Matching, Marriage, and Children: Differences Across Sexual Orientations

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ABSTRACT

There are many puzzling differences in behavior across couples of different sexual orientations. We propose a model in which the different costs of procreation across sexual orientations leads to differences in expected matching behavior, marriage rates, and fertility. The model predicts that the genetic traits of same-sex couples, unlike those of heterosexual couples, should not be correlated — holding constant other household production characteristics. In addition, the model predicts that heterosexuals have a higher probability of having children and getting married, and that childless heterosexuals are less likely to consume goods not complementary with children than childless gays and lesbians. Using two nationally representative probability samples that self-identify sexual orientation, these predictions are confirmed.

Key Words: Matching, Same-Sex Couples.

JEL: J12, J15, J16

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1. Introduction

The emergence of same-sex couples as legitimate and acceptable unions is one of the greatest social changes in developed countries over the past fifty years. Throughout the struggle for legal marriage recognition, these unions have been portrayed as similar to heterosexual couples in terms of their desires to marry and have children.[1] Despite the similarity in preferences, however, there is an obvious difference in the ability to directly procreate between opposite and same-sex couples. The question arises: how does this difference manifest itself in the behavior of people with different sexual orientations — if at all?

Recent work on labor market choices has shown that same-sex couples often make different human capital, savings, location, and occupational choices that reflect their lifestyle, gender composition, and procreative constraints.[2] This nascent economic work, however, seldom directly relates to family or marriage behavior.[3] To an economist, it would be odd if fundamental differences between couples (whether

[1] For example, see Badgett (p. 1105, 2010) or Patterson (p. 115, 1995). Of course, support for this claim is not unanimous. See Geoghegan (2013), for example.

[2] For example, Harris (2011) finds that gay men and lesbian women choose different work hours and job amenities compared to their heterosexual counterparts; Oreffice and Negrusa (2011) find that savings rates are much higher for lesbian couples than gay or heterosexual couples; and Black *et al.* (2002) find that gay men are more likely to choose to live in high amenity locations. Indeed, Black *et al.* (2007) comment:

> Gay men and lesbian women face constraints that differ from heterosexual individuals — constraints that affect decisions at the family level and therefore spill over into other aspects of economic life. [p. 54, 2007]

On the other hand, for some types of decisions and behaviors, economists have found that same-sex couples are similar to opposite-sex couples. For example, Oreffice (2010) found that gay and lesbian couples' labor supplies respond to bargaining threat points in the same fashion as heterosexual couples', and Jepsen and Jepsen (2002) found similarities in assortative mating across the different sexual orientations. Allen (forthcoming 2014) found no statistical difference in the amount of household production across different sexual orientations.

[3] An exception is Carpenter and Gates (2008), who exploit self-identified sexual orientation data in California. They are interested in describing cohabitation rates, partnerships, and family formation for lesbians and gays.

same-sex or not) failed to result in differences in matching, reasons to marry, frequency of marriage, and the presence of children. The emergence of legal same-sex marriage in Canada, along with new Canadian data that self-identifies different sexual orientations, provides an opportunity to identify differences in marriage, spousal search, fertility, cohabitation, and lifestyle choices.

In this paper, we provide a model of how differing procreation and childrearing costs across sexual orientations can lead to differences in the aforementioned dimensions, and show that the predictions of our model are largely confirmed by the data. While some of these differences in behavior are anecdotally well-known or have been found in other work (*e.g.* smoking behavior), we make three major contributions. First, we show that this wide range of behavioral differences between same-sex and opposite-sex couples can be tied to a single fundamental difference: same-sex couples are unable to procreate on their own. Other theories based on thin markets, preferences, or stigma can explain some of the behaviors, but not all of them. Second, we document that matching behavior differs across sexual orientations. To our knowledge, no other model predicts the specific matching behavior that we identify. Finally, we test our model with a large probability sample that allows us to include single individuals. Many large sample studies of gays and lesbians only utilize same-sex *couples.*

Our model stems from the observation that the inability of same-sex couples to procreate on their own forces them to engage in some type of more expensive procedure to acquire children when they want them. Given the current channels by which a same-sex couple must either conceive, adopt, or otherwise acquire children, all methods are considerably more costly than heterosexual sex.[4] There are also differences in the costs of raising children, whether due to discrimination, costs of co-parenting, social disapproval, or the imperfect substitutability of "mothering"

[4] Such procedures are also more costly for men than for women, and we exploit this difference below for lesbians and gay men.

and "fathering."[5] By the law of demand, a higher cost of children means that fewer are demanded by same-sex couples, even if they have the same desire for children as opposite-sex couples.[6] A smaller chance of having children lowers the cost of same-sex couples engaging in behaviors, lifestyles, and social capital investments that are not complementary with children. Hence, on many dimensions, the behavior of same-sex couples is likely to be different from opposite-sex couples because the shadow prices they face are different. These differences should extend to marriage itself. Moreover, due to differences in the ways in which children are acquired, heterosexuals should place greater value on the quality of their partner's inheritable traits than gays and lesbians, which should impact the matching process.

To be clear: we are not asserting that preferences are the same across orientations. Our point is that even if they were the same and even though both same-sex and opposite-sex couples are present in the marriage market, there should be many differences in their family behaviors given the different costs of having and raising

[5] "Stigma" is, therefore, built into our model in the reduced form of "higher costs" of rearing children.

[6] Given that the "costs of children" are not directly observable in our data, one might object that our results are driven by differences in preferences for children rather than costs. For the following three reasons, we assume that homosexuals and heterosexuals have the same preferences for children. First, it seems obvious that the costs are different (Black *et al.* (2002) assert this cost difference as obvious). Second, we want a testable theory of family behavior, and differences in costs are observable, in principle. Explanations based on differences in unobservable preferences are *ad hoc* (Stigler and Becker, 1977). Finally, there is a widespread claim made in the academic literature, the popular press, and by professional bodies that preferences are similar. For example, consider:

> Many gay men and lesbians, like their heterosexual counterparts, desire to form stable, long-lasting, and committed intimate relationships.
>
> [American Psychological Association, 2011]

> A high level of demand for marriage by same-sex couples ... indicates, like different-sex couples, same-sex couples wish to marry for reasons having to do with establishing a long-term commitment to one another, demonstrating commitment to families .... Many same-sex couples are raising children ...
>
> [Badgett, p. 1105, 2010]

children. These differences should be visible in the number of children, the likelihood of marriage, the willingness to engage in behaviors that are not complementary with children, and the searching and sorting behavior. Several of the predictions in our model are intuitive and straightforward; however, the matching prediction is novel.

We use two large data sets to analyze different types of households in terms of their potential marriage behavior. The first one is the Canadian Community Health Survey (CCHS), which is a large, nationally representative, probability sample of Canadian households that self-identifies sexual orientation. These data allow for the direct identification of gay and lesbian individuals (single and married).[7] The CCHS shows that currently, relative to opposite-sex couples, same-sex couples are less likely to marry, have fewer children, and, when comparing childless couples, are more likely to engage in behaviors not complementary with children.[8] Unfortunately, despite all of its advantages, the CCHS is unable to test our matching hypothesis because the information it contains on the respondent's spouse is too limited. Hence, we also use the 2006 Canada Census, which contains a large 20% random sample of the population that self-identifies same-sex couples. This data shows stronger assortative matching for heterosexual couples along the health dimension — which is heavily influenced by genetics — compared to gay and lesbian couples. The overall evidence also reveals heterogeneity in the behaviors of lesbians versus gays, which suggests that differences in sexual orientation are more nuanced than the simple heterosexual versus homosexual split. Taken together, the empirical evidence is strongly consistent with our model.

[7] It also allows for the identification of bi-sexuals. Bi-sexuals are much more difficult to analyze within the framework provided here because they may be in same-sex or opposite-sex unions, and it is unclear what their expectations of future relationships are. As a result, we drop bi-sexuals from the analysis. However, none of the general results of the paper change when bi-sexuals are included.

[8] Of course, the data here only provide a snapshot of the differences across sexual orientations. It will take time for the steady state equilibrium number of children to arise. On the one hand, the number may increase as more gays and lesbians marry and have families. On the other hand, it is likely that many of the children currently present in gay and lesbian homes come from a previous heterosexual marriage, and over time, this route to gay and lesbian parenthood should diminish.

2. A Model of Marriage, Children, and Matching

We present a highly stylized model of matching in which the key feature is a difference in the cost of children across three different sexual orientations: heterosexual, gay, and lesbian.[9] We assume that members of each group only match with members from the same group, all pregnancies are planned, and only couples (married or not) have children (no single parents). Individuals are initially randomly paired in a "date" and incur a search cost $k > 0$. Later they decide if they want to be a couple, and once a couple, they decide if they want to marry and/or to have children. Individuals can reject a date and go back to the dating pool, but once a person is coupled, they remain so. In addition, we assume that spouses have the same preferences over children and marriage and that there are no transfers, which allows for an abstraction of bargaining issues within a household and allows a focus on cost differences in conception, pregnancy, and child rearing between the different couple types.[10]

Every type of individual is described by two traits (g_i, h_i) distributed according to a positive density on $[0, G] \times [0, H]$. The trait g_i is a quality index related to biological reproduction: it accounts for genetic features such as expected longevity, health, fertility and other features that could be passed on to children, and also accounts for an individual's reproductive fitness. The trait h_i is an index of characteristics such as education, talent, etc. that produce non-child household production. A component of every potential match payoff is $h_{ij} = m(h_i, h_j)$, where m is increasing in h_i and h_j, that measures the utility of household production *independent of children or marriage.* We do not assume that g is independent of h. Therefore, our model could easily accomodate characterisics that contribute to

[9] We abstract from the fact that some agents may be able to choose between the same-sex and the heterosexual markets. Many of these individuals would self-identify as bi-sexual, which are excluded from our empirical analysis and a small part of the sample. Furthermore, these individuals face the same constraints on procreation as others in whichever market they choose.

[10] See note 4 above.

both traits: for example, intelligence may be genetically passed on, and may also produce non-child related household production.[11]

Stage Play

There are three stages of play to the matching game.

Stage 1: Singles are randomly paired in a dating market at cost $k > 0$.

Stage 2: Each person i decides if he wants to break up after observing the other person's g_j and their h_{ij}. Coupling is mutual, so either can break the date and return to stage 1.

Stage 3: Each couple c_{ij} that remains together now observes $\epsilon_c \in \Re$, their suitability for marriage, and decides whether to marry, and how many children to have.[12] We assume that ϵ_c is independent of all other variables and distributed according to a continuous cumulative distribution function. We do not, however, constrain its sign: some couples may prefer the status and institutional protections of marriage, while others may prefer the flexibility of remaining unmarried.

Person i has the following separable utility function over children and household production when matched with person j:

$$\begin{aligned} U_{ij} &= v_{ij} + h_{ij}, \\ &= \begin{cases} [\gamma(g_i, g_j) + M_c - s - f_c + \epsilon_c M_c] + h_{ij} & \text{if children} \\ \epsilon_c M_c + h_{ij} & \text{if no children} \end{cases} \end{aligned} \tag{1}$$

Note that v_{ij} captures the utility related to marriage and children, and h_{ij} captures all other household utility. The sub-utility function v_{ij} has a number of components. First, $\gamma(g_i, g_j)$ is the expected utility of children, conditional on the genetic

11 The closest one-dimensional counterpart to the matching portion of our model is Morgan (1998). Atakan (2006) studies a similar model, but with transferable utility. Both papers obtain assortative matching if surplus is super-modular in matched types.

12 To simplify notation, we drop the subscripts for couple c_{ij}. Couples are assumed to have the optimal number of children if they have any.

attributes of the couple. We assume that $\gamma(g_i, g_j) = \max\{a, b(g_i, g_j)\}$, where a is the expected utility from adopting, and b is the expected utility from having own biological children.[13] For same-sex couples, option b is unavailable because we ignore surrogacy and alternative insemination options for all couples.[14] We assume b is increasing in both arguments; that is g_i and g_j both improve child quality.

Second, M_c is an indicator variable for being married. Marriage is understood to be an institution that increases the value of children — either by raising the quality of children, lowering the costs of raising them, or maintaining the marriage in stressful times. We normalize the value of this increase to 1.[15] The variable s is the value of foregone consumption that results from having children. This is the value of consumption activities that are not complementary with children and which are sacrificed when children arrive. Finally, our critical variable is f_c, the extra cost of having children for same-sex couples. These are the extra costs of parenting that might arise in a same-sex relationship.[16] We assume that these costs are greater for gays than for lesbians; that is, $f_{Gay} > f_{Lesbian} > f_{Hetero} = 0$. [17] [18]

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[13] Even assuming that all heterosexuals rear their own biological children, there can be a supply of children for adoption from various sources, such as parent deaths and foreign countries.

[14] Introducing surrogacy and other options to the model strengthens our results – gays and lesbians with higher g would care *less* about their partner's g because only the higher g would be used – but adds complexity. Hence, we ignore them.

[15] It has been suggested that some benefits of marriage, such as companionship, may be more valuable to childless couples, so that marriage and children may be substitutes in certain ways. However, it appears reasonable to assume that, *overall*, marriage and children are complements. Therefore, one may interpret this "1" as the *net* amount by which marriage increases the value of children.

[16] As discussed in the introduction, these costs of parenting might arise from the inability (or reduced ability) to have a sexual division of labor; that is, "mothering" and "fathering" might be imperfect substitutes. They might also arise from stigma and discrimination against same-sex couples and their children.

[17] Surrogacy is also significantly more costly than insemination, so including these options would strengthen our $f_{Gay} > f_{Lesbian}$ assumption.

[18] More realistically, one could assume f_c to be stochastic, and that the distributions by sexual orientation are ranked by first-order stochastic dominance. Doing so does not qualitatively impact any of our propositions and corollaries.

Table 1

Individual Marriage and Child Payoffs

	No Children	Children
Cohabiting	(A): h	(C): $h + \gamma - s - f_c$
Married	(B): $h + \epsilon_c$	(D): $h + \epsilon_c + \gamma + 1 - s - f_c$

Table 1 shows the four possible utility outcomes once a pairing decides to be a couple (subscripts have been suppressed).

No outcome dominates the others, and which outcome is chosen depends on the couple's specific values of the various utility components. The difference in utility between cohabitation with children (option (C)) and marriage with children (option (D)) is $1 + \epsilon_c$. The utility difference between cohabitation and marriage without children is just ϵ_c. These values may be greater or less than zero depending on the couples suitability for marriage. The difference in utility between married couples with children and married couples without children is $\gamma + 1 - s - f_c$, which can also be greater or less than zero. As a result, different couple combinations will choose different outcomes with respect to marriage and children.

Incentive to To Marry and Have Children

Because we assume that ϵ_c is observed after a dating pair becomes a couple in stage 3 and is independent of g and h, every *same-sex* couple has the same probability of marriage.[19] We show that the probability of marriage is weakly greater for every heterosexual couple, regardless of the couple's g_i and g_j. It is strictly greater when not all same-sex couples adopt and at least some heterosexual couples have children. This is stated in Proposition 1.

[19] This is not true for heterosexual couples because their decision whether to have children, which impacts the value of marriage, may depend on the genetic attributes g_i, g_j. Hence, different heterosexual couples will have a different threshold for ϵ_c.

Proposition 1. *Same-sex couples are no more likely to marry than heterosexual couples, and they are strictly less likely to do so than a heterosexual couple with genetic traits* (g_i, g_j) *when* $s > a - f_{Lesbian}$ *and* $s < \max\{a, b(g_i, g_j)\} + 1$.[20]

Proof: See Appendix B.

Corollary 1. *Lesbian couples are at least as likely to marry as gay couples, and more so if* $a - f_{Gay} < s < a + 1 - f_{Lesbian}$.

Proof: See Appendix B.

Corollary 2. *Heterosexual couples are at least as likely to have children as lesbian couples, which are in turn at least as likely to do so as gay couples. These relations are strict as long as* $a - f_{Lesbian} < s < a + 1 - f_{Lesbian}$*, so that some, but not all lesbian couples adopt.*

Proof: See Appendix B.

Proposition 1 and its corollaries are rather intuitive. Consider an increase in f_c to f_c', all else equal. Couples who would have chosen no children before the change do not change their behavior because f_c is not in their payoff function. Couples who would have chosen children with cohabitation reveal that $\gamma - s - f_c > 0$, and an increase in f_c means that those at the margin will now decide to have no children. Finally, couples who would have chosen marriage with children under the original cost will now continue with (D) or choose (A) or (B), depending on how close they are to indifference between having children or not.[21]

In other words, an increase in the cost of children will lead some couples to forego having children, and some of these couples will also forego marriage as a result. No

[20] These conditions are most likely to hold when a is low relative to $b(g_i, g_j)$, which implies a high cost of adoption.

[21] Note that they do not choose to cohabitate with children (option C) because they have revealed $1 + \epsilon_c > 0$, and this does not depend on f_c.

couple changes its decision in the opposite direction. Since $f_{Gay} > f_{Lesbian} > 0$, all other attributes equal, gay couples should be the least likely to have children because f_c is greatest for them, followed by lesbian couples, and finally heterosexual couples.[22]

Corollary 3. *Gay couples are at least as likely to engage in behaviors not complementary with children as lesbian couples, which in turn are at least as likely as heterosexual couples to engage in non-complementary behaviors.*

Proof: See Appendix B.

Another intuitive result follows from the model:

Corollary 4. *Suppose couples A and B have genetic traits (g_i, g_j) and (g_i', g_j'), respectively, with $g_i > g_i'$, $g_j \geq g_j'$, and $b(g_i, g_j) > a$. Then if the couples are heterosexual, couple A is more likely to marry than couple B, while if they are same-sex, they have the same probability of marriage.*

Proof: See Appendix B.

Matching Behavior

We now examine matching behavior for different sexual orientations. We focus on stationary situations (which we call *threshold equilibria*) where each type's reservation utility remains constant. We assume that individuals leaving the dating pool are replaced by individuals with the same characteristics. First, we show that same-sex matching occurs independently from g. This implies that any correlation in g between same-sex partners should disappear once we control for h. Then, we show that this is not the case for heterosexuals. Indeed, under the assumption that

[22] If f_c is not driven completely by biology, and depends in part on social stigma and discrimination, then this effect would be reduced over time as such stigma is reduced.

$b(.)$ is super-modular in its arguments, heterosexual sorting should have assortative characteristics (defined later) in the g dimension, even controlling for h.[23]

We use the following definitions:

Let $U_i(g_j, h_j)$ be the expected utility of person i, with characteristics (g_i, h_i), coupling with a partner of type (g_j, h_j), prior to observing ϵ_c. That is, $U_i(g_j, h_j)$ is the expectation of U_{ij} maximized over the child and marriage decisions.

A stationary strategy profile σ is a *threshold equilibrium* if there exists a collection of utility thresholds $\underline{U}^\sigma(g_i, h_i)$ such that each type (g_i, h_i) accepts couple with type (g_j, h_j) if and only if $U_i(g_j, h_j) \geq \underline{U}^\sigma(g_i, h_i)$, and in doing so, maximizes their expected utility.

In addition, in a threshold equilibrium σ, let:

$A^\sigma(g_i, h_i) = \{(g_j, h_j) : U_i(g_j, h_j) \geq \underline{U}^\sigma(g_i, h_i)\}$ be the set of types that (g_i, h_i) accepts,

$B^\sigma(g_i, h_i) = \{(g_j, h_j) : U_j(g_i, h_i) \geq \underline{U}^\sigma(g_j, h_j)\}$ be the set of types that accept (g_i, h_i).[24]

Note that due to the search cost k, type (g_i, h_i) may "settle" (accept a type even though better ones exist in $B^\sigma(g_i, h_i)$), even in the absence of transfers, as is the case here.

Same-Sex Matching

Proposition 2. *In any threshold equilibrium σ for same-sex couples, for all $g, g' \in [0, G]$ and all $h \in [0, H]$, $B^\sigma(g, h) = B^\sigma(g', h)$ and $A^\sigma(g, h) = A^\sigma(g', h)$.*

Proof: See Appendix B.

[23] As discussed by Chiappori, McCann and Neishem (2010), there is no straightforward way to generalize the concept of assortative matching to multiple dimensions. We will simply show that, in our setting, equilibria exhibit characteristics suggesting that heterosexuals with higher g (holding h fixed) tend to have partners with higher g. This is the hypothesis that we will take to the data.

[24] As usual, $A^\sigma(g_i, h_i) = B^\sigma(g_i, h_i) = \emptyset$ is a trivial equilibrium. We will restrict our attention to other equilibria.

Therefore, conditional on h_i, the expected g of individual i's partner in a same-sex couple is independent of g_i. In other words, the genetic fitness of same-sex partners should be uncorrelated, conditional on h. This will not be true in general for heterosexual couples because their genetic fitness is passed on to their own offspring.

Heterosexual Matching

For our study of heterosexual matching, we assume that $b(.)$ is super-modular; that is, if $g_i > g_i'$ and $g_j > g_j'$, then $b(g_i, g_j) + b(g_i', g_j') > b(g_i, g_j') + b(g_i', g_j)$. For example, individuals with high g may place greater value on their children having high g because they do not want their children to face difficulties that they did not face. Alternatively, if parents are risk-averse with respect to the quality of genes passed on to the child, then it is more important for an individual with high g to have a partner with high g (so that good genes are passed on for sure) than for an individual with a low g.

Under the above assumption, we show that heterosexuals with higher g will be more selective than individuals with lower g when considering partners with low g. This points to assortativeness along the g dimension for heterosexual matching.

Recall from equation (1) that the utility function is separable in genetic and household characteristics. We denote the expectation of v_{ij} (before observing ϵ_c) as $v(g_i, g_j)$. Taking the expectation of equation (1) gives: $U_i(g_j, h_j) = h_{ij} + v(g_i, g_j)$. Therefore, $v(g_i, g_j)$ is the expected utility from marriage and/or children, over and above the utility from coupling.

Lemma 1. *$v(g_i, g_j)$ is super-modular: if $g_i > g_i'$ and $g_j > g_j'$, then $v(g_i, g_j) - v(g_i, g_j') \geq v(g_i', g_j) - v(g_i', g_j')$. Moreover, if $v(g_i, g_j) - v(g_i, g_j') > 0$, then $v(g_i, g_j) - v(g_i, g_j') > v(g_i', g_j) - v(g_i', g_j')$.*

Proof: See Appendix B.

Lemma 1 shows that if, as we assume, the expected utility from biological children $b(.,.)$ is super-modular, then the expected utility of marriage and children $v(.,.)$ is weakly super-modular. The argument is simple: if $b(.,.)$ is super-modular, then the expected utility from children $\gamma(.,.)$ must be weakly super-modular. Adding marriage into the mix does not change this fact because marriage and children are complementary.

The super-modularity of v leads to result below. To avoid confusion between specific own type and a generic partner's type, we denote the partner's type as (x, y), where x is the genetic trait, and y is the household trait. Moreover, we assume that for every g_i, $v(g_i, G) - v(g_i, 0) > 0$. That is, every heterosexual cares about the genetic trait of their partner at least to some extent.

Proposition 3. *If $g > g'$, then in any threshold equilibrium σ for heterosexual couples, for all h, we have $B^\sigma(g, h) \supseteq B^\sigma(g', h)$, and there exists $g^* > 0$ such that:*

– if $x < g^*$ and $(x, y) \in A^\sigma(g, h)$, then $(x, y) \in A^\sigma(g', h)$; and

– as long as type (g, h) has biological children with positive probability, there exists a positive measure of types (x, y) with $x < g^*$ such that $(x, y) \notin A^\sigma(g, h)$, but $(x, y) \in A^\sigma(g', h)$.

Proof: See Appendix B.

This proposition states that for heterosexuals, if individual 1 has a higher g and the same h as individual 2, then individual 1 is acceptable to (weakly) more types, and is weakly more selective (requires equal or higher y) among partners with a low x. Furthermore, if individual 1 has biological children with positive probability, individual 1 is strictly more selective than individual 2 among partners that have a low x, and the additional low x types that individual 1 rejects as a result form a nonzero fraction of the population.

To understand the intuition for this result, note that the boundary of $A^\sigma(g, h)$ must be one of type (g, h)'s indifference curves. Figure 1 shows an example of indifference curves for types (g,h) and (g',h), where $g > g'$, plotted on a plane with the partner's genetic trait on the horizontal axis and the partner's household trait on the vertical axis.

Consider the indifference curve for either type (g,h) or (g',h). For low values of x, the benefits from adopting children are greater than from procreation, and the indifference curves remain flat: the genetic trait x has no value in this region. Once $b > a$, the indifference curves start to fall because one type is willing to substitute x and y in a partner. This occurs sooner for type (g,h) than for type (g',h) since $g > g'$. Moreover, by Lemma 1, whenever the marginal utility of x for type (g,h) is nonzero, it is greater than the marginal utility of x for type (g',h). Hence, whenever it is not flat, type (g,h)'s indifference curve at a given (x,y) is strictly steeper than type (g',h)'s at the same (x,y).[25]

[Figure 1 Here]

Consider a potential mate given by point 1 in the graph. Type (g,h) would reject this person as a match because they fall below their indifference curve boundary. On the other hand, type (g',h) would accept this person as a mate. Now consider another potential mate given by point 2. This person has a higher x and lower y than the person at point 1. Now type (g,h) finds this person acceptable, while type (g',h) does not. The reason is found in Lemma 1: the supermodularity of expected utility in the genetic trait means that point 2's high genetic trait matters more to type (g,h) than to type (g',h).

Figure 1 is one example of the how the boundary conditions might look for types (g,h) and (g',h). There are actually three cases to consider:

1. The indifference curves corresponding to the lowest acceptable utility cross, as depicted in Figure 1. In this case, type (g,h) is less selective than type (g',h) among partners with high x. Since type (g,h) is more selective among partners with low x, matching along the genetic dimension has assortative properties.

[25] The downward sloping part of the indifference curves need not be concave as depicted.

2. Type (g, h) is more selective than type (g', h) among partners of all x. If we assume that h_{ij} is log-separable in h_i and h_j, then even with different partners, types (g, h) and (g', h) have the same marginal utility for y. In this case, type (g, h) has a steeper boundary of acceptable types, which again suggests assortative matching.

3. Type (g, h) is less selective than type (g', h) among partners of all x. The proof of Proposition 3 shows that this is not possible because type (g, h) is more willing to wait for a partner of higher genetic quality than type (g', h), and because type (g, h) is acceptable to more types than type (g', h).

Summary of the Model's Predictions

Our model delivers the following testable implications.[26]

1. Non-heterosexuals are less likely to marry and less likely to have children.

2. Among non-heterosexuals, gays are less likely to marry and less likely to have children compared to lesbians.

3. Non-heterosexual couples are more likely to engage in the consumption of goods that are non-complementary with children, not controlling for the presence of children.

4. Heterosexuals should be more likely to marry and less likely to cohabitate as their g increases. No such relationship should exist for gays and lesbians.

5. Conditional on h, non-heterosexuals should not sort for mates along genetic lines, but there should be positive assortative matching for heterosexuals on genetic lines.

These differences in predicted behavior arise without positing any difference in preferences, marriage market conditions, costs of marriage, or type distributions

[26] These predictions would hold for other types of couples who, *ex ante*, would be predicted to have high costs of procreation. For example, these predictions would apply to couples that are elderly at the time of matching or infertile. Unfortunately, the data set used here does not allow the identification of such couples.

across sexual orientations. Instead, they all occur due to simple variations across orientations in the availability of means of conception and/or the cost of having children. More complicated models are possible, but our goal is to examine if differences in the costs of children can explain differences in behavior between couples of different orientations.[27]

3. Empirical Results

3.1. The Data

Data for most of our tests come from repeated waves of the Canadian Community Health Survey (CCHS). This is a probability sample survey with a cross-sectional design of approximately 65,000 respondents per year. The target population of the CCHS is all Canadians aged 12 and over, and it covers 98% of the provincial populations. Data is collected voluntarily and directly from survey respondents through computer assisted interviews. Data for this paper comes from years 2005, 2007, 2008, and 2009 — all years after same-sex marriage became legal across the country.[28] The paper uses the restricted master files.[29]

The CCHS has extensive information on the respondent, but only limited information on all other members of the household. What makes it particularly unique for a large probability sample is that it self-identifies sexual orientation — heterosexual, gay, lesbian, and bi-sexuality — for all individuals. Some might critique

[27] A model based on differences in preferences (ie., gays and lesbians have a smaller demand for children) will lead to the same predictions as this model because the effect on the shadow price of children would be the same (see Pollak and Wachter (1975)).

[28] In Canada same-sex couples were allowed to adopt before they were allowed to marry. Ontario became the first province to allow adoption in 1997. Others quickly followed.

[29] The full CCHS, with access to the sexual orientation information, is not a public use data set. To use the data, a proposal is screened by the Social Sciences Research Council of Canada, an RCMP criminal check is conducted, and the researcher becomes a deemed employee of Statistics Canada subject to the penalties of the Statistics Act. Results are screened by Statistics Canada, and as a result, no maximums, minimums, or sample counts for variables are reported in this paper, and the data are not available from the authors.

direct self-reporting of sexual orientation on the grounds that some individuals are unwilling to reveal such sensitive information; however, self-reporting is better than the alternatives, and the CCHS has some additional advantages. First, in studies that use the U.S. census or other such data sets, only same-sex *couples* are identified through correct responses to a series of questions that i) identifies them as married or common-law, ii) identifies their sex, and iii) identifies their spouse as the same-sex. Such measures fail to identify gays or lesbians who are single, fail to distinguish bi-sexual individuals, are subject to the same under-reporting problem when same-sex couples are reluctant to identify themselves as married or common-law, and have the added problem of capturing large numbers of heterosexual couples who incorrectly record the wrong sex.[30] Second, the CCHS refined identification of bi-sexual individuals is helpful for reducing measurement error in identifying gays and lesbians.

Another advantage of using the CCHS is that the data are from Canada, where one could argue there has been little official discrimination against same-sex couples for some time: same-sex couples have had all taxation and government benefits since 1997, and where same-sex marriage has been legal since 2001–2005.[31] Other social scientists have noted that legalization has reduced the stress and stigma of homosexuality in Canada, which makes it more likely that respondents would be unintimidated to respond correctly to the CCHS.[32] All things considered, the CCHS

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[30] The Williams Institute 2010 census study claims that the total national error rate is approximately 0.25%. The problem is that small errors in the large heterosexual response rate leads to large errors in the small same-sex sample.

[31] Regarding his 1967 Omnibus bill that legalized homosexuality, Justice Minister Pierre Trudeau famously stated that "There's no place for the state in the bedrooms of the nation ... what's done in private between adults doesn't concern the Criminal Code." (http://www.cbc.ca/archives/categories /politics/rights-freedoms/trudeau). Many Canadians consider this as a watershed moment in the acceptance of homosexuality in Canada. The first Canadian same-sex marriages took place on January 14, 2001 at the Toronto Metropolitan Community Church. These became the basis of a successful legal challenge that ended at the court of appeal on June 10, 2003. On July 20, 2005, the federal government passed the Civil Marriage Act that made Canada the fourth country in the world to legalize same-sex marriage. Thus, different people date the arrival of same-sex marriage in Canada as 2001, 2003, or 2005.

[32] See, for example, Biblarz and Savci (p. 490, 2010).

is an excellent large, random sample data set available to study non-heterosexuals.[33]

3.2. **Basic Demographics**

Table 1 shows some estimated population relationship characteristics for lesbian households in Canada.[34] The estimated total number of lesbians in Canada is 80,209.[35] Just over one half of lesbians (41,363) live in two-person households. In just over one half of these cases (23,335), the two people are a lesbian common-law couple, about 15% are with roommates, 9% are married, and only 5% are made up of a lesbian mother and child under 18. Overall, 41.9% of lesbians are single, and only 12.2% of them are married. The estimated total number of children under 18 living with a lesbian is 23,698.

Table 2 shows the same estimated population relationship characteristics for gay households. Like lesbians, almost half the gays live in two-member households, with close to one half of these households in common-law relationships. On the other hand, there are considerably more gays (142,038) than lesbians.[36] Furthermore, gay men are much more likely to be single (61.7%) than lesbians, and there are many fewer children under 18 living with them (11,677). Only 4.9% of gay men are married.

Contrast these numbers with those of heterosexuals found in Table 3. Heterosexuals are the least likely to be single, the least likely to be living alone, and the

[33] It is possible that those who self-identify as gay or lesbian may also be more likely to self-identify the use of drugs, multiple sex partners, and the like. This, however, would not explain other systematic differences in behaviors that carry less stigma. For example, though not reported, there are differences in alcoholic consumption rates across the sexual orientations that one would not expect if the results were purely selection driven. In the end, self-reporting is a reasonable method of identification for an invisible minority, and the problems that may arise seem light compared to the problems that arise from other methods such as snowball sampling.

[34] Almost all of the results of this paper are weighted estimates from the CCHS sample. As a result, we will normally drop the adjective “estimated” unless the context calls for clarification.

[35] Lesbians make up around 0.6 percent of females in the CCHS sample, which includes individuals aged 12 and over. Over the time period of the samples, the population of Canada averaged just under 27 million people.

[36] Gays make up just over 1 percent of males in the CCHS sample. The fact that there are more gays than lesbians is consistent with several other studies.

most likely to be married. Table 4 compares household characteristics of heterosexuals, gays, and lesbians and points to other profound differences. According to the CCHS, the percentages of non-heterosexual orientations are extremely small, with gays and lesbians making up .53% and .30% of the entire population.[37] Whereas 40.2% of the heterosexual households have at least one child under the age of 18, the proportions of such gay and lesbian households are only 5.7% and 20.3%. In terms of income, the CCHS confirms other findings that show gay and lesbian households do not appear to suffer any household income penalty.[38]

Table 4 shows several other differences. Heterosexuals, despite their lower average incomes, are more likely to own their home compared to all other groups. Gays and lesbians are more likely to be white (especially lesbians), and on average are considerably more educated than the other household types. Heterosexuals are less likely to be smokers, on average. However, perhaps the most striking difference is with respect to sexual behavior. In this regard, lesbians and heterosexuals appear quite similar on average: 86.1% and 87.3% had only one sexual partner in the past twelve months, and around 3% of them had more than four. In contrast, gays are much less likely to have one sexual partner in the past twelve months, and much more likely to have had more than four. Indeed, 22.1% of gay men had more than four sexual partners in the past twelve months. All of these unconditional averages are consistent with our model.

3.3. **Presence of Children**

Our model predicts that children are least likely in gay households and most likely in heterosexual households. The summary statistics confirm this. Tables 1 to 4 showed that children were rare among gay and lesbian households without

[37] The 95% confidence intervals for these estimates are .49%–.57% for gays and .28%–.33% for lesbians. These estimates are not that different from fractions found in other random samples. For example, Wainright *et al.* (2004), using the National Longitudinal Survey of Adolescence Health, find that lesbians make up about 1/3 of one percent of the sample. Golombok *et al.* (2003), using the Avon Longitudinal Study of Parents and Children find that .22% of the mothers are lesbians.

[38] See Ahmed, Andersson, & Hammarstedt (2011) or Carpenter (2004).

controlling for household characteristics. Table 5 confirms the findings from Tables 1 to 4. This table shows the results of a logit regression on the full sample, using full controls, robust standard errors, and regression weights, where the dependent variable is whether or not a child under 18 is present in the household. Although both types of households are less likely to have such children present, there is a considerable difference between gay and lesbian households. Looking at the odds ratio, the coefficient for gays means that the odds of having children present in the home are almost 17 times smaller compared to heterosexual homes. On the other hand, the odds of lesbians having children are only about half as large as those for heterosexuals. This difference is consistent with our prediction that non-heterosexual households are less likely to include children, and that this effect is stronger among gay households.

3.4. **Behaviors Non-Complementary With Children**

Tables 6 to 8 investigate a series of behaviors that most would consider non-complementary with the presence of children: smoking, illegal drug use, and sexual activity with more than four partners in the past year. Each table contains the coefficients from five regressions: two for each male and female sample, and one full sample regression. Columns (1) and (3) in each table report the coefficients and odds ratios for gays or lesbians, along with an interaction between gay/lesbian and the presence of children under 18, using a minimum number of controls, unweighted observations, and non-robust standard errors. Columns (2) and (4) in each table contains the coefficients and odds ratios for the same variables, but with all controls, weighted observations, and robust standard errors. We report these four regressions to indicate the robustness of our findings. Finally, column (5) reports the regression results for the full sample when all controls, weights, and robust standard errors are used. We will most often refer to this last column.[39]

[39] Many other combinations of controls, weighting, and robust errors were tried, but unreported to keep the table sizes manageable. The results from these unreported regressions generally lie between the two extremes reported. The definitions of the variables used are in Table 1A in the appendix.

Our model predicts that the presence of children should reduce the frequency of these behaviors. We find that the presence of children is indeed strongly associated with less smoking, less illegal drug use, and a lower likelihood of having many sex partners in the past year, for all three sexual orientations. Furthermore, if gays and lesbians without children are less likely than childless heterosexuals to *expect* having children in the future, then our model also suggests that: (i) on average, childless gays and lesbians should engage in these behaviors more often than childless heterosexuals; and (ii) the measured effect of children on these behaviors should be larger for gays and lesbians, because the difference in expectation between gays and lesbians that have children and those that do not is larger than the difference for heterosexuals. As detailed below, we find support for these predictions as well.

Table 6 reports the results on several logit regressions for smoking behavior. Considering the full sample in column (5), these results show that childless gays are more likely to smoke compared to their heterosexual counterparts. Looking at the odds ratios, the odds of gays smoking are 62% higher than for heterosexuals. (Lesbians are not significantly more or less likely to smoke: their odds ratio is close to one.) However, the presence of children in the home reduces smoking behavior, and this effect is stronger for both gays and lesbians than for heterosexuals.

Table 7 reports the results of logit regressions on illegal drug use. Illegal drug use is defined as ever having used an illegal substance such as marijuana, cocaine, and the like.[40] Table 7 shows that both childless gays and lesbians have used illegal drugs more than childless heterosexuals, when most controls are ignored. However, from the regressions in columns (2), (4) and (5), we see that childless gays are not much more likely to have used drugs, but the odds for childless lesbians are about three times higher to have done so.[41] Again, individuals with children are less likely to use drugs than those without, and this effect is significantly stronger for gays (insignificantly for lesbians) than for heterosexuals.

[40] The results do not change when the drugs are separated into individual categories.

[41] Although not reported, this finding holds for all drug categories.

Finally, Table 8 reports some logit results where the dependent variable is whether or not the respondent has had sex with more than four partners in the past twelve months. The full regressions in columns (2), (4), and (5) show that childless gays and lesbians are much more likely to be sexually active in this way than childless heterosexuals.[42] As in the other tables, the presence of children strongly curtails this behavior, and more so for gays and lesbians than for heterosexuals. For example, looking at column (5), while the odds for childless gays to have had more than four partners in the past year are over five times higher than for childless heterosexual men, gays with children are no more likely than heterosexual men with children to have engaged in this behavior.

Taken together, the results from Tables 6 to 8 show that childless individuals in both categories of the non-heterosexual orientations more frequently engage in two of the three examined types of "non-family-friendly" behavior, relative to childless heterosexuals. However, the results suggest that while the presence of children inhibits these behaviors for all sexual orientations, this effect is generally stronger for gays and lesbians. As noted earlier, these observations are all consistent with our model, which shows that they can be explained by differences in child-rearing costs, without assuming other differences across sexual orientations.

3.5. Probability of Marriage Given Health

Our model predicts that heterosexuals with high g's should be more likely to have children, and therefore, more likely to marry. Fortunately, the CCHS contains excellent information on an individual's health status. It provides information on many health problems, but also calculates an index of health based on vision, speech, hearing, dexterity, cognition, mobility, or emotional disorders.[43] We use

[42] The large odds *ratios* result from the small likelihoods of engaging in this type of behavior to begin with.

[43] It is reasonable to assume that all of these are exogenous to the institutional decision, with the possible exception of emotional disorders. Excluding this within a different index makes no effective difference in the results.

this health index as a measure of genetic fitness. Although the health index ranges from negative values to one, we create a health dummy variable that equals zero if the health index is less than one, and equals one otherwise.[44]

Table 9 reports several logit regressions on a couple's choice to marry or cohabitate. Consider the full sample regression in column (5). This regression uses robust standard errors, weighted observations, and controls for a host of variables including a spouse's income.[45] The reported coefficients are the sexual orientation variables, these variables interacted with the health index fixed effect, and these variables interacted with the child fixed effect. The variables of interest for matching are the interactive terms of sexual orientation and the health index fixed effect. The sorting hypothesis predicts that the interactive terms should only matter for heterosexuals.[46]

Table 9 confirms the summary statistic findings of the first four tables: lesbians and gay men are significantly less likely to be married relative to cohabitation. In terms of marriage and genetic fitness, we cannot reject the null hypothesis that the health status of non-heterosexual orientations is unrelated to marriage. On the contrary, health status matters for heterosexuals. Healthy heterosexuals have odds of marrying that are 69% higher than the odds for unhealthy heterosexuals, a statistically significant effect that is larger than the point estimates for gays and lesbians.[47]

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[44] We do this to avoid imposing cardinality on our genetic measure. However, this makes almost no difference to the estimates.

[45] Where an individual reports no income, an income is imputed by running a regression of actual income on age, education (categorical), white, marital status, and presence of children.

[46] In the CCHS, and on average, heterosexuals are slightly healthier than gays and lesbians, and the difference in means is statistically significant. There is no meaningful or statistical difference in the health of gays or lesbians.

[47] It is possible that differences in the propensity to marry, have children, and engage in non-family consumption, may result from a cohort effect; that is, we are picking up the effect of older gays and lesbians who did not marry. We have explored this by dropping the older gay and lesbians from the sample. When looking at samples younger than 30 or younger than 40, we find the same differences in behaviors as reported in the tables (although with more imprecision). This suggests that the results are driven more by the differences in the costs of having children rather than a cohort effect.

3.6. **Assortative Matching**

Our model predicts that heterosexual couples should match along genetic and reproductive fitness lines (g), holding constant household traits (h). At the same time, same-sex couples should not match along g because these couples cannot procreate. The one weakness of the CCHS data set is that it contains very limited information on the respondent's spouse, which means we cannot use it to test this proposition because we do not know the health status of the spouse. To resolve this we turn to another data set: the 2006 Canada census.

The 2006 Canada census only identifies same-sex couples (both married and cohabitating), but it does contain the same information on each spouse. This information includes a crude measure of health status. In particular, the census asks if the individual has home, leisure, education, work, or other activities limited due to poor health. The question goes on to define poor health as a condition resulting from injury, illness, mental illness, and hereditary diseases. Respondents only have the three options of "never," "sometimes," or "often." As such, the census health measure is a noisy measure of our g parameter. Moreover, spousal health also contributes to h, as it generates well-being independently from reproduction. Therefore, the model does not rule out sorting along the health dimension for same-sex couples. Rather, the prediction is that such sorting should be more pronounced for heterosexual couples due to the importance of health for the g parameter.

We use the 20% restricted census master file.[48] From this file, all couples, either married or cohabitating, were selected. Statistics Canada does not allow the sample sizes to be released; however, the weighted estimates of the population based on

[48] Like the CCHS, this is not a public use data set, and the separate procedures for access are identical to those of the CCHS. Empirical work was conducted at the SFU Research Data Center, and all results were screened by Statistics Canada before release. Statistics Canada does not allow any unweighted observations or descriptives to be released, nor any maximums or minimums of weighted estimates.

this sample are: 19,575 lesbian couples; 23,125 gay couples; 1,296,250 cohabitating heterosexual couples; and 5,920,270 married heterosexual couples.[49]

Table 10 shows our simple test of assortative matching. Columns (1) – (4) run our regression selecting samples based on sexual orientation. Column (5) pools the data. The dependent variable is the ordinal health status of the spouse identified as person 1 in the census. This is regressed on the health status of this person's spouse and a host of controls. In the case of the pooled regression the health status of person 2 is interacted with sexual orientation. We report the coefficient on the health status of the spouse and one of the controls: the presence of children. The results confirm our hypothesis. Heterosexual married couples sort more strongly along the health dimension than same-sex couples: the differences between the coefficients on the spouse's health are statistically significant.[50] Pooling produces identical results. In addition, when children are present in the marriage, the health status of each spouse is higher for heterosexual couples, but not for same-sex couples.[51]

4. Conclusion and Discussion

This paper has exploited two data sets that allow for reliable estimates of demographic characteristics of different sexual orientations, and for some investigation of lifestyle choices and mate matching behavior. The model argued that a difference in the cost of procreation could lead to a number of different lifestyle and

[49] As required, these numbers are rounded to the nearest 5. About 85% of the lesbian and gay couples are cohabitating, and since the results of interest from Table 10 were the same whether same-sex married couples were separated out or not, we have combined them to make the table simpler.

[50] If the census health measure only identified genetic traits that could be passed on to children, then we might expect the health coefficient for same sex couples to be zero. However, it measures general health status, which is likely to be correlated with our household characteristic. Hence, it is not too surprising that even same sex couples have a positive health correlation.

[51] An alternative explanation for the higher health correlation in heterosexual couples is that it might be difficult to care simultaneously for children and an ill partner. This would increase the importance of health for couples with or wanting children for all orientations; the coefficient on partner's health would still be higher for heterosexuals since they more frequently have children. However, as observed here, gay and lesbian couples with children do not exhibit better health than those without, which does not support this alternative reasoning.

relationship choices. In particular, heterosexuals with low procreation costs have a high demand for the institution of marriage, and more strongly sort for a mate on inheritable dimensions that impact their offsprings' welfare. Gays and lesbians with higher procreation costs have a lower demand for marriage, and more weakly value the inheritability of genetic traits when matching. Moreover, childless gays and lesbians have a higher demand for behaviors not complementary with children than childless heterosexuals, but the difference disappears when comparing individuals with children.

The model presented here ties all of these different behaviors together and shows how they result from a simple and observable cost difference, which leads to heterosexuals having a stronger expectation of children than lesbians and gays do. Other studies, mostly based on small nonrandom samples, have found similar results for fertility and non-family behaviors, but none to our knowledge have tied these together with the matching problem, nor have they used a data set with the qualities of the CCHS.

The CCHS data reveal several interesting findings. First, most non-heterosexual relationships do not involve marriage and do not involve children. Second, relative to heterosexuals, childless gays and lesbians are more likely to engage in at least one activity that is not complementary to children, and this holds whether they are married or not.[52] However, while, across all orientations, households with children engage less frequently in these activities than households without children, this difference is generally more pronounced for same-sex households, reflecting a higher variance in the expectation of children among non-heterosexual couples. Finally, heterosexuals care more about the health status of their partner than gays and

[52] Not reported are a series of regressions similar to Tables 5 to 9 where the sample is restricted to individuals married or common law. Generally speaking, the number of significant differences between the two non-heterosexual orientations and heterosexuals in the various categories is reduced. However, each of the minority sexual orientations engages in at least one activity that is not complementary to children. Thus, even when married, gay men still are more likely to have more than four sex partners in one year, lesbian and bi-sexual women are still more likely to have engaged in illegal drug use, and the like.

lesbians when it comes to the decision to marry or cohabitate. We argued that these lifestyle choices can be explained by the procreation constraint each group faced.

An alternative explanation for some of our results is that, while same-sex marriage is legal in Canada, it may still be stigmatized, or may simply not have reached a steady state. This observation would explain lower marriage rates for same-sex couples and, if marriage and children are complementary as we hypothesize, the lower prevalence of children in same-sex households. However, our model also predicts systematic differences between gays and lesbians, and this is strongly confirmed in our tests. Such differences imply that a general stigma theory is an unsatisfactory explanation of these findings. Furthermore, as previously mentioned, our model additionally explains differences in matching behavior. Thus, while a higher cost of marriage for same-sex couples may contribute to some of this paper's findings, it is neither necessary nor sufficient for explaining all of them. Hence, our contribution suggests that these differences are likely to persist in the long run, even after transitory factors vanish, because they can also be explained by biological constraints.

One may also worry that our results about behavior non-complementary with children may be caused by a selection effect: i) people that are comfortable reporting their homosexuality may also be more comfortable admitting to sensitive behavior, or ii) our results result from older gays who were unable to marry. While we cannot completely rule out either effect, we make several observations that alleviate these concerns. First, same-sex households with children are not more likely than heterosexual households with children in reporting such behavior. Second, our matching results show that differences in non-sensitive behavior occur, so it appears plausible that differences in sensitive behavior would occur as well. Finally, we ran our regressions without the older gays and found similar (but insignificant) results.

In the end, we have provided a model of household behavior that explains a wide range of behavior differences across couples of different sexual orientation, which are documented by our empirical work. We do not claim that our model is the only explanation for these correlations, as we have not established causality. However, we have demonstrated that a parsimonious model based on a single fundamental difference - in procreation and childrearing costs - can generate the many differences in behavior that are observed. Other factors may well contribute to the magnitude of these effects, but few can, alone, simultaneously explain all these phenomena. We leave it to future work to compare the importance of various explanations.

TABLE 1: Estimated Population Relationship Characteristics of Lesbian Households
Weighted Observations

	Household Size					
Characteristic	One	Two	Three	Four	Five	**All**
Number	15,384	41,363	12,889	6,641	3,609	80,209
% of All						
Lesbian HHs	19.2	51.2	16.1	8.3	4.5	
Average Age:						
Person 1	42.2	42.3	42.8	44.5	40.3	
Person 2		40.7	37.9	39.2	37.6	
Person 3			22.1	16.1	19.3	
Person 4				11.8	23.0	
Person 5					29.4	
# Children <18		2114	6,568	9,129	5,408	23,698
# males in HH		3944	13,331	8548	6,526	
Relationships†:						
Married		3,668	4,219	1,424	96	
% Married		8.8	32.7	21.4	2.6	12.2
% Single						41.9
Common Law		23,335	4,364	1,327	1,146	
Girlfriends		2,202	NATR	NATR	NATR	
Lesbian Mother/Child*		2,876	12,267	17,388	10,311	
Lesbian Mother/Adopted or Step Child*		NATR	3,415	4,084	2,157	
Lesbian Adult with Parent		399	1,234	NATR	NATR	
Room-mates*		6,428	5,888	2,446	1,061	

† The CCHS tracks 35 potential relationships within a household. Here, only the major ones are reported.

* These numbers refer to the number of *relationships* within the household. For example, a household with one lesbian mother and three children makes three mother/child relationships.

NATR = Not Able To Report, because Statistics Canada does not allow the release of counts for cells where the sample has fewer than 5 observations (which may correspond to an estimated population count above 5).

TABLE 2: Estimated Population Relationship Characteristics of Gay Households
Weighted Observations

	Household Size					
Characteristic	One	Two	Three	Four	Five	**All**
Number	52,993	67,165	9,605	10,023	3,248	143,038
% of All						
Gay HHs	37.1	46.9	6.6	7.0	2.2	
Average Age:						
Person 1	41.8	41.6	40.3	45.2	45.1	
Person 2		40.3	41.9	43.7	46.0	
Person 3			28.15	24.4	19.8	
Person 4				23.7	18.5	
Person 5					16.3	
# Children <18		747	2,485	4,357	4,012	11,677
# Females in HH		10,398	7,339	13,730	8,183	
Relationships†:						
Married		5034	517	675	592	
% Married		7.5	5.3	6.7	18.2	4.9
% Single						61.7
Common Law		32,248	655	751	NATR	
Boyfriends		3,029	NATR	NATR	NATR	
Gay Father/Child*		2024	7,260	26,067	14,483	
Gay Father/Adopted or Step Child*		NATR	2,344	710	NATR	
Gay Adult with Parent		234	2,794	1,500	NATR	
Room-mates*		15,022	7,639	10,891	NATR	

† The CCHS tracks 35 potential relationships within a household. Here, only the major ones are reported.

* These numbers refer to the number of *relationships* within the household. For example, a household with one gay father and three children makes three father/child relationships. In addition, when there are more than two members in the household, the marriage may not be between gays. For example, a gay child may live with married heterosexual parents.

NATR = Not Able To Report, because Statistics Canada does not allow the release of counts for cells where the sample has fewer than 5 observations (which may correspond to an estimated population count above 5).

TABLE 3: Estimated Population Relationship Characteristics of Heterosexual Households
Weighted Observations

	Household Size					
Characteristic	One	Two	Three	Four	Five	
Number	3,453,005	8,710,690	4,014,814	4,526,272	1,966,331	
% of All Heterosexual HHs†	13.0	32.9	15.1	17.1	7.4	
Average Age:						
Person 1	55.2	52.8	44.6	42.6	42.8	
Person 2		50.4	40.8	40.5	41.3	
Person 3			21.8	17.6	19.6	
Person 4				16.3	16.8	
Person 5					17.2	
Sex:						
% Males	43.7	49.0	49.7	50.6	50.4	
% Females	56.3	51.0	50.3	49.4	49.6	
Relationships‡:						
Married		5,574,099	2,597,182	3,674,877	1,715,978	
% Married		64.0	.64.6	81.2	87.3	48.8
% Single						29.4
Common Law		1,306,429	530,758	488,835	177,632	
Parent/Child*		783,857	6,059,959	14,846,169	9,320,403	
Parent/Adopted or Step Child*		52,256	353,702	610,407	446,702	
Adult with Parent		209,028	673,283	1,138,209	713,772	
Room-mates*		348,381	336,440	368,732	160,968	

† The CCHS does not sample individuals younger than 12. As a result, it estimates the population at 26,886,744.

‡ The CCHS tracks 35 potential relationships within a household. Here, only the major ones are reported.

* These numbers refer to the number of *relationships* within the household.

TABLE 4: Population Estimates of Other Household Characteristics
Weighted Observations

	Household Type		
	Heterosexual	Gay	Lesbian
Characteristic			
% of Population	98.56	.53	.30
% HH with child <18	40.2	5.7	20.3
Ave. HH Income	75,753	79,549	78,166
HH Income:			
Singles	39,021	53,395	41,961
Couples	69,148	89,804	88,197
Three People	82,384	85,472	79,980
Four People	95,531	164,796	86,254
Five People	95,993	110,942	111,067
% Homeowners	76.0	55.1	66.6
% White	84.5	88.2	93.4
% Smokers	46.2	55.5	54.7
% High School	77.3	95.3	94.9
% No Post Secondary	13.7	12.7	12.8
% Graduate Work	10.1	15.5	15.0
Number of Sex Partners in Past 12 Months, if at least one			
% One	87.3	56.9	86.1
% Two	6.7	14.6	9.3
% Three	2.9	6.2	1.5
% Four +	3.0	22.1	3.1

TABLE 5 Presence of Children Under 18
Logit Regression

Variable	Full Sample
Gay coefficient	−2.70
Gay Odds Ratio	0.06
	(−5.12)*
Lesbian coefficient	−0.59
Lesbian Odds Ratio	0.55
	(−2.63)*
Exogenous Controls	Yes
Other Controls	Yes
Weighted observations	Yes
Robust Std. Errors	Yes
N	214,614
Log Likelihood	−10,402,319
Pseudo R2	0.19

* Significant at the 5% level. t-statistics in parentheses.

Exogenous Controls: Age, Year, White. Other Controls: Smoking, Income, Urban, Graduate Work, Obesity, Married, and the sexual orientation health interactions.

TABLE 6 Smoking Behavior
Logit Regression

Variable	Males		Females		Full Sample
	(1)	(2)	(3)	(4)	(5)
Gay coefficient	0.28	0.38			0.49
Gay odds ratio	1.31	1.46			1.62
	(3.26)*	(1.89)			(2.42)*
Lesbian coefficient			0.14	−0.04	−0.09
Lesbian odds ratio			1.08	1.04	0.91
			(1.16)	(−0.16)	(−0.39)
Gay× Children		−1.34			−1.36
Gay× Children odds ratio		0.26			0.25
		(−2.15)*			(−2.19)*
Lesbian× Children				−0.84	−0.79
Lesbian× Children odds ratio				0.43	0.45
				(−2.09)*	(−2.00)*
Children		−0.06		−0.005	−0.06
Children odds ratio		0.93		0.99	0.94
		(−1.97)*		(−0.16)	(−2.39)*
Exogenous Controls	Yes	Yes	Yes	Yes	Yes
Other Controls		Yes		Yes	Yes
Weighted observations		Yes		Yes	Yes
Robust Std. Errors		Yes		Yes	Yes
N	137,918	102,278	164,185	112,266	214,644
Log Likelihood	−5,983,401	−4,603,891	−5,207,376	−3,784,389	−8,449,543
Pseudo R2	0.01	0.03	0.03	0.05	0.03

* Significant at the 5% level. t-statistics in parentheses.

Exogenous Controls: Age, Year, White. Other Controls: Smoking, Income, Urban, Graduate Work, Obesity, Children, Marriage, and the sexual orientation health interactions.

TABLE 7 Illegal Drug Use
Logit Regression

Variable	Males		Females		Full Sample
	(1)	(2)	(3)	(4)	(5)
Gay coefficient	0.49	0.06			0.13
Gay Odds Ratio	1.63	1.05			1.13
	(3.50)*	(0.13)			(0.29)
Lesbian coefficient			1.11	1.10	1.04
Lesbian Odds Ratio			3.05	3.02	2.85
			(7.28)*	(3.72)*	(3.60)*
Gay× Children		−2.18			−2.16
Gay× Children odds ratio		0.11			0.11
		(−2.06)*			(−2.03)*
Lesbian× Children				−0.22	−0.24
Lesbian× Children odds ratio				0.80	0.78
				(−0.42)	(−0.47)
Children		−0.23		−0.21	−0.23
Children odds ratio		0.79		0.81	0.79
		(−4.30)*		(−3.62)*	(−5.82)*
Exogenous Controls	Yes	Yes	Yes	Yes	Yes
Other Controls		Yes		Yes	Yes
Weighted observations		Yes		Yes	Yes
Robust Std. Errors		Yes		Yes	Yes
N	137,918	102,378	164,185	112,266	214,644
Log Likelihood	−2,527,473	−1,927,439	−2,019,022	−1,494,923	−3,433,477
Pseudo R2	0.12	0.14	0.13	0.14	0.14

* Significant at the 5% level. t-statistics in parentheses.

Exogenous Controls: Age, Year, White. Other Controls: Smoking, Income, Urban, Graduate Work, Obesity, Children, Married, and the sexual orientation health interactions.

TABLE 8 More Than Four Sex Partners
Logit Regression

Variable	Males		Females		Full Sample
	(1)	(2)	(3)	(4)	(5)
Gay coefficient	2.01	1.98			1.62
Gay Odds Ratio	7.49	7.31			5.64
	(12.52)*	(5.55)*			(4.25)*
Lesbian coefficient			0.99	4.25	3.51
Lesbian Odds Ratio			2.71	71.3	41.35
			(2.52)*	(2.32)*	(2.13)*
Gay× Children		−1.80			−1.96
Gay× Children odds ratio		0.13			0.12
		(−2.22)*			(−2.09)*
Lesbian× Children				−2.31	−2.25
Lesbian× Children odds ratio				0.09	0.12
				(−1.96)*	(−1.90)
Children		−0.51		−0.57	−0.63
Children odds ratio		0.60		0.56	0.53
		(−4.98)*		(−5.02)*	(−7.92)*
Exogenous Controls	Yes	Yes	Yes	Yes	Yes
Other Controls		Yes		Yes	Yes
Weighted observations		Yes		Yes	Yes
Robust Std. Errors		Yes		Yes	Yes
N	41,003	40,453	46,598	44,112	84,576
Log Likelihood	−804, 617	−720, 213	−342, 582	−289, 271	−1, 044, 123
Pseudo R2	0.09	0.17	0.11	0.14	0.16

* Significant at the 5% level. t-statistics in parentheses.

Exogenous Controls: Age, Year, White. Other Controls: Smoking, Income, Urban, Graduate Work, Obesity, Children, Married, and the sexual orientation health interactions.

TABLE 9: Logit Regressions for Marriage vs Cohabitation

	Males		Females		Full Sample
Variable	(1)	(2)	(3)	(4)	(5)
Now Married					
Lesbian coefficient			−2.56	−2.41	−2.62
Lesbian odds ratio			.07	−0.09	0.07
			(−9.06)*	(−3.64)*	(−3.98)*
Gay coefficient	−2.57	−2.08			−1.87
Gay odds ratio	0.07	0.12			0.15
	(−7.88)*	(−5.52)*			(−5.23)*
Lesbian × Healthy			0.45	0.23	0.28
odds ratio			1.57	1.26	1.32
			(1.23)	(0.61)	(0.73)
Gay × Healthy	0.44	0.36			0.40
odds ratio	1.56	1.44			1.50
	(1.14)	(0.80)			(0.92)
Heterosexual × Healthy	0.56	0.51	0.58	0.54	0.52
odds ratio	1.76	1.67	1.79	1.72	1.69
	(13.03)*	(10.56)*	(15.00)*	(12.40)*	(15.88)*
Gay× Children		2.10			2.12
Gay× Children odds ratio		8.81			8.38
		(3.25)*			(3.21)*
Lesbian× Children				0.65	1.78
Lesbian× Children odds ratio				1.93	2.18
				(1.22)	(1.49)
Children		0.66		0.82	0.76
Children odds ratio		1.95		2.28	2.13
		(15.45)*		(20.43)*	(25.61)*
Exogenous Controls	Yes	Yes	Yes	Yes	Yes
Other Controls		Yes		Yes	Yes
Weighted observations		Yes		Yes	Yes
Robust Std. Errors		Yes		Yes	Yes
N	74,892	60,807	81,642	61,185	121,992
Log Likelihood	−3,031,551	−2,469,837	−2,874,101	−2,190,262	−4,687,039
Pseudo R2	0.14	0.17	0.16	0.19	0.17

* Significant at the 5% level. t-statistics in parentheses.

Exogenous Controls: Age, Year, White. Other Controls: Smoking, Income, Spouse Income, Urban, Graduate Work, Obesity.

TABLE 10: OLS Regressions for Assortative Matching
Dependent Variable: Spouse 1 Health

Variable	Lesbian Couples (1)	Gay Couples (2)	Heterosexual Common Law (3)	Heterosexual Married (4)	Pooled Sample (5)
Spouse 2					
Health	0.33	0.29	0.37	0.42	
	(13.31)*	(12.08)*	(98.71)*	(487.36)*	
Lesbian × Health					0.33
					(13.29)*
Gay× Health					0.28
					(12.06)*
Common Law × Health					0.37
					(102.61)*
Married × Health					0.42
					(301.59)*
Children	−0.02	−0.04	0.01	0.005	−0.0009
	(−0.81)	(−0.98)	(7.00)*	(4.46)*	(−0.89)
Controls	Yes	Yes	Yes	Yes	Yes
Weighted obs.	Yes	Yes	Yes	Yes	Yes
N	19,575	23,125	1,296,250	5,920,270	7,259,220
R^2	0.18	0.19	0.22	0.29	0.96

* Significant at the 5% level. t-statistics in parentheses.

Controls: Age, White, Rooms, Education, Ethnicity, Province, Citizenship, Value, Urban Size, Work. For the pooled regression the CONSTANT is interacted with the family type fixed effect as well.

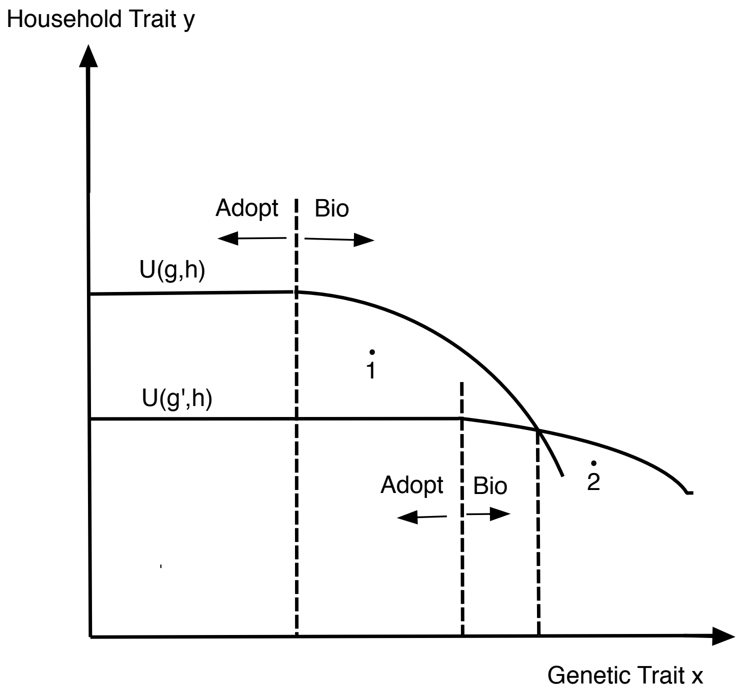

Figure 1: Example of Matching Boundary Conditions

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Appendix A
TABLE 1A: Definitions of Variables
Canadian Community Health Survey

Variable Name		**Definition**
Gay	=	1 if respondent self-identified as gay.
Lesbian	=	1 if respondent self-identified as lesbian
Bi-sexual male	=	1if respondent self-identified as male bi-sexual
Bi-sexual female	=	1if respondent self-identified as male bi-sexual
Age	=	age in years.
Year	=	year of survey, either 2005, 2007, 2008, or 2009.
White	=	1 if respondent was white.
Smoking	=	1 if respondent was a daily smoker, and had smoked more than 100 cigs. in life.
Income	=	self reported income of respondent.
Urban	=	1 if respondent lived in urban area.
Graduate Work	=	1 if respondent had completed graduate degree.
Obesity	=	1 if body mass index was greater than 30.
Children	=	1 if any child in household was less than 18.
Health	=	1 if respondent had no serious health problems.
Alcohol	=	1 if alcohol consumed less than once per month.
	=	2 if alcohol consumed once per month.
	=	...
	=	7 if alcohol consumed once per day.
Drug Use	=	1 if the respondent has used marijuana, cocaine, speed, ecstasy, hallucinogens, glue, or heroin
Health Index	=	1 if person suffered from vision, speech, hearing, dexterity, cognition, mobility, or emotional disorders.

TABLE 2A: Definitions of Variables
2006 Canada Census

Variable Name		Definition
Spouse 1 Health	=	1 if poor health often prohibits job, school, or other activities.
	=	2 if poor health sometimes prohibits job, school, or other activities.
	=	3 if poor health never prohibits job, school, or other activities.
Spouse 2 Health	=	same as Spouse 1 Health.
Children	=	1 if children are present in home.
Age1	=	age of spouse 1.
Age2	=	age of spouse 2.
Education1	=	highest grade achieved by spouse 1.
Education2	=	highest grade achieved by spouse 2.
Ethnicity1	=	ordinal ethnic category for spouse 1.
Ethnicity2	=	ordinal ethnic category for spouse 2.
Citizen1	=	1 if spouse 1 is Canadian citizen.
Citizen2	=	1 if spouse 2 is Canadian citizen.
White1	=	1 if spouse 1 is white.
White2	=	1 if spouse 2 is white.
Work1	=	number of weeks worked in 2005 for spouse 1.
Work2	=	number of weeks worked in 2005 for spouse 2.
Rooms	=	number of rooms in residence.
Value	=	value of residence.
Province	=	ordinal value for province.
Urban Size	=	population of rural/urban district.

Appendix B

Proof of Proposition 1

All couples who do not have biological children, both same-sex and opposite-sex, will marry if and only if (up to measure zero indifference cases)

$$\epsilon_c > \begin{cases} 0 & \text{if } f_c + s \geq a + 1, \text{ (}i.e.\text{ couple never adopts)} \\ f_c + s - a - 1 & \text{if } a \leq f_c + s < a + 1, \text{ (}i.e.\text{ couple adopts if married)} \\ -1 & \text{if } f_c + s < a, \text{ (}i.e.\text{ couple always adopts).} \end{cases} \quad (2)$$

Because the right-hand side is independent of g and h, all couples of a given sexual orientation will have the same probability of marrying. That is, all gay couples have the same probability of marriage, all lesbian couples have the same probability, and all heterosexual couples that do not have biological children have the same probability. However, the probability of marriage is always weakly greater for heterosexual couples than gay and lesbian couples because the right hand side, the net cost of marriage, is weakly smaller for heterosexual couples.

For the marriage probability to be strictly greater for heterosexual couples, we need $s < a + 1$ so that some heterosexual couples adopt, and $f_{Lesbian} + s > a$, so that some same-sex couples do not adopt. If no heterosexual couples adopt or if all same-sex couples do adopt, then right-hand side of equation (2) is the same regardless of sexual orientation.

Couples who choose to have biological children have an even greater probability of marriage since their value of having children is $b(g_i, g_j) > a$. ■

Proof of Corollary 1

Use the same reasoning as in the first half of the proof of Proposition 1, and the assumption that $f_{Gay} > f_{Lesbian}$. ■

Proof of Corollary 2

This is a direct consequence of Proposition 1, Corollary 1, the fact that marriage increases the utility from having children, and $f_{Gay} > f_{Lesbian} > 0$. ■

Proof of Corollary 3

This is a direct consequence of Corollary 2. ■

Proof of Corollary 4

Given the assumptions, for heterosexuals, we have $\gamma_g > 0$, so couple A has a higher γ than couple B. This is equivalent to facing a lower f, so by the same logic as Proposition 1, couple 1 is more likely to marry. For gays and lesbians, $\gamma = a$ does not depend on g. ■

Proof of Proposition 2

Since gays and lesbians only care about h, $B^\sigma(g, h) = B^\sigma(g', h)$ for all h. Therefore, (g, h) and (g', h), which have the same preferences, must have the same threshold, so $A^\sigma(g, h) = A^\sigma(g', h)$. ■

Proof of Lemma 1

Because $\gamma(g_i, g_j) = \max\{a, b(g_i, g_j)\}$, we have: $\gamma(g_i, g_j) - \gamma(g_i, g'_j) \in \{b(g_i, g_j) - b(g_i, g'_j), b(g_i, g_j) - a, 0\}$. Thus, $\gamma(g_i, g_j) - \gamma(g_i, g'_j) \leq b(g_i, g_j) - b(g_i, g'_j)$. Therefore:

If $\gamma(g_i, g_j) - \gamma(g_i, g_j') = b(g_i, g_j) - b(g_i, g_j')$, then $\gamma(g_i', g_j) - \gamma(g_i', g_j') \leq b(g_i', g_j) - b(g_i', g_j') < b(g_i, g_j) - b(g_i, g_j') = \gamma(g_i, g_j) - \gamma(g_i, g_j')$.

If $\gamma(g_i, g_j) - \gamma(g_i, g_j') = b(g_i, g_j) - a > 0$, then, because $b_1 > 0$, $\gamma(g_i', g_j) - \gamma(g_i', g_j') = \max\{b(g_i', g_j) - a, 0\} < b(g_i, g_j) - a = \gamma(g_i, g_j) - \gamma(g_i, g_j')$.

If $\gamma(g_i, g_j) - \gamma(g_i, g_j') = 0$, then clearly $\gamma(g_i', g_j) - \gamma(g_i', g_j') = 0$.

Thus, $\gamma(g_i, g_j) - \gamma(g_i, g_j') \geq \gamma(g_i', g_j) - \gamma(g_i', g_j')$.

Therefore, even with the same probability of child rearing, type g_i would benefit weakly more than type g_i' from increasing the genetic type of her partner. Furthermore, for any given type of the partner, type g_i is weakly more likely than type g_i' to have children. Thus, $v(g_i, g_j) - v(g_i', g_j) \geq v(g_i, g_j') - v(g_i', g_j')$.

If $v(g_i, g_j) - v(g_i, g_j') > 0$, then it must be that $\gamma(g_i, g_j) - \gamma(g_i, g_j') \neq 0$. The argument above shows that $\gamma(g_i, g_j) - \gamma(g_i, g_j') > \gamma(g_i', g_j) - \gamma(g_i', g_j')$. Moreover, if $v(g_i, g_j) - v(g_i, g_j') > 0$, then it must be that a couple with genetic traits g_i, g_j has a strictly positive probability of having children. Therefore, $v(g_i, g_j) - v(g_i', g_j) > v(g_i, g_j') - v(g_i', g_j')$. ■

Proof of Proposition 3

Denote type (g_j, h_j)'s utility from being matched with type (g, h) as $U_{g_j,h_j}(g, h)$. Since $g > g'$, we have $U_{g_j,h_j}(g, h) \geq U_{g_j,h_j}(g', h)$ for all (g_j, h_j). It follows that $B^\sigma(g, h) \supseteq B^\sigma(g', h)$.

Case 1: The boundaries of $A^\sigma(g, h)$ and $A^\sigma(g', h)$ cross. It follows from the discussion about indifference curves in the main text that they must cross at only one type. Letting g^* be this type's genetic characteristic yields the desired result.

Case 2: $A^\sigma(g, h) \subseteq A^\sigma(g', h)$. Here, we must simply show that $A^\sigma(g, h)$ and $A^\sigma(g', h)$ must differ by a set of positive measure. Due to the assumption that every g_i, $v(g_i, G) - v(g_i, 0) > 0$, Lemma 1 implies that $v(g, G) - v(g, 0) > v(g', G) - v(g', 0)$. Thus, no indifference curve for any type can be flat across the entire type space. Again, by the discussion about indifference curves in the main text, the boundary of $A^\sigma(g, h)$ must be strictly steeper than the boundary of $A^\sigma(g', h)$ in some range.

Case 3: $A^\sigma(g', h) \subset A^\sigma(g, h)$. The rest of the proof shows that this case cannot arise if type (g, h) has a positive probability of having biological children.

In a threshold equilibrium, we must have:

$\int_{A^\sigma(g,h) \cap B^\sigma(g,h)} [U_{g,h}(x, y) - \underline{U}^\sigma(g, h)] dF(x, y) = k = \int_{A^\sigma(g',h) \cap B^\sigma(g',h)} [U_{g',h}(x, y) - \underline{U}^\sigma(g', h)] dF(x, y)$.

Define $L = A^\sigma(g, h) \cap B^\sigma(g, h)$ and $L' = A^\sigma(g', h) \cap B^\sigma(g', h)$. Recall that $B^\sigma(g, h) \supseteq B^\sigma(g', h)$. Thus, if $A^\sigma(g', h) \subset A^\sigma(g, h)$, it must be that $L' \subseteq L$. Since $U_{g,h}(x, y) - \underline{U}^\sigma(g, h) > 0$ for all $(x, y) \in A^\sigma(g, h)$, it follows that:

$$\int_{L'} [U_{g,h}(x, y) - \underline{U}^\sigma(g, h)] dF(x, y) \leq \int_{L} [U_{g,h}(x, y) - \underline{U}^\sigma(g, h)] dF(x, y) = k$$

Thus,

$$\int_{L'} [U_{g,h}(x,y) - \underline{U}^{\sigma}(g,h)]dF(x,y) \leq k = \int_{L'} [U_{g',h}(x,y) - \underline{U}^{\sigma}(g',h)]dF(x,y),$$

and therefore,

$$\frac{\int_{L'}[v(g,x) - v(g',x)]dF(x,y)}{\int_{L'} dF(x,y)} \leq \underline{U}^{\sigma}(g,h) - \underline{U}^{\sigma}(g',h). \qquad (B1)$$

Let $\underline{x}$ be the lowest x such that there exists y for which $(x,y) \in A^{\sigma}(g,h)$. Let $\underline{y}$ be this y, so that $U_{g,h}(\underline{x},\underline{y}) = \underline{U}^{\sigma}(g,h)$. Since $A^{\sigma}(g',h) \subset A^{\sigma}(g,h)$, it must be that $U_{g',h}(\underline{x},\underline{y}) \leq \underline{U}^{\sigma}(g',h)$. Then we have:

$$\underline{U}^{\sigma}(g,h) - \underline{U}^{\sigma}(g',h) \leq U_{g,h}(\underline{x},\underline{y}) - U_{g',h}(\underline{x},\underline{y}) = v(g,\underline{x}) - v(g',\underline{x}). \qquad (B2)$$

Combining equations B1 and B2 gives:

$$\frac{\int_{L'}[v(g,x) - v(g',x)]dF(x,y)}{\int_{L'} dF(x,y)} \leq v(g,\underline{x}) - v(g',\underline{x}). \qquad (B3)$$

Since $g > g'$ and all $(x,y) \in A^{\sigma}(g',h)$ must have $x \geq \underline{x}$, it follows from Lemma 1 that $v(g,x) - v(g',x) \geq v(g,\underline{x}) - v(g',\underline{x})$. Therefore, for B3 to hold, it must be that $v(g,x) - v(g',x) = v(g,\underline{x}) - v(g',\underline{x})$ for almost all types $(x,y) \in A^{\sigma}(g',h) \cap B^{\sigma}(g',h)$. By the second half of Lemma 1, this means that $v(g,x) - v(g,\underline{x}) = 0$. This implies that type (g,h) does not care about the genetic trait of its partner, which means that it will not have biological children. ■