.292*
Lying	0.486 *0.221*	0.470 *0.220*	0.421 *0.215*	0.500 *0.218*	0.367 *0.217*	0.490 *0.199*
Occupation characteristics:						
% Prejudiced workers	0.694 *0.116*	0.701 *0.121*	0.746 *0.141*	0.677 *0.100*	0.717 *0.132*	0.640 *0.101*
% Sexual minority workers	0.048 *0.032*	0.048 *0.033*	0.046 *0.037*	0.049 *0.030*	0.076 *0.043*	0.054 *0.023*
Managerial	0.077	0.077	0.127	0.046	0.162	0.054
Professionals	0.299	0.287	0.347	0.253	0.243	0.324
Para-Professionals	0.122	0.123	0.088	0.141	0.135	0.189
Trades and Services	0.085	0.100	0.212	0.037	0.162	0.027
Clerical	0.264	0.250	0.079	0.349	0.189	0.216
Sales	0.099	0.104	0.067	0.127	0.054	0.081
Laborer	0.049	0.055	0.077	0.045	0.054	0.108
Number of observations	1144	2142	745	1323	37	37

Standard deviations in italics.

Table 3

Table 3
Sexual Prejudice and Sexual Orientation across Occupations

Occupation	% Prejudiced	% Minority	Obs
Entire sample	0.761	0.054	3,731
General managers	0.750 (24)	0.092 (43)	20
Specialist managers	0.623 (12)	0.082 (40)	60
Farmers and farm managers	0.836 (32)	0.022 (14)	95
Managing supervisors (sales and service)	0.643 (13)	0.077 (37)	95
Managing supervisors (other)	0.806 (30)	0.041 (26)	27
Professionals	0.540 (5)	0.053 29)	21
Natural scientists	0.609 (11)	0.054 (31)	55
Building professional and engineers	0.682 (15)	0.000 (1)	70
Health diagnostics and treatment practitioners	0.514 (3)	0.051 (28)	115
School teachers	0.599 (8)	0.037 (23)	401
Other teachers and instructors	0.531 (4)	0.166 (51)	18
Social professionals	0.599 (9)	0.152 (50)	51
Business professionals	0.676 (14)	0.030 (20)	159
Artists and related professionals	0.461 (2)	0.071 (34)	78
Miscellaneous professionals	0.457 (1)	0.031 (22)	46
Para-professionals	0.823 (31)	0.152 (49)	14
Medical and science technical officers	0.587 (6)	0.000 (1)	26
Electrical and electrical engineering	0.891 (41)	0.000 (1)	28
Registered nurses	0.588 (7)	0.062 (32)	282
Police	0.930 (45)	0.017 (13)	32
Welfare para-professionals	0.735 (23)	0.149 (48)	60
Metal fitting and machining tradespersons	0.921 (44)	0.000 (1)	38
Other metal tradespersons	0.909 (43)	0.005 (8)	36
Electrical and electronics tradespersons	0.870 (35)	0.015 (12)	63
Building tradespersons	0.985 (50)	0.027 (18)	73
Printing tradespersons	0.946 (47)	0.000 (1)	11
Vehicle tradespersons	0.967 (49)	0.031 (21)	32
Food tradespersons	0.889 (40)	0.096 (44)	55
Amenity horticultural tradespersons	0.956 (48)	0.079 (38)	24
Miscellaneous tradespersons	0.861 (34)	0.027 (17)	83
Clerks	0.730 (22)	0.054 (30)	499
Stenographers and typists	0.703 (17)	0.009 (10)	215
Data processing and business machine operators	0.711 (18)	0.025 (16)	39
Numerical clerks	0.755 (25)	0.071 (35)	59
Receptionists, telephonists and messengers	0.770 (27)	0.014 (11)	62
Collection clerks	0.885 (39)	0.142 (47)	13
Salespersons and personal service workers	0.775 (29)	0.040 (24)	44
Investment, insurance and real estate salespersons	0.894 (42)	0.041 (25)	26
Sales representatives	0.874 (37)	0.138 (46)	16
Sales assistant	0.770 (28)	0.080 (39)	152
Tellers, cashiers and ticket salespersons	0.855 (33)	0.000 (1)	13
Miscellaneous salespersons	0.698 (16)	0.091 (42)	60
Personal services workers	0.602 (10)	0.008 (9)	116
Road and rail transport drivers	0.715 (20)	0.045 (27)	33
Mobile plant operators (except transport)	1.000 (51)	0.000 (1)	11
Machine operators	0.766 (26)	0.118 (45)	18
Laborers and related workers	0.871 (36)	0.029 (19)	38
Trades assistants and factory hands	0.930 (46)	0.082 (41)	54
Agricultural laborers and related workers	0.875 (38)	0.023 (15)	17
Cleaners	0.713 (19)	0.076 (36)	27
Miscellaneous laborers	0.719 (21)	0.070 (33)	51

The top panel reports and ranks (in parentheses) shares of prejudiced straight workers and shares of lesbian, gay and bisexual workers. Shares are calculated using sexual prejudice and sexual orientation information of 3,731 workers in ATR. For occupation information we rely on the Australian Standard Classification of Occupations (first edition) of the Australian Bureau of Statistics using occupation definitions at the two-digit level. Within each occupation we first calculate the share of male and female workers who are prejudiced and straight, and then compute weighted prejudice averages using representative occupation shares of male and female fulltime workers taken from the 1986 Census of Population and Housing. Occupational cells with less than 10 observations are excluded.

Table 4

Estimating the Relationship between Intolerant Occupations and Sexual Orientation

	LS (1)	LS (2)	LS (3)	LS (4)	LS/IV (5)	LS/IV (6)	FE (7)	FE (8)	FE (9)	FE (10)	FE/IV (11)	FE/IV (12)
A. Identical twins:												
Worker is gay or lesbian	-0.04	-0.03			-0.09	-0.08	-0.07	-0.05			-0.06	-0.05
	*0.02***	*0.02*			*0.04***	*0.04**	*0.02****	*0.02***			*0.04**	*0.04*
Worker is gay or lesbian			-0.07	-0.06					-0.08	-0.07		
(*other twin agrees*)			*0.03***	*0.04*					*0.03***	*0.03***		
Worker is gay or lesbian			-0.02	-0.01					-0.06	-0.04		
(*other twin disagrees*)			*0.02*	*0.02*					*0.03***	*0.03**		
Number of observations	1144						572					
Number of minority observations	36						28					
B. Identical and fraternal twins:												
Worker is gay or lesbian	-0.03	-0.03			-0.06	-0.06	-0.05	-0.04			-0.08	-0.05
	*0.01***	*0.01***			*0.02****	*0.03***	*0.02****	*0.02***			*0.03****	*0.03***
Worker is gay or lesbian			-0.05	-0.05					-0.05	-0.04		
(*other twin agrees*)			*0.02***	*0.02***					*0.03***	*0.03**		
Worker is gay or lesbian			-0.02	-0.02					-0.05	-0.03		
(*other twin disagrees*)			*0.02*	*0.02*					*0.02***	*0.02*		
Number of observations	2142						1071					
Number of minority observations	74						62					
Inclusion of schooling and personality trait controls:												
	—	×	—	×	—	×	—	×	—	×	—	×

[1] Robust standard errors are in italics; *significant at 10% level , ** significant at 5% level, *** significant at 1% level. All cross-sectional least squares regressions control for age, age squared and gender.

[2] Own sexual orientation is instrumented using each sibling twin report on the other's twin sexual orientation.

[3] The number of minority observations in the fixed-effects specifications refers to those pairs with different sexual orientation.

[4] Sample mean (with standard deviation between parentheses) of fraction of prejudiced straight workers in identical and full twin samples: 0.694 (0.116), 0.701 (0.121)

Table 5
Table 5
Estimating the Relationship between Sexual Minority Occupations and Sexual Intolerance

	LS (1)	LS (2)	LS (3)	LS (4)	FE (5)	FE (6)	FE (7)	FE (8)
A. Identical straight twins:								
Worker is prejudiced	−0.005	−0.005			0.001	0.002		
(at least one prejudiced response)	*0.002***	*0.002****			*0.003*	*0.003*		
Worker is little prejudiced			−0.003	−0.004			−0.002	−0.003
(one to four prejudiced responses)			*0.002*	*0.002*			*0.003*	*0.003*
Worker is much prejudiced			−0.007	−0.008			0.001	−0.000
(at least five prejudiced responses)			*0.002****	*0.002****			*0.004*	*0.004*
Number of observations	1168				584			
Number of prejudiced observations	760				182			
B. Identical and fraternal straight twins:								
Worker is prejudiced	−0.004	−0.004			−0.000	−0.001		
(at least one prejudiced response)	*0.002****	*0.001****			*0.002*	*0.002*		
Worker is little prejudiced			−0.003	−0.003			−0.001	−0.001
(one to four prejudiced responses)			*0.002**	*0.002*			*0.002*	*0.002*
Worker is much prejudiced			−0.006	−0.006			0.000	−0.000
(at least five prejudiced responses)			*0.002****	*0.002****			*0.003*	*0.003*
Number of observations	2186				1093			
Number of prejudiced observations	1465				359			
Inclusion of schooling and personality trait controls:								
	—	×	—	×	—	×	—	×

[1]Robust standard errors are in italics; *significant at 10% level ,** significant at 5% level, *** significant at 1% level. All cross-sectional least squares regressions control for age, age squared and gender.

[2]The number of prejudiced observations in the fixed-effects specifications refers to the number of discordant twin pairs.

[3]Sample Mean (and Standard Deviation) of Fraction of Prejudiced Workers in Identical and Full Twin Sample: 0.047 (0.032), 0.048 (0.032)

Table 6

Estimating the Relationship between Intolerant Occupations and Sexual Orientation using Alternative Subsamples and Specifications

	LS (1)	LS (2)	LS (3)	LS (4)	FE (5)	FE (6)	FE (7)	FE (8)
A. Male twins (including identical and fraternal twins):								
Worker is gay	−0.01	−0.02			−0.01	−0.00		
	0.03	0.03			0.03	0.03		
Worker is gay (other twin agrees)			−0.05	−0.06			−0.06	−0.04
			0.03*	0.04			0.05	0.05
Worker is gay (other twin disagrees)			0.03	0.02			0.01	0.02
			0.04	0.04			0.04	0.04
Number of observations	570				285			
Number of gay observations	25				23			
B. Female twins (including identical and fraternal twins):								
Worker is lesbian	−0.04	−0.02			−0.07	−0.06		
	0.02*	0.02			0.02***	0.02**		
Worker is lesbian (other twin agrees)			−0.08	−0.07			−0.08	−0.08
			0.03**	0.03**			0.04**	0.04**
Worker is lesbian (other twin disagrees)			−0.01	0.01			−0.06	−0.04
			0.02	0.02			0.03**	0.03
Number of observations	1148				574			
Number of lesbian observations	31				23			
C. Identical twins (with minority worker share as additional control):								
Worker is gay or lesbian	−0.03	−0.02			−0.06	−0.05		
	0.02*	0.01			0.02***	0.02***		
Worker is gay or lesbian (other twin agrees)			−0.06	−0.05			−0.08	−0.06
			0.03*	0.04			0.03**	0.03**
Worker is gay or lesbian (other twin disagrees)			−0.02	−0.00			−0.06	−0.04
			0.02	0.02			0.03**	0.02
Share minority workers	−0.40	−0.48	−0.40	−0.47	−0.25	−0.27	−0.24	−0.27
	0.11***	0.11***	0.11***	0.11***	0.11**	0.11**	0.11**	0.11**
D. Identical twins (with minority twin sibling as additional control):								
Worker is gay or lesbian	−0.04	−0.03						
	0.02**	0.02						
Worker is gay or lesbian (other twin agrees)			−0.07	−0.06				
			0.03**	0.04				
Worker is gay or lesbian (other twin disagrees)			−0.02	−0.01				
			0.02	0.02				
Twin sibling is gay or lesbian	0.02	0.00	0.03	0.01				
	0.02	0.02	0.02	0.02				
Inclusion of schooling and personality trait controls:								
	—	×	—	×	—	×	—	×

[1]Robust standard errors are in italics; *significant at 10% level ,** significant at 5% level, *** significant at 1% level. All cross-sectional least squares regressions control for age, age squared and gender.