

NBER WORKING PAPER SERIES

CHILD-ADOPTION MATCHING:  
PREFERENCES FOR GENDER AND RACE

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Working Paper 16444  
<http://www.nber.org/papers/w16444>

NATIONAL BUREAU OF ECONOMIC RESEARCH  
1050 Massachusetts Avenue  
Cambridge, MA 02138  
October 2010

This paper was previously circulated under the title: “Gender and Racial Biases: Evidence from Child Adoption.” We thank Luca Anderlini, Oriana Bandiera, Heski Bar-Isaac, Cristian Bartolucci, Tim Besley, Chantal Collard, Federico Echenique, Ray Fisman, Carola Frege, Maia Güell, Luigi Guiso, Ali Hortacsu, Soohyung Lee, Alessandro Lizzeri, Hong Luo, James Myatt, Nicola Persico, Ronny Razin, Sevi Rodríguez Mora, Jean-Laurent Rosenthal, Bernard Salanié, Gianluca Violante, and Yoram Weiss for helpful conversations and comments. We are especially grateful to Alistair Wilson for outstanding research assistance. Finally, we thank the adoption professionals that offered us invaluable insights into the adoption process. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 16444  
October 2010  
JEL No. C78,J13,J15,J16

**ABSTRACT**

This paper uses a new data set on child-adoption matching to document the preferences of potential adoptive parents over U.S.-born and unborn children relinquished for adoption by their birth mothers. We show that adoptive parents exhibit significant preferences in favor of girls and against African-American children. A non-African-American child relinquished for adoption attracts the interest of potential adoptive parents with probability 11.5% if it is a girl and 7.9% if it is a boy. As for race, a non-African-American child has a probability of attracting the interest of an adopting parent at least seven times as high as the corresponding probability for an African-American child. In addition, we show that a child's desirability in the adoption process depends significantly on time to birth (increasing over the pregnancy, but decreasing after birth) and on adoption costs. We also document the attitudes toward children's characteristics across different categories of adoptive parents – heterosexual and same-sex couples, as well as single women and foreign couples. Finally, we consider several recently discussed policies excluding same-sex and foreign couples from the adoption process. In our data, such policies would reduce the number of adopted children by 6% and 33%, respectively, and have a disproportionate effect on African-American children.

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An online appendix is available at:  
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# 1 Introduction

## 1.1 Overview

Adoption is an important phenomenon in the U.S. In 2000, about 1.6 million or 2.5% of all children were adopted. Of these, 87% were U.S.-born and adopted through the domestic-adoption channel. In terms of revenues, the adoption industry is a substantial one, generating approximately 2-3 billion dollars annually.<sup>1</sup>

In most cases, a successful domestic adoption is the result of a match between a *birth mother* (BMO hereafter) who seeks to relinquish her child, and *prospective adoptive parents* (PAPs hereafter). The underlying matching process involves a bilateral search characterized by several layers of mediation: Typically, adoption agencies represent BMOs, while PAPs work vis-à-vis adoption agencies, lawyers, or facilitators.

According to the Census, 54% of U.S.-born adopted children under the age of 10 are female, and 18% are African-American.<sup>2</sup> In contrast, girls and African-American represent 48% and 15% of all children, respectively. These differences can be explained by either the preferences of PAPs (the demand side), or the characteristics of children relinquished for adoption by BMOs (the supply side). In this paper, we exploit the unique nature of a new data set documenting the operations of an adoption facilitator in order to disentangle demand and supply effects on outcomes. We identify the preferences of PAPs over the attributes of children relinquished for adoption, the BMOs' choices, and the factors that determine ultimate outcomes (i.e., a successful adoption, a decision to parent by the BMO, or the child's placement in foster care).

The contribution of this paper is threefold. First, we provide a direct assessment of parents' preferences over children's attributes, in particular gender and race. Unlike consumers' preferences (that are observable through market behavior) or preferences over marriage partners (that are revealed in dating patterns),<sup>3</sup> very little is known about parents' preferences over children's attributes.<sup>4</sup> For the

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<sup>1</sup>See the Census 2000 and Riben (2007).

<sup>2</sup>These figures are derived from the authors' own tabulation using the 5% PUMS.

<sup>3</sup>See the recent papers by Fisman, Iyengar, Kamenica, and Simonson (2006, 2008), Hitch, Hortacsu, and Ariely (2009), and Lee (2009).

<sup>4</sup>An important exception is Dahl and Moretti (2008) and Almond and Edlund (2008), which we discuss below.

specific case of adoptive children, our analysis is a step toward filling this gap.

Second, we analyze the determinants of successful matches. In fact, unmatched children enter foster care, which is notoriously detrimental to their short- and long-term welfare.<sup>5</sup> Despite the social value of a well-functioning matching process that delivers suitable parents to every child, adoption has not received much attention by the economics literature.<sup>6</sup> Our analysis of parents' preferences, combined with the identification of factors facilitating an ultimate match, opens the door to policy interventions aimed at increasing the efficiency of this process.

The third contribution of the paper is, in fact, the evaluation of several recently implemented or suggested regulatory policies. Specifically, we assess the potential effects of a ban on adoption by same-sex parents (implemented in several states) on the volume of successful adoptions. We also illustrate the potential reduction in adoptions of U.S.-born children by foreign parents due to the recent ratification of the Hague Convention, which significantly toughened intercountry adoption, starting in 2008.

We constructed our data set following the matching process managed online by an adoption facilitator between 2004 and 2009. The data set is comprised of approximately 800 cases of either born or unborn children that the facilitator collected from multiple agencies and posted on a website designed for client PAPs. On the website, each baby is identified by a code, by an array of attributes, by the adoption finalization costs, and by a set of restrictions imposed by the BMO specifying which categories of PAPs she considers acceptable (such as straight couples, single-sex couples, single women, and foreign PAPs).

Each PAP pays a fixed fee to the facilitator to enter this matching process. PAPs who participate in the matching process observe the children available for adoption sequentially and can express interest in any baby by submitting an application to the BMO (as long as they meet the BMO's requirements). Our data records all the PAPs that apply for each baby, as well as each BMO's final

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<sup>5</sup>Nearly 40% of youth exiting foster care are homeless within 18 months of discharge (U.S. General Accounting Office, 1999). Entry into foster care is also associated with a much higher rate of incarceration. For instance, in California, 70% of all penitentiary inmates have spent time in foster care (Select Committee Hearing of the California Legislature, 2006).

<sup>6</sup>We discuss several exceptions in Section 1.2.

choice, be it selecting an applicant PAP, matching through channels other than the facilitator, or deciding to parent the child.

In order to elicit parents' preferences directly from their behavior in the application process, we need to account for the supply of children of different attributes. To that effect, we utilize a decentralized search and matching model à-la Burdett and Coles (1997) and Eeckhout (1999). We assume PAPs' preferences depend on the observable attributes of the children they are matched with, and BMOs' preferences depend on PAPs' attributes. Participants on both sides of the market effectively solve an option value problem. In equilibrium, a PAP applies for a baby if the utility associated with it exceeds a certain threshold (their reservation utility) and a BMO accepts a PAP's application if a match with that PAP yields a utility exceeding her own reservation utility. The model enables us to estimate the preferences on each sides of the matching process separately. In particular, we use our data to identify which children fall above and below the PAPs' reservation utilities, and subsequently to estimate PAPs' marginal rates of substitution over children's attributes (gender, race, and time to birth) and adoption finalization costs.

We show that PAPs exhibit a preference in favor of girls and against African-American children. Specifically, if we consider a non-African-American baby, the probability that a given PAP expresses interest in such a baby is 11.5% if the baby is a girl and 7.9% if the baby is a boy. The effect of the estimated adoption cost on child desirability is significant and negative. That is, *ceteris paribus*, an increase in expected adoption costs lowers the desirability of a child. This allows us to convert the gender preference into dollars. We find that the increase in desirability of a non-African-American girl with respect to a non-African-American boy is equivalent to a \$16,000 decrease in adoption finalization costs.

With regard to race, most children in our data are characterized by the composition of varying percentages of three ethnicities: Caucasian, African-American, and Hispanic. If we consider an unborn baby before the gender is known, the probability that a given PAP expresses interest in the baby is about 13% if the baby is non-African-American and 1.7% if the baby is African-American. Again, converting the racial preference into dollars, we find that the increase in desirability of a non-African-American baby with respect to an African-American baby (both of unknown gender) is

equivalent to at least a \$38,000 decrease in adoption finalization costs. However, we do not observe *any* bias against Hispanic children, who represent a substantial fraction of the children in our data set.

It is interesting to contemplate what underlies these observed preferences. Consider, first, the gender preference. The existing literature on parents' preferences for the gender of their biological children has invariably identified a preference for boys. This is believed to be the case both within the U.S. and abroad (e.g., as manifested in the case of the missing women in China). However, our results on gender preferences constitute a reversal of this evidence in the adoption environment. One possible explanation is that PAPs fear dysfunctional social behavior in adopted children and perceive girls as "less risky" than boys in that respect.<sup>7</sup>

Consider, now, the racial preference. *Homophily*, defined as individuals' preference for similarity, is well-established in the sociological literature. In the adoption context, homophily can translate into PAPs preferring adopted children that resemble them in looks, who can potentially pass as their biological children. Given that the PAPs in our sample are predominantly Caucasian, the desire for similarity is consistent with a preference for Caucasian children. While we suspect that this taste for similarity is at the root of some of the racial preferences we observe, it cannot fully explain the preferences we document. Indeed, to the extent that Hispanic children are more likely to appear different from Caucasian PAPs relative to Caucasian children, homophily would suggest a (possibly weaker) bias against Hispanic children as well. However, as highlighted above, this is not confirmed by the data.

A natural concern pertains to the selection of participants on both sides into the matching process. In particular, observed characteristics of children (such as gender and race) may signal important health and behavioral attributes. Consequently, estimated PAPs' preferences may simply reflect their concerns regarding health and behavior. To address this, we look at the correlation between

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<sup>7</sup>The lifetime probabilities of incarceration for men and for women were estimated at 11.3% and 1.8%, respectively, by the Department of Justice (see <http://www.ojp.usdoj.gov/bjs/crimoff.htm>). Also, girls are less likely to develop behavioral problems such as autism spectrum disorders (four times more prevalent in boys than in girls, according to the Autism Society of America) or ADHD (diagnosed two to four times more frequently in boys; see Dulcan, 1997). These facts can be regarded as support for the perceived higher risk boys entail.

gender and race of the children in our data and an array of health and behavioral measures of the BMOs. We find no significant difference in any of these measures across gender and race. If anything, we find that African-American BMOs are characterized by slightly more desirable health and behavioral markers. On the other side of the process, the preferences of the PAPs that select into the facilitator's operations may not be representative of the entire population of adoptive parents. However, using the Census 2000 data, we find that the cases available through the facilitator end up with adoptions of substantially more boys and African-American children relative to the average adopting household in the U.S. This suggests that PAPs selecting into the facilitator's client pool are potentially more open to boys and African-American children.

We also estimate the extent to which PAPs' preferences depend on their own characteristics. We differentiate between PAPs according to whether they participate as a couple or as a single person, their sexual orientation (heterosexual and same-sex couples), and their nationality (U.S. residents and foreigners). We find that same-sex couples submit applications at nearly three times the rate of straight ones. The preferences mentioned above hold true for all of these categories of PAPs. The racial preference is stronger for same-sex couples and weaker for foreign PAPs.

Next, we quantify the variation of child desirability over the course of the BMO's pregnancy and after birth. The probability that a PAP is interested in an unborn child steadily increases the closer the BMO is to delivery, with the probability of an application rising from 3.6% seven months before birth to 8.6% a month before birth. This effect is presumably the outcome of two countervailing forces. On the one hand, the earlier the match between the BMO and the PAP, the closer the adoptive PAPs can monitor the BMO's pre-natal care. On the other hand, BMOs cannot legally relinquish their parental rights until after birth. This implies that BMOs who are closer to birth have less opportunities to change their minds regarding the adoption and, thus, the match has a higher chance of being successful. Our results suggest that the latter effect dominates the former.

We also find that the probability of a PAP applying for a baby drops substantially immediately after birth. In terms of policy design, this highlights the importance of minimizing bureaucratic obstacles that could disrupt an adoption plan that is in place at the time of birth.

On the normative side, the question of which parents are legitimate prospective adoptive parents

(specifically, for the case of same-sex or single PAPs) is a topic of ongoing debate in the U.S. and abroad. Internationally, The Hague Convention, originally crafted in 1993, regulates intercountry adoption and was ratified in the U.S. on April 1, 2008. The Hague Convention has simultaneously made international adoption far more difficult for U.S. citizens (potentially increasing demand for domestic adoption) and domestic adoption virtually impossible for foreign PAPs. Consequently, its merits are highly debated on both the domestic and international fronts.

Our analysis sheds light on some of these debates. Banning a certain category of PAPs from the adoption process has two effects. First, it affects the volume of PAPs involved in the process, and therefore the number of expected matches. Second, given the differential preferences across PAPs' categories, it changes the distribution of preferences among active PAPs and consequently impacts the type of children that are adopted. For example, focusing on the effects of participation of same-sex couples, we perform a natural counterfactual experiment. We shut down the possibility for same-sex PAPs to submit applications to BMOs. This results in a 6% decrease in the probability of being matched. We reach a similar conclusion when looking at whether adoption should be open to foreign PAPs. If we ban foreign PAPs from our sample, we find a sizable reduction of 33% in the chances that a baby will find a match. Furthermore, for both PAPs' categories, there are significantly more boys and African-American children within the lost matches.

## 1.2 Literature Review

Despite the scope of the adoption industry in terms of volume of children and annual revenues, as well as the unique matching mechanisms it employs, adoption has, thus far, received little attention in the economics literature.<sup>8</sup> There are, however, a few important exceptions.

The paper that is closest to ours in terms of questions addressed is Bernal, Hu, Moriguchi, and Nagypal (2007). This paper presents an historical analysis of domestic adoption, uncovering the trends in different types of adoption: domestic and international, related and unrelated, as well as standard adoption and foster care. At the individual level, the paper estimates the propensities

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<sup>8</sup>See Fisher (2003) for an account of how adoption has also been overlooked by sociologists and social scientists more generally.



of PAPs to adopt and of BMOs to relinquish their child across time. These findings provide an important springboard for our analysis, which takes PAPs' and BMOs' decisions to participate in the adoption process as given and focuses on their behavior *within* that process.

From a policy perspective, Landes and Posner (1978) propose a strategy for amending the shortage of children relinquished for domestic adoption and the abundance of children in foster care. They suggest the opening of a market for children that would allow for equilibrating monetary transfers between PAPs and BMOs. The envisioned market would entail little governmental regulation and would remove adoption agencies' monopolistic power. Our analysis is useful in assessing this proposal, in that it identifies parents' preferences that would feed into estimating efficiency and the likelihood of entry to foster care in a fully decentralized mechanism as such.

Sacerdote (2002, 2007, 2009) makes use of adoption data to study questions regarding the impacts of nature as opposed to nurture. In particular, he analyzes the long-term performance of Korean-American adoptees who, as infants, were randomly assigned to families in the U.S. While there exists a performance gap between biological and adopted children (favoring biological children) in both education and income, there is no gap in the transmission of other habits (namely, eating, drinking, and smoking). Björklund, Lindahl, and Plug (2006) also focus on the long term effects on both education and income of Swedish adoptees. They show that the adoptive father's income is the most significant determinant of the adoptee's income, while the birth mother's education has the strongest effect on education performance.

The adoption industry has received attention in other disciplines, ranging from legal studies, to sociology, psychology, and history. We provide a summary of the legal background of adoption in Section 2 below. For detailed accounts of child adoption in the U.S., we refer the interested reader to Melosh (2002), Pertman (2000), and references therein.

Other than the literature on adoption per se, our paper is linked to the work on two-sided matching with frictions (e.g., Adachi, 2003; Burdett and Coles, 1997; Eeckhout, 1999; and Smith, 2006). The underlying model in that literature has two sides of a market (e.g., workers and firms, men and women, etc.) encountering each other randomly each period. During an encounter, the two parties observe the utility the match would generate and jointly decide whether to pursue the match

and leave the market, or to separate and wait for future periods. Equilibrium behavior is generally characterized by threshold strategies, where each participant agrees to a match with someone who is “good enough” from the other side of the market.

From a methodological point of view, our paper uses the underlying search and matching model to estimate parents’ preferences. We know of very few other empirical estimations of two-sided matching with frictions (see Abramitzky, Delavande, and Vasconcelos, 2009 and Botticini and Siow, 2008, Del Boca and Flinn, 2006, as well as some of the work on online dating discussed below). The existing work focuses mainly on the marriage-market context. We note that the commitment entailed in the successful conclusion of an adoption (that is arguably irreversible) makes our process a particularly good fit for this class of models.

Gender and racial preferences are both common and well documented in many realms of modern society.<sup>9</sup> Related to this paper, several recent papers have used matching environments of other types, particularly the online dating market, to estimate racial preferences (e.g., Fisman, Iyengar, Kamenica, and Simonson, 2006, 2008; and Hitch, Hortacsu, and Ariely, 2009). This work identifies a preference for same-race partners, much in the spirit of the racial preferences we observe.<sup>10</sup> Technically, adoption through facilitators and online dating are similar in that both involve a two-sided search. However, unlike most online dating markets, in which an outcome is an agreement for a rather preliminary contact, outcomes in the adoption environment are effectively binary and irreversible: A match means a likely successful adoption. In terms of gender preferences, there is a large body of work suggesting preferences for sons in the U.S. (see Dahl and Moretti, 2008; and Almond and Edlund, 2008) and abroad (for instance, the case of the missing women in Asia, as noted by Sen, 1990). Most of this work uses indirect indicators (e.g., separation rates of couples as a function of their children’s gender) to assess these preferences. In this paper, we use the detailed

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<sup>9</sup>There exists a large literature that corroborates gender and racial biases in the workplace (e.g., Altonji and Blank, 1999; Bertrand and Mullainathan, 2004; Bertrand, Goldin, and Katz, 2008; and Flabbi, 2009), in the health system (Cooper-Patrick, Gallo, Gonzales, Vu, Powe, Nelson, and Ford, 1999), in the education system (Fryer and Levitt 2006; Skiba, Michael, Nardo and Peterson, 2004), and in the justice system (Mustard, 2001; Iyengar, 2007, 2008). For overviews, see Loury (2002) and Nelson (2009).

<sup>10</sup>See also Banerjee, Duflo, Ghatak and Lafortune (2009) for an empirical analysis of the arranged marriage market in India. They document strong preferences for within-caste marriages, similar to the preferences for same-race partners unearthed by the online dating literature.

matching data to estimate parents' preferences over children's attributes directly, and we identify a substantial preference for girls in the adoption context.

## **2 Institutional Environment**

### **2.1 The Adoption Process in the U.S.**

Adoption is an ancient institution.<sup>11</sup> The concept of adoption, however, was not legally recognized in the United States until 1851, with the enactment of The Massachusetts Adoption of Children Act, widely considered the first “modern” adoption law. Prior to the 20th century, court adoptions were very rare. During the 20th century, formal adoptions increased dramatically in the U.S., reaching a numerical peak by 1970, when 175,000 adoptions were finalized. This increase went hand in hand with a variety of reforms dedicated to the provision of adopted children with legal safeguards enforced by certified agencies. In 1917, Minnesota passed the first state law that required children and adults to be investigated and adoption records to be shielded from public view. By mid-century, virtually all U.S. states had revised their laws to incorporate such minimum standards as pre-placement investigations, post-placement probation, and sealed records of the adoption process. Since 1950, a number of major shifts have occurred. First, the definition of adoptable children was expanded to include older, disabled, non-Caucasian, and special-needs children. Second, a variety of reforms have been introduced to encourage open adoptions, which allow adoptees and birth parents to remain in contact.

In 1994, the National Conference of Commissioners on Uniform State Laws created The Uniform Adoption Act as an attempt to codify and make current legal practice uniform across states. Nonetheless, very few states altered jurisdiction to incorporate the Uniform Adoption Act and states still differ with respect to an assortment of details regarding the legal formalization of adopted kinship. In what follows, we summarize the main elements of the adoption process in the U.S. (see Jasper, 2008 or Mabrey, 2006 for a full state-by-state survey of adoption jurisdiction).

The supply side of domestic adoption is represented by a population of BMOs who intend to re-

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<sup>11</sup>Greeks, Romans, Egyptians, and Babylonians, all had adoption systems.

relinquish their children for adoption. The children can be either born or unborn. When not searching for adoptive parents on her own, the BMO looks for (or is located by) an adoption agency or some other organization in order to be matched with PAPs.<sup>12</sup> Adoption agencies can be either private or public. While public adoption agencies typically specialize in special-needs children, private agencies match all types of children, and can be either non-profit or for-profit organizations, depending on state law.<sup>13</sup>

The demand side of domestic adoption consists of PAPs. These PAPs can be either (straight or same-sex) couples or singles, and either U.S. or foreign citizens. After undergoing a certification based on a home study, the first choice that PAPs seeking to adopt face is whether to participate in either the international or the domestic adoption process, or in both.<sup>14</sup> The PAPs who decide to search for a child domestically can use adoption agencies, pursue a private (or “independent”) adoption with the aid of specialized attorneys, or advertise in local magazines and newsletters.

Each of these channels can be problematic from the PAPs’ point of view. Since adoption agencies often operate in geographical areas where they can easily locate BMOs, or where they are subject to less regulation, it can be difficult for PAPs (who usually reside in cities and high-income areas) to locate, screen, and interact with many agencies at the same time. Moreover, in many states, the law does not allow adoption attorneys to act as intermediaries in adoption matches. Finally, independent search through advertising is time-consuming and may entail significant cost uncertainty.

These considerations created a role for intermediaries, usually referred to as “adoption facilitators.” Much like adoption agencies, the role of facilitators is regulated by state laws, and in some states their activity is restricted.<sup>15</sup> Often operating online, adoption facilitators connect with BMOs from multiple agencies and coordinate the matching process with PAPs.

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<sup>12</sup>If the child is already born, the BMO can immediately relinquish her parental rights (legal custody of the child) to the agency, and forego her participation in the selection of the adoptive parents.

<sup>13</sup>Some agencies are faith-based and give priority to families from a particular religious background.

<sup>14</sup>These two adoption routes entail several trade-offs. While costs are comparable, international adoption is subject to the restrictions of the Hague Convention (see Section 2.3 below), as well as to the laws of the child’s country of origin. Children adopted internationally are typically older than those adopted domestically, and the wait to adopt them has been reported to be longer (see <http://www.americanadoptions.com>).

<sup>15</sup>In fact, only in very few states, such as California and Pennsylvania, can adoption facilitators be legally paid (see, e.g., California Family Code Sections 8623-8638, Chapter 1.5).

Once a PAP is matched with a child, the ensuing process depends on whether the child is born or not. If the BMO of an already born child has not yet relinquished her parental rights to an agency, then she can relinquish them as soon as the match occurs. The child is then put in the custody of the PAP. If, instead, the baby is unborn, the parties wait until birth, with no commitment to complete the adoption on either side. During this time, the PAP normally pays the living and the medical expenses of the BMO. At birth, with a lag determined by state law, the BMO can, if she still desires, relinquish her parental rights. In this case, the child is placed in the custody of the PAP.

This initiates the post-placement process. The adoption is finalized when a court transfers the parental rights to the PAP. The finalization is conditional on a series of legal requirements determined by the state. The court bases its decision on a post-placement report completed by a registered social worker on the basis of some visits to the adopting family. The court also screens the nature of the financial transfers that have taken place between the PAP and the BMO, as well as the transfers that the PAP has made to the adoption agency. In particular, the court checks that transfers to the BMO constitute allowed reimbursements of either living or medical expenses.<sup>16</sup> Successful PAPs can then file for an adoption tax credit that effectively reduces the cost of adoption by a fixed amount.<sup>17</sup>

## **2.2 Gay, Lesbian, and Single Adoption**

Adoption by gay and lesbian couples or individuals is premitted in only a few countries around the world.<sup>18</sup> In the U.S., many states have enacted or attempted to enact legislation on gay and lesbian adoption since the early 2000s. However, state laws are still largely silent on the issue. While some states restrict adoption by sexual orientation or marital status, legislation with respect to this issue is still in flux, and gay and lesbian adoption is the subject of a very active and heated policy debate.

At the time of writing of this paper, only Arkansas, Florida, Michigan, Mississippi, New Hamp-

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<sup>16</sup>Any transfer from the PAP to the BMO that is aimed to obtain consensus of the adoption is illegal. State laws specify the precise categories of BMO expenses (such as medical, legal, and living costs) that can be covered by PAPs, which are classified as charity. If the BMO changes her mind regarding the adoption before finalization, all transfers are generally non-reimbursable.

<sup>17</sup>For 2008, the maximal adoption credit was \$11,650; see IRS Form 8839, *Qualified Adoption Expenses*.

<sup>18</sup>Besides the U.S., these are Andorra, Belgium, Canada, Denmark, Guam, Iceland, the Netherlands, Norway, South Africa, Spain, Sweden, the United Kingdom, and two states in Australia.

shire, and Utah imposed restrictions on gay and lesbian adoption.<sup>19</sup> Nonetheless, in many states in which statutes do not prohibit adoption by gay men and lesbians, individual judges or courts have ruled against the practice. In fact, in 40 states, Statute or Appellate Court rulings have banned joint adoption by same-sex couples.<sup>20</sup>

The Census 2000 indicated that 4% of all adopted children in the U.S. live in a gay or lesbian household. Even though in 2000 the adoption rate of same-sex households was reported as 1.6%, this rate has the potential to increase dramatically if the current restrictions are lifted.<sup>21</sup>

Since the early 90s, there has been an increase in the number of adoptions by single individuals, the vast majority of whom are women. By 2000, singles accounted for at least 15% of all adoptive parents in the U.S. (see the Census 2000). While allowed in the U.S., adoption by local or foreign single individuals is prohibited in the majority of countries all over the world.

### **2.3 The Hague Convention**

Intercountry adoptions have played an important role over the years. The percentage of intercountry adoptions (out of all adoptions) fluctuated between 4% and 9% between the 80s and the mid 90s and rose to a documented 15% in 2001 (see Bernal, Hu, Moriguchi, and Nagypal, 2007).

A critical development in international adoption law and practice was the enactment of the 1993 Hague Convention on Protection of Children and Cooperation in Respect of Intercountry Adoption (hereafter, “The Hague Convention”).<sup>22</sup> The Hague Convention was ratified in the U.S. on April 1, 2008, at which time 74 other nations had already signed, ratified, or acceded it. The primary principles of The Hague Convention are targeted at ensuring that each adoption is in the best interests of the child and at preventing the abduction, sale, or trafficking of children between countries. Most

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<sup>19</sup>Arkansas and Utah, while not explicitly banning gay and lesbian adoption, prohibit adoption by a couple that is not legally married. At the same time, in these states it is legal for single individuals to adopt, regardless of sexual orientation, so long as they are not co-habiting in non-marital relationships. Historically, Florida has been the only state that had explicitly banned adoption by a gay or lesbian single individual. This ban was ruled unconstitutional in November 2008.

<sup>20</sup>For details regarding states’ jurisdiction on gay and lesbian adoption, see American Civil Liberties Foundation (2006), Human Rights Campaign (2009), and National Conference of State Legislatures (2009).

<sup>21</sup>See Badget, Chambers, Gates, and Macomber (2007).

<sup>22</sup>The Hague Convention is available through [http://hcch.e-vision.nl/index\\_en.php?act=conventions.pdf&cid=69](http://hcch.e-vision.nl/index_en.php?act=conventions.pdf&cid=69)

notably, the treaty requires that: (i) Agencies involved in intercountry adoption, in both the sending and receiving country, be certified by government agencies; (ii) Agencies provide proof of effort to place the child for adoption in their country of origin by advertising the case prior to matching the child with foreign PAPs; and (iii) The baby remains in foster care in the country of origin for a minimal amount of time before full custody is granted to the selected PAP.

There are two channels through which The Hague Convention may affect U.S. domestic adoption. First, the high costs associated with agency certification and advertising have reduced the number of agencies, in both the U.S. and abroad, that can legally send foreign children to the U.S. This can potentially increase both the costs and the waiting times to adopt a foreign child. As a result, the demand for domestic children is expected to increase.

Second, prior to the ratification of The Hague Convention, foreign PAPs could adopt U.S.-born children in much the same way U.S. residents do. Since the adoption process in European countries and Canada is often slower and more centralized than in the U.S., foreign PAPs constituted a non-trivial portion of the demand for domestic children.<sup>23</sup> The increased regulation due to The Hague Convention is expected to dramatically slow down the adoption of U.S. children by foreign PAPs.<sup>24</sup> Government agencies took notice of these problems and modified some regulatory aspects of the The Hague Convention in March 2009.<sup>25</sup>

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<sup>23</sup>For instance, data from the Canadian immigration bureau indicates that 399 American children aged 0 to 21 were adopted by Canadian citizens between 1994 and 1998.

<sup>24</sup>Private consultations with adoption experts suggested that, as of April 2009 (one full year after the Hague convention was ratified), only one foreign PAP completed an adoption process in the U.S. Unfortunately, there are very limited solid data documenting adoption of U.S. children from abroad as there is no agency tracking issuance of U.S. passports to infants, nor any organization tracking visa applications for U.S. infants moving abroad for adoptive placement.

<sup>25</sup>In particular, if the BMO herself identifies a suitable foreign PAP, the agency's burden to show effort in recruiting a U.S. citizen as PAP was lifted (see <http://adoption.state.gov> on 22 CFR 96.54(a)).

## 3 The Data

### 3.1 The Facilitator's Operations

We constructed our data set monitoring an online adoption facilitator who mediates between agencies dealing with BMOs and PAPs, over the period from June 2004 to August 2009.<sup>26</sup> Over a five year period, we collected data on the applications of 675 PAPs to more than 800 BMOs. The facilitator placed 115 children, while 504 were placed through other channels.

New cases of unborn children or already-born children available for adoption are posted on the facilitator's publicly accessible website regularly.<sup>27</sup> Activity on the website follows this basic timing:

1. *An unborn baby, or already-born child, is posted as a new case on the facilitator's website.* The child is identified by the BMO's code name.<sup>28</sup> For every case, the facilitator publishes the following information: (a) The baby's characteristics: date on which the case is presented, race composition, gender (when available), due date for unborn children, and age for already-born children;<sup>29</sup> (b) the costs of adopting the child. These include a fixed facilitator fee, adoption agency fees, BMO's expenses (that may include living and medical costs), and legal fees; and (c) the constraints that the BMO or the adoption agency impose on PAPs. Specifically, the BMO can restrict the availability of her baby from same-sex, single, foreign PAPs, etc.<sup>30</sup>

2. *After paying the fixed fee to the facilitator, a PAP can submit one or more applications to adopt any of the available children at no additional cost.*<sup>31</sup> As PAPs submit an application to a

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<sup>26</sup>See the Data Appendix, available at: [http://www.hss.caltech.edu/~lyariv/Papers/Adoption\\_Data\\_Appendix.pdf](http://www.hss.caltech.edu/~lyariv/Papers/Adoption_Data_Appendix.pdf), for detailed information on the construction of the data set.

<sup>27</sup>On any given day, there are on average 23 BMOs on the website, all listed on the same page. This makes it straightforward for PAPs to browse the entire list of available BMOs.

<sup>28</sup>The facilitator modifies or changes the BMOs' real first names to maintain their anonymity.

<sup>29</sup>The website also reports fetus anomalies detected by an ultrasound or other documented health problems. However, these medical issues occur for only 0.2% of the children in our data set.

<sup>30</sup>There are some additional restrictions on the PAPs' characteristics dictated by state laws or special adoption regulations that are relevant for some cases. For example, the Indian Child Welfare Act of 1978 gives Native American Indian Nations and Tribes the right to control adoptions that involve their tribal members's children. As a result, the adoption of these children is often restricted to Native American PAPs only. In addition, the BMO can also express her preference toward an open adoption. In our sample, in only 2% of cases did the BMO specify a preference regarding a closed as opposed to an open adoption.

<sup>31</sup>In some cases, before applying, the PAPs receive additional information regarding the BMO and the child based on an interview the agency conducts with the BMO. This interview comprises questions regarding the BMO's health and life-style, her family and the birth-father characteristics. While the information posted on the website is verifiable by



BMO, their first name (or initials) are posted on that child's case. The PAPs' application consists of a letter to the BMO sent through the facilitator and the agency. In this letter, the PAPs describe themselves, their life-style, and how they plan to raise the child.<sup>32</sup>

3. *The posted cases can be resolved in several ways:* (a) the BMO chooses the desired PAP among the applicants.<sup>33</sup> This results in a match observable on the website, and both the BMO and the PAP leave the website;<sup>34</sup> (b) the BMO is matched through a different channel, and the child is reported as "matched" on the website; (c) the BMO decides to parent, and the decision is reported on the website; (d) the facilitator reports a lost contact with the BMO; or (e) there are no applications for the case.<sup>35</sup> This final outcome sometimes leads the BMO to parent, but in most cases the child remains unmatched. Unmatched children enter the foster-care system, where they remain adoptable until the age of 18.

The entire process, from posting of a BMO on the website to finding a match with a PAP, is very fast. Most PAP applications are submitted within the first 10 days from when a child information is first posted, and the median child is available on the website for less than a month.

## 3.2 Summary Statistics

### 3.2.1 Birth Mothers' Statistics

Table 1, below, reports the summary statistics pertaining to children's attributes in our data, while the summary statistics conditional on a match and the time trends of some of the children's attributes appear in Tables 6 and 7, respectively, in the Appendix.<sup>36</sup>

The main categories of attributes that prove most useful for our analysis are: gender, race, the agency and the facilitator, this additional information is not verifiable.

<sup>32</sup>The letter often includes photos of the PAPs, their family, and their environment. No other contact between BMO and PAPs is permitted prior to a match.

<sup>33</sup>If the child is born and the BMO has already relinquished her parental rights, the adoption agency that has legal custody of the child selects the PAP.

<sup>34</sup>Any active application of that PAP for other children is dropped. In fact, the facilitator's policy specifies that if the selected PAPs reject a match, they will not be allowed any further applications through the facilitator. Thus, *applications are binding from the PAPs' point of view*. The BMO stops receiving applications from other PAPs upon a match. However, she can still decide to parent until she relinquishes parental rights.

<sup>35</sup>If no application is received after a wait of about one month, the facilitator usually reports the case as "closed."

<sup>36</sup>Summary statistics correspond to different numbers of observations since, in some data points, not all attributes were relevant or specified.

Variable	Mean	Std. Dev.	Min.	Max.	N
Already Born	0.273	0.445	0	1	801
Months to Birth for Unborn	1.925	1.62	0.033	7.8	579
Months from Birth for Born	1.176	5.63	0.033	69.5	370
Days from First to Last Application	33.84	31.19	1	511	745
Days from Presentation on Site to Last Day on Site	51.04	42.18	1	511	804
Days on Site if Always Born	33.84	25.50	1	131	125
Days on Site if Always Unborn	53.67	38.25	1	217	477
Days on Site if Switch from Unborn to Born	85.55	53.17	3	240	138
Number of Interested PAPs	2.218	2.216	0	15	804
Applications Per Day	0.119	0.249	0	4	745
Bad Health Words	0.002	0.050	0	1	803
Single PAP Allowed	0.66	0.474	0	1	803
Same-Sex PAP Allowed	0.313	0.464	0	1	803
Foreign PAP Allowed	0.856	0.351	0	1	803
Girl	0.223	0.416	0	1	803
Boy	0.306	0.461	0	1	803
Caucasian	0.361	0.393	0	1	804
Hispanic	0.128	0.27	0	1	804
Asian	0.022	0.112	0	1	804
Non-African-American Boy	0.175	0.35	0	1	803
Non-African-American Girl	0.12	0.302	0	1	803
African-American	0.389	0.415	0	1	804
African-American Girl	0.102	0.279	0	1	803
African-American Boy	0.13	0.301	0	1	803
Domestic Finalization Cost	26290	8176	3500	52300	778

**Table 1:** Summary Statistics for BMOs

whether children have already been born or are unborn, the time period between presentation date and birth for unborn children, adoption finalization costs, and the restrictions imposed by the BMOs on the acceptable PAPs.

In terms of gender, not conditioning on the achievement of a match, 22.3% of the children in our sample are girls, 30.6% are boys, and the rest are of unknown gender. Conditioning on a match being created (either through the facilitator or through other channels), girls account for 28.8% of matched children, while boys account for 24.2%.

As for race, the unconditional breakdown in our data set is 36.1% Caucasian, 38.9% African-American, and 12.8% Hispanic. The race breakdown conditional on children finding a match is

37.5% Caucasian, 38.7% African-American, and 14.3% Hispanic.<sup>37</sup>

Already-born children constitute 27.3% of our data set, while, conditional on being unborn, the average time to birth at which the cases are presented to the facilitator is slightly below two months. The average age of already-born children is just above one month. Conditional on being matched, already-born children constitute only 11.1% of all matched children.

In terms of PAPs who are acceptable to BMOs, same-sex PAPs are allowed in 31.3% of the cases, foreign PAPs in 85.6% of the cases, and single women in 66% of the cases.<sup>38</sup>

Finally, the costs to finalize an adoption range from \$3,500 to \$52,300, in addition to the \$4,800 fixed fee for working with the facilitator. The adoption finalization costs include several components. First, they contain the BMO's reimbursable expenses until birth, which can include rent, food, and medical costs. As discussed above, these expenses are restricted by state law. Second, the adoption finalization costs contain agency and legal fees. Typically these fees are less regulated than the BMO's expenses.<sup>39</sup>

In terms of the outcomes of the matching process, the average number of PAPs who apply for a given child is 2.2, varying from 0 to 15. BMOs decide to parent their child in 5.3% of the cases, are reported as a lost contact in 5% of the cases, and as a closed case in 25.2% of cases. A match occurs in 70% of the cases (13.5% through the facilitator). The average number of days a case remains on the facilitator's website is 45 days, ranging from 1 to 469 days.

### **3.2.2 Prospective Adoptive Parents' Statistics**

We now turn to the demand side, represented by the PAPs. The summary statistics on the PAPs' attributes are in Table 2 below, while the summary statistics conditional on a match and the time

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<sup>37</sup>The sample of children posted on the facilitator's website is potentially biased with respect to the general population of adopted children. However, because states are not legally required to report the number of domestic adoptions, there are limited solid sources documenting characteristics of adopted kinships. The Census 2000 is the most recent source, according to which the breakdown of U.S.-born adopted children under the age of 10 is 54% female, and 18% African-American.

<sup>38</sup>There are very few cases in which lesbian PAPs are allowed to apply and gay men are not, or vice-versa. The variable 'Same-sex Allowed' identifies a baby for which at least one of these PAP categories is considered acceptable.

<sup>39</sup>Some states regulate agencies' and facilitators' fees. Usually, the only restriction is that they do not exceed the customary levels in that state (see Jasper, 2008).

trends of some of the PAPs’ attributes are in Table 7 in the Appendix.

Variable	Mean	Std. Dev.	Min.	Max.	N
Applies for a Baby (on a Specific Day)	0.053	0.047	0	0.501	675
Applies for a Baby (Allowed Choices only)	0.064	0.094	0	1	670
Applies for a Baby (at Some Point in Time)	0.060	0.058	0	0.504	675
Days between First and Last Application	103	171	1	1559	675
Days Since Last Application for a PAP	1.643	4.852	0	94.149	673
Gay PAP (Score)	0.064	0.218	0	1	613
Lesbian PAP (Score)	0.065	0.222	0	1	612
Foreign PAP (Score)	0.516	0.165	0.001	0.999	674
Single PAP (Score)	0.083	0.271	0	1	613
Gay PAP (Unambiguous)	0.046	0.209	0	1	675
Lesbian PAP (Unambiguous)	0.047	0.213	0	1	675
Straight PAP (Unambiguous)	0.633	0.482	0	1	675
Ambiguous PAP Name	0.201	0.401	0	1	675

**Table 2:** Summary Statistics for PAPs

Recall that when a PAP applies for a specific baby, *only the PAP’s first name(s)* appear on the website next to the baby requested. We therefore infer PAPs’ characteristics based on their names and on their behavior on the website. As a first step, when the PAP consists of one person, we identify that PAP as a single woman.<sup>40</sup> Second, when the PAPs’ names unequivocally indicate that the PAP is a straight couple, or a same-sex couple, we assign the relevant attribute to the PAP.<sup>41</sup> Of the PAPs that have names with unambiguous gender classification, 63.3% are straight couples, 4.6% are gay men, 4.7% are lesbians, and 8.3% are single women. We use these priors to construct straight, gay, and lesbian scores for PAPs with names entailing some gender ambiguity.<sup>42</sup>

As for foreign PAPs, we infer their identities from their behavior on the website. Specifically, assuming a symmetric prior, we compute the probability of a PAP being foreign using Bayesian updating over a multinomial process.<sup>43</sup>

<sup>40</sup>According to an interview with the owner of the website, there are no single men among the PAPs.

<sup>41</sup>For the sake of robustness, we replicated all of our results using these unambiguous classifications.

<sup>42</sup>For instance, ‘jack&jamie’ could be either a straight or a gay men couple and are coded with the corresponding posterior of  $0.92 = \frac{0.633}{0.633+0.046}$  that they are a straight couple as their “Straight PAP” score and with the complementary posterior of 0.08 as their “Gay PAP” score. Similarly, ‘kim&jamie’ is coded with a 0.85 “Straight PAP” score, a 0.07 “Gay PAP” score, and a 0.08 “Lesbian PAP” score.

<sup>43</sup>Given a 50-50 division between foreign and domestic PAPs, we assume a 10% error-probability for foreign PAPs applying for children for whom they are not allowed to apply. We compute the posterior probability of the PAP being foreign (see the Data Appendix for more details on the construction of the ‘Foreign PAP’ score).

According to this classification criterion, 78.8% of the PAPs in our sample are straight couples, 6.4% are gay couples, 6.5% are lesbian couples, and 8.3% are single women. In addition, 51.6% of the PAPs are foreign.

We consider a PAP *active* from the time at which the PAP submits the first application until the PAP is reported as “matched” or, if never reported as such, until ten days after the last application is submitted.<sup>44</sup> Given these assumptions, active PAPs apply for a child for which they are acceptable with a 6.4% probability.

The average time elapsed between the PAPs’ first and last application is 103 days. The (average) application probability of a PAP for an available baby on each day is 5.3%, while the probability of applying for that baby at some point is 6%.<sup>45</sup>

Finally, the composition of PAPs has been fluctuating somewhat over the years. Most notably, the fraction of foreign PAPs, which varied between 57.5% and 60.3% between 2004 and 2007, dropped to 50.3% in 2008 and to 37.4% in 2009, possibly reflecting the impact of the Hague Convention.

## 4 A Model of Matching with Search

In our environment, PAPs search for a BMO to be matched with, while BMOs search for a PAP to relinquish their baby to. Therefore, we estimate a sequential two-sided matching model. The model has two important implications for our estimation strategy. First, it allows us to assess preferences for each side of the matching process separately. Second, it enables us to evaluate marginal rates of substitution over attributes of parents and children when only a slice of the market is being observed. The latter point is particularly important in view of the fact that some PAPs may be utilizing multiple adoption channels and, likewise, some BMOs may pursue several paths when considering relinquishing their child.<sup>46</sup> In this section, we present the basic structure of the model (which is

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<sup>44</sup>We provide robustness checks for our results with respect to the length of this window.

<sup>45</sup>For instance, consider a PAP who is active for 20 days and a BMO who is available over that entire period. Suppose the PAP applies for the baby on day 11 (so that the PAP has an open application to the BMO from day 11 to day 20). Then, the (average) application probability on each day is 50% while the probability of applying at some point in time is 100%.

<sup>46</sup>However, the model does not allow for adverse selection into the matching process by either side (PAPs or BMOs). This is validated empirically in Subsection 5.5 below.

closely related to Burdett and Coles, 1997 and Eeckhout, 1999) and characterize its equilibrium structure.

## 4.1 Underlying Framework

In our data set, we observe several types of PAPs: straight couples, gay men, lesbian couples, single women, and foreign couples. These PAPs' types may have dissimilar preferences over children's attributes and may impact the BMOs' utilities differently. Formally, each type is characterized by a vector of attributes and denoted by  $\theta = (\theta_1, \dots, \theta_h) \in \Theta_{PAP}$ . BMOs may care about other PAP attributes that need not affect PAPs' preferences (e.g., wealth and looks). We capture such additional attributes by  $a = (a_1, \dots, a_m) \in A_{PAP}$ . We assume that  $(\theta, a)$  is determined independently and identically across PAPs, with a joint cumulative distribution  $F_{PAP}$ .

We assume that each BMO is characterized by the child's attributes  $c = (c_1, \dots, c_n) \in C_{BMO}$  (capturing the child's race, gender, time to birth, and so on). Attributes are independently and identically distributed across BMOs with a cumulative distribution  $F_{BMO}$ . Each BMO is also characterized by the set of types she is willing to consider  $\Theta \subseteq \Theta_{PAP}$  (such as straight couples, U.S. residents, etc). These are determined independently of the child's attributes and of the set of types other BMOs are willing to consider according to the cumulative distribution  $H_{BMO}$ .<sup>47</sup>

### 4.1.1 Prospective Adoptive Parents

A PAP of type  $\theta \in \Theta_{PAP}$  gains a match utility  $u_{PAP}(\theta; c)$  from adopting a child with attributes  $c$ . We normalize the utility from remaining unmatched to zero, while we assume that the utility from adopting any child is non-negative:  $u_{PAP}(\theta; c) \geq 0$  for all  $c$  and strictly positive for some  $c$ . This amounts to assuming that the outside option (not pursuing adoption or pursuing it through a different channel) is worse than the adoption of any child on the website.

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<sup>47</sup>Acceptable categories of PAPs are arguably due to upbringing and ideological convictions that go beyond strategic forces in the matching process we study. We therefore assume that acceptable categories of PAPs are exogenous and independent of the child's characteristics. Empirically, the most significant restriction imposed by BMOs in our data is whether they allow applications from same-sex couples and from foreign PAPs. However, none of the observable characteristics of children explains these restrictions (see Table 12 in the Appendix). Having said that, the model would extend directly to a situation in which the BMOs' attributes do affect these limitations.

PAPs have an arrival rate of  $\lambda$ . Each PAP experiences a discount factor of  $\delta_{PAP}$ . This discount rate can be thought of as capturing PAPs' fatigue or aging.

### 4.1.2 Birth Mothers

Each BMO gains a match utility  $u_{BMO}(\theta, a)$  from giving up her child to a PAP with attributes  $(\theta, a)$ .<sup>48</sup> We normalize the BMO's utility from being unmatched to zero and assume that  $u_{BMO}(\theta, a) > 0$  for some PAP attributes  $(\theta, a)$ .<sup>49</sup>

A note on the modeling asymmetry we impose between the BMOs and PAPs is now in order. In principle, some of the BMOs' attributes could play a role in both the BMOs' and the PAPs' preferences. Empirically, however, this does not seem to be the case – BMOs' observable decisions do not seem to differ across child attributes (we return to this point in Section 6 below).

BMOs have an arrival rate of  $\gamma$  and experience a discount factor of  $\delta_{BMO}$ . This discount factor can be interpreted as the forgone monetary flow that birth mothers give up by not committing immediately to a match.<sup>50</sup>

### 4.1.3 The Dynamic Matching Process

Upon arrival in the matching process, a PAP of type  $\theta$  may or may not submit an application to each BMO that enters the process and allows applications from PAPs of type  $\theta$ .

As described above, an application involves a letter from the PAP to the BMO. This letter is effectively comprised of two elements: the type  $\theta$  of the PAP submitting the application and a noisy signal  $\alpha$  of the PAP's remaining attributes  $a$  (the letter could suggest certain characteristics to BMOs, such as affluence, warmth, etc., but may not accurately describe the vector  $a$  of attributes the BMO may be interested in). That is, the BMO observes an application of the form  $(\theta, \alpha)$ , where we assume

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<sup>48</sup>As described above, in certain cases, an adoption agency has physical custody of the child. We assume that adoption agencies perceive the best interest of the child in alignment with the BMO's preferences, and so this does not affect our analysis.

<sup>49</sup>In general,  $u_{BMO}(\theta, a)$  may be negative. This allows some mothers to decide during the matching process to mother the child or use alternative routes for adoption.

<sup>50</sup>We assume that BMOs' discount factor does not depend on the child's attribute, not even on the time to birth, despite it being correlated with the time on the site (see discussion in Section 6). Table 1 implies a case resolution that is very quick (around one month). This short time interval suggests that decisions of BMOs do not change dramatically over their duration on the site, making the uniformity of the discount factor an arguably weak assumption.

that the signal  $\alpha$  has full support (of  $A_{PAP}$ ) and denote by  $G_{PAP}(\alpha|a)$  its conditional distribution. We denote by  $U_{BMO}(\theta, \alpha) = \mathbb{E}_{G_{PAP}} \{u_{BMO}(\theta, a)|\alpha\}$  the BMO's expected utility associated with the application  $(\theta, \alpha)$ . We assume that the parameters of the model are common knowledge among all participants.<sup>51</sup>

A BMO who receives an application immediately decides whether to accept it or reject it.<sup>52</sup> When an application is accepted, the match gets irreversibly formed and the corresponding PAP and BMO exit the process. Otherwise, both the PAP and the BMO stay in the matching process.

## 4.2 Equilibrium Characterization

In this subsection, we characterize the equilibrium behavior of PAPs and BMOs. Notice, first, that we can restrict attention to stationary reservation utility strategies for both PAPs and BMOs.<sup>53</sup>

In equilibrium, each PAP of type  $\theta$  and attributes  $a$  has a reservation utility  $\bar{u}_{PAP}(\theta, a)$ . That is, upon considering a BMO  $i$  with a set  $\Theta^i$  of acceptable PAPs' types and with child's attributes  $c$ , a PAP of type  $\theta \in \Theta^i$  submits an application if and only if  $u_{PAP}(\theta; c) \geq \bar{u}_{PAP}(\theta, a)$ .

Similarly, each BMO  $i$  with acceptable types  $\Theta^i$  and a child of attributes  $c$  has a reservation utility  $\bar{u}_{BMO}(\Theta^i, c)$ . Upon considering an application  $(\theta, \alpha)$  from a PAP of type  $\theta \in \Theta^i$ , the BMO will accept the application if and only if  $U_{BMO}(\theta, \alpha) \geq \bar{u}_{BMO}(\Theta^i, c)$ .

Given thresholds  $\{\bar{u}_{PAP}(\theta, a)\}_{\theta \in \Theta, a \in A_{PAP}}$  and  $\{\bar{u}_{BMO}(\Theta, c)\}_{\Theta \subseteq \Theta_{PAP}, c \in C}$ , the arrival rates  $\lambda, \gamma$ , together with the distributions  $F_{PAP}, G_{PAP}, F_{BMO}$ , and  $H_{BMO}$ , each PAP of type  $\theta$  and attributes  $a$  faces an equilibrium arrival rate  $r_{\theta, a}$  of BMOs' acceptances, and an equilibrium distribution of these BMOs' attributes  $\phi_{\theta, a}$ . Similarly, a BMO of type  $\Theta$  with a child of attributes  $c$  faces an arrival rate

<sup>51</sup>In particular, this implies that no learning about the market per se is taking place. This is consistent with our empirical observations – we do not identify differences in PAPs' and BMOs' behavior across time.

<sup>52</sup>The assumption that agents consider potential matches one at a time is standard in the literature on bilateral search (see Rogerson, Shimer, and Wright, 2005). Technically, it dramatically simplifies the equilibrium characterization of our model. In particular, it implies that a PAP's decision whether to send an application out does not depend on the number and identity of the other PAPs interested in the same child. The justification for this assumption is in the monetary flow the BMO forgoes by not making an immediate decision paired with the relatively short interval of time that a BMO spends in the matching process.

<sup>53</sup>As highlighted in Burdett and Coles (1997), this model can lead to multiple equilibria. We could impose regularity conditions on  $u_{PAP}$  and  $u_{BMO}$  that would guarantee uniqueness (mirroring, for example, the structure imposed by Eeckhout, 1999). However, since all equilibria are characterized by reservation strategies, such additional assumptions are not necessary for the purpose of our estimations.



of applications  $s_{\Theta,c}$  and an equilibrium distribution of these PAPs' attributes  $\psi_{\Theta,c}$ .<sup>54</sup>

Denote by  $V_{PAP}(\theta; c)$  the continuation value of a type  $\theta$  PAP considering a BMO whose child has attributes  $c$ . The following Bellman equation corresponds to the PAP's optimization problem:

$$V_{PAP}(\theta; c) = \max \left\{ u_{PAP}(\theta; c), \delta_{PAP} \mathbb{E}_{r_{\theta,a}, \phi_{\theta,a}} V_{PAP}(\theta; c') \right\}.$$

The solution to this problem is the reservation utility  $\bar{u}_{PAP}(\theta, a)$  such that:

$$\bar{u}_{PAP}(\theta, a) = \delta_{PAP} \mathbb{E}_{r_{\theta,a}, \phi_{\theta,a}} V_{PAP}(\theta; c').$$

or

$$\bar{u}_{PAP}(\theta, a) = \frac{1}{1 - \delta_{PAP}} \mathbb{E}_{r_{\theta,a}, \phi_{\theta,a}} [u_{PAP}(\theta; c) \mid u_{PAP}(\theta; c) \geq \bar{u}_{PAP}(\theta, a)] \quad (1)$$

A similar analysis applies to the BMOs' behavior. The reservation utility of a BMO is then:

$$\bar{u}_{BMO}(\Theta, c) = \frac{1}{1 - \delta_{BMO}} \mathbb{E}_{s_{\Theta,c}, \psi_{\Theta,c}} [U_{BMO}(\theta, \alpha) \mid U_{BMO}(\theta, \alpha) \geq \bar{u}_{BMO}(\Theta, c)] \quad (2)$$

Equations (1) and (2) fully characterize an equilibrium of this model.<sup>55</sup>

We conclude with two remarks. First, although we assumed that PAPs get positive utility from adopting any child on the website, in equilibrium, their reservation utility may be above the utility of adopting some of these children. Thus, in equilibrium, some BMOs may not find a suitable PAP.

Second, note that our data describe the operation of one adoption facilitator, while the PAPs and BMOs may take part in parallel matching processes through other channels (e.g., religious organizations, private attorneys, etc.). Thus, it is inherently difficult for us to identify the arrival and departure rates of PAPs and BMOs together with utilities corresponding to all types of participants. However, the arrival and departure rates do not affect the marginal rates of substitution given by the underlying preferences of participants. Therefore, our approach of using the information on whether

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<sup>54</sup>We are essentially characterizing a partial equilibrium of this environment in that the distributions over characteristics are assumed exogenous. As discussed in Burdett and Coles (1999), this can be viewed as a full equilibrium if one assumes the appearance of 'clones' of agents who leave the market. Alternatively, under simple regularity assumptions, one can show that, in fact, there exist distributions constituting part of a full equilibrium. However, we stress that the key insight for our estimations is the equilibrium use of threshold strategies.

<sup>55</sup>Note that the particular structure of the noise in our model assures that PAPs who submit an application are never indifferent between applying and not applying.

PAPs and BMOs fall above or below each other’s reservation utility in order to make inferences on the relative importance of different children’s and PAPs’ characteristics is valid even when other channels are being utilized by either side.

## 5 Estimating Adoptive Parents’ Preferences

This section presents our estimations regarding PAPs’ preferences. We are interested in studying PAPs’ preferences over gender, race, time to birth, and costs. Since many adoption-policy debates revolve around the participation of special categories of PAPs (such as same-sex couples, singles, and foreign PAPs), we analyze how the preferences with respect to children’s attributes vary across these categories. This will allow us to examine how a participation ban on specific categories of PAPs would affect outcomes.

An observation in our sample corresponds to a triplet  $(t, b, p)$ , where  $t$  identifies a date,  $b$  a baby who is unmatched on the website at date  $t$ , and  $p$  a PAP that is active on the website at time  $t$  and for whom  $b$  is an available choice – that is,  $b$ ’s BMO did not exclude the type of PAP  $p$  upon entering the matching process. Recall that we consider a PAP *active* from the time at which the PAP submits the first application until the PAP is reported as “matched” or, if it is never reported as such, until ten days after the last application is submitted.<sup>56</sup>

The model of Section 4 implies that a baby receives an application from a PAP if and only if the PAP’s utility from being matched with that baby exceeds the PAP’s reservation utility. For the sake of estimation, we consider a stochastic version of the model above and assume that each PAP of type  $\theta$  assesses the utility from a child of characteristics  $c$  as

$$u_{PAP}(\theta; c) = \beta_{\theta} \cdot c + \beta_{\theta,0} + \varepsilon_{tbp} \geq u_{PAP}(\theta), \quad (3)$$

where  $\beta_{\theta,0}$  is a constant term that varies with PAP’s type and year, and  $\varepsilon_{tbp}$  is an idiosyncratic

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<sup>56</sup>In principle, the window of activity is important for our estimations as we assume that active PAPs who do not apply for available babies value them below their threshold. In the Appendix, we discuss the robustness of our results to a window of *90 days* (Table 8). Also, Table 9 illustrates results obtained looking at the decision of a PAP to apply to a BMO without including the time variation  $t$ . These alternative definitions of PAP activity do not have a noticeable impact on our results.

unobservable distributed according to the standard normal distribution (corresponding to each triplet  $(t, b, p)$ ).<sup>57</sup>

The specification allows us to estimate discrete choice models in which the probability of applying for a match with a specific child depends on the child's observable attributes. Note that this method enables us to evaluate the weights that different types of PAPs put on different attributes. However, it does not allow us to identify the absolute level of the reservation utility corresponding to (1), as it is confounded with the constant term in the utility specification.

The model is useful in two respects. First, it provides a justification for these estimations. In particular, it validates the separate estimation of PAPs' and BMOs' preferences (rather than the estimation of a simultaneous set of equations capturing the demand and supply of children, which would have emerged from a static model). Second, it links the estimated constant term with an endogenous reservation utility (in addition to a constant associated with the parents' utility function), affecting its interpretation. In principle, individual PAPs may be using different reservation utilities (due to, say, access to different adoption channels). We have estimated the parameters of equation (3) using a conditional logit with PAP-month fixed effects, and we find coefficients  $\beta_\theta$  that are virtually identical to those we present below.

Table 3 below presents the results of probit estimations targeted at assessing PAPs' preferences over different attributes and their dependence on PAPs' categories. We cluster standard errors by child-PAP pair to account for serial correlation, since a PAP's application is kept on the website until the baby is matched. Here and throughout the rest of the regression tables unless otherwise indicated, the t-statistics appear in parenthesis.

The first column of Table 3 refers to the behavior of the entire PAP population. It corresponds to a model in which the different categories of PAPs in our sample—straight couples, gay men, single women, lesbian couples, and foreign PAPs—are characterized by the same utility function—namely, the coefficients  $\beta_\theta$  in (3) are restricted to be identical across PAPs—but may have different thresholds (captured by the dummy variables corresponding to PAPs' categories) due to the different

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<sup>57</sup>Formally, PAPs' threshold  $\bar{u}_{PAP}(\theta, a)$  depends on the PAPs' unobserved attributes  $a$ . Since we assume that these attributes do not enter directly into the PAPs' utility assessments, our estimations are not affected by the inherent aggregation over these unobserved characteristics.

Dependent Variable: PAP Applies for Baby ♠ Activity Window: 10 Days	All	Straight PAP	Gay PAP†	Lesbian PAP†	Single PAP	Foreign PAP†
Already Born (d)	-0.016* (-2.35)	-0.021** (-3.15)	-0.074 (-1.48)	-0.064 (-0.84)	0.026 (0.84)	-0.025** (-2.66)
Months to Birth	-0.001** (-3.26)	-0.001** (-3.29)	-0.002 (-0.77)	-0.001 (-0.54)	-0.001 (-1.13)	-0.001* (-2.50)
Finalization Cost in \$10,000s	-0.018*** (-5.69)	-0.016*** (-4.93)	-0.013 (-0.58)	-0.091* (-2.57)	-0.020* (-2.16)	-0.024*** (-5.89)
African-American Girl	-0.052*** (-6.22)	-0.045*** (-4.98)	-0.181** (-2.80)	-0.189** (-2.66)	-0.052* (-2.18)	-0.039*** (-3.51)
African-American Boy	-0.070*** (-7.70)	-0.067*** (-6.89)	-0.047 (-0.76)	-0.093 (-1.07)	-0.077** (-2.74)	-0.062*** (-5.19)
African-American Unknown Gender	-0.069*** (-8.15)	-0.067*** (-7.19)	-0.091 (-1.31)	-0.089 (-1.32)	-0.073*** (-3.59)	-0.061*** (-5.50)
Non-African-American Girl	0.029*** (4.26)	0.025*** (3.49)	0.121 (1.50)	0.229* (2.57)	0.032 (1.38)	0.025* (2.49)
Non-African-American Boy	-0.007 (-1.06)	-0.010 (-1.43)	0.014 (0.25)	0.115 (1.90)	0.001 (0.07)	0.003 (0.34)
Hispanic	0.002 (0.27)	0.004 (0.49)	0.117 (1.47)	-0.023 (-0.21)	-0.024 (-0.95)	0.005 (0.48)
Year 2004 (d)	-0.043*** (-7.79)	-0.036*** (-6.15)	-0.035 (-0.59)	-0.088 (-1.52)	0.014 (0.56)	-0.052*** (-6.37)
Year 2005 (d)	-0.036*** (-5.68)	-0.020** (-2.90)	-0.056 (-1.07)	-0.076 (-1.40)	-0.003 (-0.14)	-0.043*** (-4.36)
Year 2006 (d)	-0.009 (-1.24)	0.009 (1.03)	0.119 (1.30)	-0.060 (-0.93)	0.012 (0.36)	-0.006 (-0.57)
Year 2007 (d)	-0.024*** (-3.65)	-0.005 (-0.59)	0.025 (0.44)	-0.190*** (-6.11)	0.034 (0.74)	-0.022* (-2.27)
Year 2008 (d)	0.014* (2.00)	0.029** (3.19)	0.012 (0.31)	0.067 (1.55)	0.042 (1.82)	0.026* (2.32)
Gay PAP	0.061*** (4.78)					
Lesbian PAP	0.093*** (7.71)					
Single PAP	0.003 (0.45)					
Foreign PAP	0.077*** (7.21)					
Probability for Mean Attributes	0.086	0.072	0.165	0.193	0.079	0.091
Probability for Base Case ♡	0.073	0.115	0.172	0.263	0.094	0.151
$\chi^2$	407.23	203.14	37.39	55.51	42.27	148.01
Log-Likelihood	-205182.0	-170467.6	-27102.0	-29930.5	-25409.0	-208980.9
Observations	818413	708443	66190	60804	96665	734659
PAP-Babies	29053	25459	2382	2134	3134	27128

(d) for discrete change of dummy variable from 0 to 1. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Standard Errors Clustered by PAP-Baby Pair. ♡ Note that the omitted category is an unknown-gender, non-African-American, unborn child who is less than one month to birth, with finalization costs of \$26,000 in 2009. †: Gay, lesbian, and foreign estimated using weighted probit.

**Table 3:** Determinants of PAPs' Applications (Activity Window of 10 Days) – Marginal Effects for Probit

streams of children for whom they can be considered. The PAPs-category dummy variables in the first column are significantly different from one another, highlighting the response of PAPs to the matching dynamics. The remaining columns of Table 3 correspond to estimated models in which different categories of PAPs are allowed to have different preferences. In what follows, we first discuss the aggregate preferences over children's attributes and then compare estimated preferences across different categories of PAPs.

The omitted category corresponding to all estimations reported in Table 3 is a 2009 baby, a month before birth, whose gender is still unknown, whose race composition is zero percent African-American, and whose adoption finalization costs are \$26,000. This omitted category of children has a 7.3% probability of receiving an application, while a child whose attributes correspond to the population means (as reported in Table 1) receives an application with a probability of 8.6%.

According to the third and fourth columns of Table 3, gay and lesbian couples have a significantly higher probability of submitting an application than straight couples. Indeed, the probability of submitting an application for the child whose attributes correspond to the population mean is 7.2% for straight couples, 16.5% for gay PAPs, 19.3% for lesbian PAPs, 7.9% for single women, and 9.1% for foreign PAPs. These can be partly explained by the constraints that gay and lesbian couples face when adopting a baby: Since many of the children on this website are not available to them, gay and lesbian couples conceivably compensate by applying more frequently when they can.<sup>58</sup>

## 5.1 Preferences over Gender

In our data, the gender of each baby is “boy,” “girl,” or “unknown.” A baby of unknown gender is either a baby at an earlier stage of gestation or a baby who is less likely to have received medical attention than a baby whose gender is known. In order not to confound gender and health effects, we measure the PAPs' gender preference by comparing the probabilities of receiving an application between girls and boys.

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<sup>58</sup>As mentioned before, these baseline probabilities confound the differing reservation utilities and the constant terms in the utility functions corresponding to different categories of PAPs and, therefore, should be interpreted with caution. In particular, the differences between these probabilities do not fully mirror the differences between the coefficients of the dummy variables corresponding to PAP categories in the first column of the table.

Non-African-American girls have a probability of receiving an application that is 3.6% higher than non-African-American boys, a large effect given that the child with mean attributes has a probability of 8.6% of receiving an application. In other words, PAPs have a positive and sizable preference in favor of (non-African-American) girls. We can quantify the gender preference in dollar terms by comparing the effect of gender to the effect of adoption finalization costs. The increase in desirability of a non-African-American girl with respect to a non-African-American boy is equivalent to a decrease of \$16,000 in finalization costs.<sup>59</sup> This higher desirability of girls is consistent with anecdotal evidence reported by adoption agencies and the popular press covering the adoption process.<sup>60</sup> It is also consistent with adoption *outcomes* in the U.S. Indeed, the Census 2000 reported 47% male adopted children as compared with 51% male biological children (see Kreider, 2003). A preference for girls has also been documented for biological mothers by Gallup polls, though, interestingly, biological fathers tend to report a preference for boys.

In our data, the preference for girls is apparent, though somewhat different, across all categories of PAPs. Lesbian couples exhibit, by far, the most intense preference for non-African-American girls. Indeed, for non-African-American children, the estimated difference in application probabilities between girls and boys is 3.5% for straight couples, 10.7% for gay couples, 11.4% for lesbian couples, 3.1% for single women, and 2.2% for foreign PAPs. The large gender preferences pertaining to gay and straight PAPs suggest that women's preference for girls is not the sole driving force behind this preference.<sup>61</sup> We note that there is a strand of literature based on hypothetical surveys of different classes of PAPs regarding preferences over children's gender (see Goldberg, 2009, and references therein). Our results are the first to report a stronger preference over children's gender for same-sex than for straight PAPs.

Table 3 also highlights a positive and sizable (although not statistically significant) preference for African-American girls with respect to African-American boys. In particular, the difference

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<sup>59</sup>Note that if the finalization costs are positively correlated with some unobservable but desirable child attributes, \$16,000 becomes an upper bound of the willingness to pay for a non-African-American girl with respect to a non-African-American boy.

<sup>60</sup>See, for instance, Slate (1/16/2004).

<sup>61</sup>We should mention that the gender biases we observe in gay men and single women, despite being large in sizes, are not significant due to the scarcity of observations.

between the application probabilities for an African-American boy and an African-American girl is 1.8%. This difference results in an overall application probability of 3.4% for African-American girls and 1.6% for African-American boys. In other words, the probability of an African-American girl receiving an application is more than double that of an African-American boy. In relative terms, the gender preference for African-American children is larger than the preference for non-African-American children.

This observation is compatible with the idea that girls are viewed as “safer” in terms of dysfunctional behavior and are, therefore, more appealing candidates for adoption.<sup>62</sup> Furthermore, this conjecture would suggest that the gender gap should be stronger for African-American children, for whom the gap in terms of negative outcomes is greater between the genders.<sup>63</sup>

We note that the substantial preference for girls we document constitutes a reversal, in the adoption environment, of the preference for sons identified by the literature studying the preferences over gender of biological children by looking at indirect indicators such as divorce, likelihood of the mother’s remarriage, etc. For instance, Dahl and Moretti (2008) find that first-born daughters are associated with a range of negative predicaments for the survival of couples.<sup>64</sup> Since the Census 2000 suggests that approximately 50% of households containing adopted children do not include any biological child, it is difficult to explain this inconsistency by the mere ordering of children in the family.<sup>65</sup>

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<sup>62</sup>There are some data backing such perceptions. For instance, the U.S. Department of Justice reports that lifetime chances of a person going to prison are significantly higher for men (11.3%) than for women (1.8%). Also, girls are less likely to develop behavioral problems such as autism spectrum disorders (four times more prevalent in boys than in girls, according to the Autism Society of America), or ADHD (diagnosed two to four times as frequently in boys as in girls, see Dulcan, 1997). This conjecture has been mentioned repeatedly in the popular press, see, e.g., Slate (10/14/2003 and 1/16/2004).

<sup>63</sup>In terms of incarceration, the U.S. Department of Justice reports that the imprisonment statistics in 2001 were: 16.6% for African-American males, 7.7% for Hispanic males, 2.6% for Caucasian males, 1.7% for African-American females, 0.7% for Hispanic females, and 0.3% for Caucasian females.

<sup>64</sup>Specifically, Dahl and Moretti (2008) report that (i) women are less likely to remarry if they have a first-born daughter than if they have a first-born son; (ii) couples tend to divorce less often if they have first-born sons rather than first-born daughters; and (iii) the number of children is significantly higher in families with first-born girls.

<sup>65</sup>Indeed, such an explanation would require parents to have dramatically different gender preferences between first and later children.

## 5.2 Preferences over Race

To our knowledge, racial preferences over offspring have not yet been documented. Anecdotal evidence from adoption agencies and facilitators suggest that there are greater difficulties in matching African-American children with respect to other ethnicities. However, to this date, the only evidence to support this claim had been the gap between the proportion of African-American children awaiting adoption in the U.S. foster-care system (32% in 2006, according to the U.S. Department of Health and Human Services Report) and the proportion of African-American children in the total (domestic and international) population of adoptees (16% in 2000, according to the Census). Although suggestive, these statistics cannot be directly related to PAPs' preferences. In that respect, our data set provides a direct channel to estimate parents' racial preferences in the adoption environment.<sup>66</sup>

Our results show that a baby's aggregate probability of receiving an application is considerably affected by his or her race. In particular, this probability dramatically decreases if the baby is, at least partially, African-American.

Projecting the marginal effect linearly, the probability that a 100% African-American baby (of unknown gender) receives an application is 1.7% in contrast to a probability of 13% for a 0% African-American baby.<sup>67</sup> Similarly, application probabilities decrease dramatically for both African-American girls and boys. In other words, PAPs in our sample exhibit a large and negative preference against African-American children.

Again, the estimated effect of finalization costs in Table 3 allows us to convert the racial preference into dollars. The increase in desirability of a non-African-American baby with respect to one with mean attributes is equivalent to \$38,000 decrease in adoption finalization costs. In fact, using the linear interpolation described above, as well as the incidence of the African-American attribute in our sample, we obtain a willingness to pay for a 100% African-American baby with respect to a

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<sup>66</sup>Estimating preferences over physical characteristics of biological children is inherently difficult due to the limited choice parents have over offsprings' appearance. Furthermore, according to the Census 2000, only 4% of marriages in the U.S. are interracial, so variation in the race of biological children may be challenging to assess.

<sup>67</sup>The 13% probability is derived through a linear interpolation of the 1.7% probability of application for a 100% African-American baby (of unknown gender) and the 8.6% probability of application for the baby with mean attributes (according to Table 1, such a baby is 38.9% African-American).



0% African-American baby as high as \$62,000.<sup>68</sup>

Physical similarity may be underlying these preferences. In fact, preference for similarity, or *homophily*, is a well-known and documented phenomenon in the sociology literature (see McPherson, Smith-Lovin, and Cook, 2001 and references therein).<sup>69</sup> In the context of adoption, homophily may manifest itself in the desire of PAPs to adopt children who are similar to them and could, therefore, appear as their biological offspring. Since the large majority of PAPs in our data set are Caucasian, homophily would be consistent with a negative attitude toward African-American children.<sup>70</sup>

Hispanic children account for 12.8% of children on the website. However, we do not find a racial preference for or against Hispanics. The estimated desirability of Caucasian and Hispanic children is roughly identical, with a non-significant increase of the application probability of 0.2% if the baby is Hispanic. To the extent that Hispanic children may look different than Caucasian children, this suggests that a preference for physical similarity alone cannot account for the racial preferences we observe.

In terms of different PAP categories, we find that the preference against African-American children is similar across straight, gay men, lesbian couples. The negative effect on the application probability for an African-American child of a straight couple is  $-4.5\%$  for a girl,  $-6.7\%$  for a boy, and  $-6.7\%$  for a child of unknown gender, off an application probability of 7.2% for a child with mean attributes. This same effect on the application probability of gay men is  $-18.1\%$  for a girl,  $-4.7\%$  for a boy and  $-9.1\%$  for a child of unknown gender, off an application probability of 16.5% for a child with mean attributes. Likewise, this effect for lesbian couples is  $-18.9\%$  for a girl,  $-9.3\%$  for a boy, and  $-8.9\%$  for a child of unknown gender, off an application probability of 19.3% for a child with mean attributes. These observations suggest that the racial preference against

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<sup>68</sup>On the other hand, as before, if the finalization costs are positively correlated with some unobservable but desirable child attributes, our estimate for the willingness to pay for a non-African-American baby with respect to an African-American one should be revised downward.

<sup>69</sup>This desire for similarity would be in line with racial preferences over romantic partners documented by Fisman, Iyengar, Kamenica, and Simonson (2006, 2008).

<sup>70</sup>Indeed, according to the Census 2000, only 12% of adoptive parents in the U.S. are African-American. In addition, according to an informal assessment of the facilitator, the vast majority of the participating PAPs is Caucasian. African-Americans and Hispanics constitute only an approximate 1% of the PAPs. African-American and Hispanic PAPs are known to favor other adoption channels (local religious communities, extended families, etc.).

African-American children is somewhat stronger (although in some cases not significantly so) for gay men and lesbian couples than for straight couples.

Moreover, we find strong and significant racial preferences for single women, for whom we find an effect on the application probability for an African-American child of  $-5.2\%$  for a girl,  $-7.7\%$  for a boy, and  $-7.3\%$  for a baby of unknown gender, off an application probability of  $7.9\%$  for a child with mean attributes.

Finally, the foreign PAPs' racial preference is somewhat weaker than that identified for straight couples. Indeed, the overall probabilities of submitting an application for African-American girls, African-American boys, and African-American children of unknown gender are consistently higher for foreign PAPs ( $5.2\%$ ,  $2.9\%$ , and  $3\%$ , respectively) than for straight couples ( $2.7\%$ ,  $0.5\%$ , and  $0.5\%$ , respectively).

### **5.3 Preferences over Time to Birth and Child Age**

Understanding how the desirability of a baby changes during the pregnancy and after birth is relevant for evaluating how a disruption of an adoption plan at different stages of the BMO's pregnancy and child growth can affect adoption outcomes.

Tables 3 and 10 show estimates regarding the desirability of unborn children over the pregnancy and of already-born children. Table 3 reports a probability of  $7\%$  for an already-born child to receive an application, while the same probability for an unborn child is  $8.6\%$ . Note that this significant decrease occurs despite the fact that the average age of already-born children in our sample is *just over 1 month*.

Table 3 suggests a significant negative effect of time to birth for unborn children. In Table 10, we allow for nonlinearities over the months to birth. We find that, while in the first 6 months of pregnancy application probabilities increase rapidly, going monotonically from  $3.6\%$  to  $7\%$ , they are fairly constant over the three months preceding birth.<sup>71</sup>

In principle, there are two opposing effects at work that influence children's desirability over

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<sup>71</sup>This is somewhat surprising in view of the documented importance of pre-natal care in early stages of pregnancy (see, e.g., <http://www.expectantmothersguide.com>).

time. On the one hand, a match occurring early in the pregnancy offers PAPs the possibility of monitoring the BMO's health habits and medical conditions for a longer portion of the pregnancy.<sup>72</sup> On the other hand, several forces make BMOs early in their pregnancy potentially less appealing. First, since by law the BMO cannot relinquish parental rights until after the birth, a BMO who is in early pregnancy might be more tentative about relinquishing her baby for adoption and has more time to reconsider her decision. Thus, BMOs that are in late pregnancy can be perceived as more committed to the adoption plan. Second, since PAPs typically cover the BMO's living and medical expenses from the time of the match until the delivery, an early match could entail more risk with respect to the ultimate costs.<sup>73</sup> Indeed, if the BMO eventually reconsiders the adoption plan, most of the costs incurred up to that point are non-recoverable for the PAPs. Our results show that the effects that make a BMO that is closer to delivery more appealing to PAPs are dominant.

#### **5.4 Preferences over Adoption Finalization Costs**

Our analysis reveals that PAPs' application behavior is significantly affected by the cost of finalizing the adoption. However, the effects we find are not very large in aggregate terms. Indeed, Table 3 shows that an increase in adoption finalization costs of \$10,000 decreases the probability of receiving an application from 8.6% to 6.8%.

As it turns out, there is a strong dependence of adoption finalization costs on children's attributes. We find that African-American children of unknown gender are associated with costs that are \$7,700 lower relative to non-African-American children of unknown gender. In addition, non-African-American boys are associated with costs that are \$1,900 lower than non-African-American girls (see Table 11 in the Appendix). While these differences are significant, notice that they are far smaller than the differences in willingness to pay discussed in Sections 5.1 and 5.2. Thus, while differences in costs mitigate the differences in desirability for race and gender, they provide only

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<sup>72</sup>It is often the case that, after the match takes place, the matched PAPs monitor the BMO's medical condition and lifestyle. Depending on PAPs' state of residence, this can be done, for example, by offering the BMO to move temporarily to the PAPs' geographical area or home until the delivery.

<sup>73</sup>Detailed information we collected on auxiliary cases suggests that out of the total adoption finalization costs, up to 60% is non-refundable in the event the match falls through.

partial compensation.<sup>74</sup>

Finally, we find that alternative PAP categories respond quite differently to changes in adoption finalization costs. Indeed, lesbian couples seem to respond to changes in adoption finalization costs more than straight and gay couples, single women and foreign PAPs. Thus a \$10,000 increase in adoption finalization costs reduces the desirability of a child by 1.6% for straight couples, 1.3% for gay men, 9.1% for lesbian couples, 2% for single women, and 2.4% for foreigners. The sensitivity of these categories is consistent with the Census 2000, which reports that adoptive straight couples and gay men are, on average, wealthier than single women and lesbian couples.

## **5.5 Selection into the Matching Process**

A natural concern regarding our analysis pertains to the selection of participants on both sides into the matching process. In particular, observed characteristics of children (such as gender and race) may signal important health and behavioral attributes. In turn, PAPs may take into account the signaling aspect of observed characteristics when applying for children. Estimated preferences may then simply reflect PAPs' concerns regarding health and behavior. On the other side of the process, the preferences of the PAPs that select into the facilitator's operations may not be representative of the entire population of adoptive parents.

### **5.5.1 Adverse Selection of BMOs**

We obtained auxiliary data from the facilitator containing more detailed information about 125 BMOs corresponding to recently posted cases. These data document BMOs' age, medical history, education background, criminal record, as well as drug and alcohol abuse. If observed characteristics are proxies for any of these, we should observe a nontrivial correlation between observed characteristics and indicators of health and behavioral issues.

Table 4 reports means of the BMOs' health, demographic, and behavioral markers conditional on the children's gender and race.

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<sup>74</sup>We stress that even though costs depend to some extent on children's attributes and are therefore not exogenous, the preferences we estimate using our application regressions remain valid since we effectively control for this dependence.

	African-American				Gender					
	< 50%		≥ 50%		Boy		Girl		Unknown	
	Mean	N	Mean	N	Mean	N	Mean	N	Mean	N
Pre-Natal Care*	0.90	63	0.87	39	0.83	30	0.88	32	0.90	36
	(0.04)		(0.05)		(0.07)		(0.06)		(0.03)	
Criminal Record <sup>◇</sup>	0.58	36	0.47	19	0.53	19	0.46	13	0.60	20
	(0.08)		(0.12)		(0.12)		(0.14)		(0.11)	
Serious Health Problems <sup>†</sup>	0.50	56	0.39	31	0.45	29	0.54	24	0.40	30
	(0.07)		(0.09)		(0.09)		(0.10)		(0.09)	
Serious Drug Use <sup>‡</sup>	0.36	42	0.17	24	0.36	28	0.35	17	0.11	18
	(0.07)		(0.08)		(0.09)		(0.12)		(0.08)	
Obesity (BMI Above 30)	0.21	68	0.14	36	0.08	37	0.21	29	0.29	34
	(0.05)		(0.06)		(0.05)		(0.08)		(0.08)	
Age	28.3	74	28.2	38	29.3	40	28.31	32	26.89	36
	(0.7)		(0.9)		(0.91)		(1.01)		(0.82)	
Education <sup>♠</sup>	2.04	56	2.15	33	2.13	38	1.81	26	2.24	21
	(0.11)		(0.16)		(0.15)		(0.16)		(0.17)	

Standard Errors in parenthesis. \* Pre-Natal Care refers to a binary variable that records whether the BMO received medical attention during the pregnancy. <sup>◇</sup> Criminal Record refers to felony convictions or jail time. <sup>†</sup> Serious Health Problems include cancer, diabetes, heart condition, coma, epilepsy, severe depression, and chlamydia during pregnancy. <sup>‡</sup> Serious Drug Use include meth, crack, heroin, cocaine, amphetamines, and heavy alcohol consumption during pregnancy. <sup>♠</sup> Education refers to the last grade completed as follows: 1 for some high school, 2 for completed HS/GED, 3 for some college, and 4 for a college degree.

**Table 4:** BMOs' Selection

Regarding gender, the cases corresponding to boys and girls do not appear significantly different from one another (with 10% confidence) in any of the dimensions we consider.

Regarding race, we have split the data according to whether the race composition of the child is above or below 50% African-American.<sup>75</sup> Overall, we find that African-American BMOs, who are associated with the less desirable children according to our preference analysis in Section 5.2, consistently exhibit slightly superior values in each of the markers. The level of pre-natal care, age, and education achievement are all very similar across the two groups of BMOs. However, criminal records, serious health problems, serious drug abuse, and obesity are more frequent (albeit not in a statistically significant way, even with 10% confidence) among the less African-American cases.

<sup>75</sup>Of the 125 cases in our additional data, 47 involve children whose race composition is at least partly African-American. Of these, 3 children are 25% African-American, 21 are 50% African-American, and 23 are fully African-American. The division of the data utilized to create the table therefore corresponds to a median split over these cases.

### 5.5.2 Selection of PAPs

Using the Census 2000, we can compare aggregate characteristics of adopted children in the U.S. and of matched children in our data set.<sup>76</sup> Specifically, the Census identifies 54% of adopted children as girls. In our data set, 22% of posted cases correspond to girls and 30% to boys (with the remaining cases corresponding to unborn children of unknown gender). Out of matched cases in which the children's gender is known, 49% correspond to girls, while 51% correspond to boys. This difference is consistent with the preference for girls we have identified. However, the comparison with the Census figures suggests that PAPS who select into our data set are, if anything, more open to adopting a boy relative to the average adopting household in the U.S.

With respect to race, the Census reports 18% of adopted children as African-American, while only 6.4% of adopted children are reported as African-American when the head of the household is classified as Caucasian (the Census' data is based on self-reported coarse classification of race). In our data, of all cases of matched children (through the facilitator or through other channels), 54% correspond to children who are at least partially African-American and 24% correspond to children who are 100% African-American. Recall that PAPS in our data set are virtually all Caucasian. This suggests that PAPS who select into our data set are, if anything, more open to adopting an African-American child than the average adopting household in the U.S.

## 6 Birth Mothers' Choices and Matching Outcomes

Conditional on putting up their children for adoption through an agency and the facilitator, BMOs make two distinct choices that we observe in our data: Ex-ante, they decide which categories of PAPS are acceptable, and, ex-post, they resolve the case by selecting one of the PAP applications received, deciding to parent, or losing contact with the facilitator.

As discussed in Section 4, the ex-ante choice of acceptable categories of PAPS cannot be explained by baby attributes, as can be seen in Table 12 in the Appendix. In fact, the only significant

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<sup>76</sup>As mentioned, all reported figures are derived from the authors' own tabulation using the 5% PUMS for domestic adoptions of children under the age of 10.

predictors of the choice of acceptable categories are the year in which the cases were presented and the adoption finalization costs. Specifically, both gay men and lesbian PAPs were significantly less likely to be acceptable prior to 2007 (by 18% – 30% between 2004 and 2006, relative to 2009). According to the time trends reported in Table 7 in the Appendix, the fraction of gay, lesbian, and foreign PAPs was fairly stable through time. In that respect, the increase in BMOs' propensity to allow same-sex PAPS may reflect a shift in BMOs' preferences (mirroring important ideological and political changes, e.g., legalization of gay marriages in several states). In addition, a BMO's decision to allow applications from same-sex PAPs is significantly correlated with adoption finalization costs, with higher costs corresponding to a substantially lower probability of same-sex PAPs being declared acceptable.<sup>77</sup>

The propensity to consider foreign PAPs was consistently and significantly higher prior to 2008, echoing the difficulties of adoption by foreign parents imposed by the ratification of the Hague Convention in early 2008.

Regarding the BMOs' selection of PAPs among those who apply, we cannot reject BMOs' selecting one of the applications randomly. Indeed, a model in which the chosen PAP is allowed to depend on all observable characteristics (namely, the volume of applicants and the categories to which they belong, in addition to the relevant baby's attributes) generates no significant proxies of choice (see Table 13 in the Appendix).

BMOs can also decide to match through channels other than the facilitator, or to forgo committing to an adoption agreement altogether (thereby deciding to parent or to relinquish their children to foster care).<sup>78</sup> In our sample, 13.4% of cases result in a match through the facilitator, and, overall, 70% of cases become matched through the facilitator or in other ways.<sup>79</sup> Table 5 contains estimation

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<sup>77</sup>We suspect that the correlation between banning same-sex couples and finalization costs is due to the fact that adoption agencies that ban same-sex couples also make greater investments in legal and medical services, rather than because of BMOs' decisions per se.

<sup>78</sup>As mentioned above, foster care is notoriously harmful in terms of outcomes. It is associated with a far higher rate of post-care homelessness (40% are homeless within 18 months of discharge, according to the U.S. General Accounting Office, 1999). Foster care is also associated with a much higher rate of incarceration. In California, 70% of all penitentiary inmates have spent time in foster care (Select Committee Hearing of the California Legislature, 2006).

<sup>79</sup>Reported decisions to parent occurred in only 5% of cases, whereas cases were determined closed, without a specified resolution, in 4.8% of the cases (which may entail some unreported matches and some decisions to parent).

results regarding the determinants of a successful match, through the facilitator or through other channels, controlling for all observable baby characteristics.

Several insights come out of these estimations. First, the successful match of a baby is weakly associated with some constraints imposed by BMOs. Specifically, the establishment of a match is *negatively* linked with allowing applications from same-sex PAPs. We interpret this result as consistent with the presence of some adoption agencies being particularly effective in finding matches and, at the same time, more restrictive in their attitudes toward same-sex PAPs. Also, Table 5 suggests that the matches through the facilitator are *positively* associated with allowing applications from foreign PAPs.

Second, the application arrival rate significantly affects the likelihood of a match. In order to get a sense of the magnitudes, and bearing in mind the fact that the average time from first to last application for a baby on the website is 33 days, our estimations suggest that an increase of three applications corresponds to the overall probability of a successful match increasing by approximately 6%.

Third, the knowledge of a baby's gender (be it a boy or a girl) is associated with a significantly higher probability of a match. This is particularly intuitive in view of the distribution of the time to birth. Recall that the average time to birth of an unborn baby in our sample is about two months. At that stage, not knowing the gender of the child is a strong signal of very limited medical attention (an ultrasound exam would reveal a child's gender starting from approximately the 20th week of gestation). In that respect, the knowledge of the child's gender serves as a proxy for medical care (and our results are consistent with the preference for girls identified through PAPs' choices in Section 5).

Last, on average, higher adoption finalization costs are linked with higher probabilities of a match. *Ceteris paribus*, an increase of \$10,000 corresponds to an increase of 7% in the probability of a match through the facilitator, and an increase of 12% in the probability of a reported match through any channel. This result is consistent with adoption agencies playing an important role in setting prices, and generating matches. Specifically, a link between costs and the probabilities of a match may be the result of two effects: (i) more expensive agencies being more effective in



Dependant Variable	Matched	Matched through Facilitator
Already Born (d)	0.04 (0.29)	-0.10*** (-4.08)
Months from Presentation to Birth	0.01 (1.59)	0.00 (0.56)
African-American	0.05 (0.69)	0.08 (1.66)
Girl (d)	0.19** (2.88)	-0.03 (-0.69)
Boy (d)	0.18** (2.72)	0.04 (0.92)
PAP Arrival Rate Per Day	0.61** (3.22)	0.16** (2.75)
Finalization Cost (in 10 000s of dollars)	0.12* (2.41)	0.07* (2.55)
Same-Sex PAP Allowed (d)	-0.24** (-2.74)	0.04 (0.70)
Single PAP Allowed (d)	-0.00 (-0.05)	0.00 (0.04)
Foreign PAP Allowed (d)	0.02 (0.24)	0.07* (2.00)
Year 2005 (d)	0.14 (1.26)	-0.01 (-0.21)
Year 2006 (d)	0.10 (0.87)	-0.01 (-0.23)
Year 2007 (d)	0.03 (0.27)	0.03 (0.37)
Year 2008 (d)	-0.01 (-0.07)	0.10 (1.08)
Probability for Mean Attributes	0.666	0.089
$\chi^2$	46.77	29.17
Log-Likelihood	-162.9	-91.7
Babies	286	286

(d) for discrete change of dummy variable from 0 to 1. \* $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Note that the omitted category is an unknown-gender, non-African-American, unborn child who is less than one month to birth, with finalization costs of \$26,000 in 2009.

**Table 5: Matching Regression – Marginal Effect from Probit of a Child Finding a Match.**

generating matches, and (ii) more expensive agencies targeting children that are desirable in terms of unobserved characteristics, resulting in more successful matches.

## 7 Policy Implications

When considering the debate on whether or not to ban a certain category of PAPs from the adoption process, there are two effects to consider. First, reducing the volume of participating PAPs will potentially decrease the number of adopted children. We stress that reducing the number of adopted children comes at significant costs. For example, Barth, Lee, Wildfire, and Guo (2006), as well as Hansen and Hansen (2006), show that state and federal governments save between \$65,422 and \$126,825 on the average child who enters foster care at age three if he or she is adopted rather than remaining there throughout childhood. Furthermore, Hansen (2006) calculated that the human service costs of adoption are about one-half the costs of long-term foster care.<sup>80</sup> Second, given the difference in preferences across PAP categories identified in Section 5, excluding particular PAPs will affect the distribution of attributes (gender, race, etc.) of adopted children. In this section, we provide counterfactual exercises that quantify these two effects for same-sex and foreign PAPs.

### 7.1 Gay and Lesbian Adoption

We start by noting that studies tracking adopted children identify some positive effects and no negative effects of adoption by gay or lesbian parents as opposed to heterosexual parents.<sup>81</sup> Therefore, given the likely costs generated by children that remain unmatched, the number of successful adoptions is a reasonable proxy for the effectiveness of the matching process. Therefore, we estimate the impact of the participation of same-sex couples in the adoption process by assessing the number of matches that would be lost should gay and lesbian PAPs be restricted from participating.<sup>82</sup> In our

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<sup>80</sup>She also found that when examining other social costs, such as reduced incarceration or increased education attainment, each dollar spent on the adoption of children from foster care results in \$2.45 to \$3.26 in tangible benefits to society.

<sup>81</sup>See Brewaeys, Ponjaert, Van Hall, and Golombok (1997); Golombok, Perry, Burston, Murray, Mooney-Sommer, Stevens, and Golding (2003); Golombok, Spencer, and Rutter (1983); and Wainwright, Russell, and Patterson, (2004).

<sup>82</sup>In this counterfactual exercise, and in the one in Section 7.2, we study the comparative statics within one equilibrium of the model presented in Section 4.

data, same-sex couples are chosen by the BMOs in 12% of all cases of matched children for whom we know the identity of the chosen PAP. This serves as an upper bound on the percentage of matches that would have been lost had same-sex couples been prohibited from participating in the adoption process. In order to generate a more conservative estimate, we assume that whenever we observe a match, the BMO views all applicants as acceptable. In that case, banning same-sex applicants would reduce the number of matches by the number of cases in which the child was ultimately adopted *and* no application by heterosexual parents was submitted.<sup>83,84</sup> This amounts to 6% of matched cases in our data. This is clearly a large effect given that, according to Table 6, only 18.6% of matched cases allow gay and lesbian PAPs to apply. This method is an underestimate of the loss of matched children, in that it ignores two important elements of our environment. First, it ignores the fact that certain heterosexual parents may not appear acceptable to some birth mothers. Second, it ignores the endogenous effects on PAPs' threshold attributes. Indeed, consider our underlying model. Reducing the pool of potential parents would reduce the competition on the parents' side and would lead to an increase in the threshold utility  $\bar{u}_{PAP}$ . Consequently, fewer applications would be placed, and potentially fewer matches would be created.

Obviously, this result depends on the participation rate of gay and lesbian PAPs in our matching process, which is not necessarily representative of the overall gay and lesbian participation in adoption overall. It would be interesting to convert our counterfactual exercise into an estimate of the number of matches that would have been lost due to a gay and lesbian adoption ban, relative to a world in which gays and lesbians are universally allowed to adopt (except for restrictions imposed by the BMOs' preferences). In order to do that, one would need recent estimates of the gay and lesbian population and their propensity to adopt.

In terms of the attributes associated to children whose match would have been lost under our counterfactual exercise, we find that 50% of severed matches correspond to boys (to be contrasted

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<sup>83</sup>The significant variance observed in the number of applications BMOs receive by the time of a match suggests that they are not determining their duration on the website based on the number of applications received.

<sup>84</sup>Since the same-sex classifications are probabilistic, if a child receives an application from  $n$  PAPs with probabilities of being same-sex  $p_1, \dots, p_n$ , the probability of *all* applicants being same-sex couples is  $\prod_{i=1}^n p_i$ , which is the probability at the root of our counterfactual estimation.

with boys representing 24% of the overall observed matches). In terms of race, 62% of lost matches correspond to African-American children (as compared with 37% of matched children being African-American). This suggests that, while same-sex couples have strong preferences against boys and African-American children, they still play an important role in their placement due to lower reservation utilities, as we discussed in Section 5.

## 7.2 Foreign Adoptive Parents and the Hague Convention

As discussed in Section 2.3, the ratification of the Hague Convention in 2008 has made it difficult for foreign PAPs to adopt domestically. In our sample, classification of PAPs as foreign is only approximate in that our deductions are based on application behavior alone. Nonetheless, even with this coarse classification, we observe sharp declines in the probability of PAPs being foreign: While between 2004 and 2009 these probabilities varied between 56.3% and 60.3%, they are estimated at 50.3% in 2008 and at 37.4% in 2009. The concern regarding the reduction of foreign PAPs is similar to that discussed with respect to gay and lesbian adoption bans. That is, a reduction of foreign PAPs would potentially lead to a reduction in the volume of children that find an adoptive home.

We perform a similar counterfactual to the one done above. We calculate the expected number of children that would have remained unmatched in our data had foreign PAPs been prohibited.<sup>85</sup> We find that, in expectation, 33% of matches would have been severed had foreign PAPs not participated in the process.

While the precise value of 33% is derived from the way we classify PAPs as foreign, we note that the qualitative impact is consistent with the preferences we estimate for foreign PAPs. Indeed, foreign PAPs appear to exhibit more flexibility with respect to baby attributes since they apply for more children than straight couples do. Therefore, removing them from the matching process would clearly have a negative effect on matching probabilities. Given that the reduction in foreign participation may be underestimated in our sample and that the outcomes of such bans are crucial for policy decisions, a deeper investigation of the consequences of restrictions on international adoption

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<sup>85</sup>As before, since the foreign classification is probabilistic, if a child receives an application from  $n$  PAPs with corresponding probability of being foreign of  $p_1, \dots, p_n$ , the probability of *all* applicants being foreign is  $\prod_{i=1}^n p_i$ .

is an important avenue for future research.

Foreign PAPs' higher tolerance with respect to boys and African-American children ties directly to the attributes associated with the lost matches. Indeed, we find that 50% of severed matches correspond to boys, whereas African-Americans account for 55% of lost matches.

## 8 Conclusion

We collected a novel data set to track the matching of potential adoptive parents to birth mothers looking to relinquish their child for adoption. The detailed data on over 800 children allow us to estimate parents' preferences over child attributes, most notably over gender, race, time to birth, and adoption finalization costs.

We find clear patterns in parents' preferences. First, girls are consistently preferred to boys, and Caucasians and Hispanics are consistently preferred to African-Americans. In monetary terms, the increase in desirability of a girl relative to a boy can be compensated by a decrease of approximately \$16,000 in adoption finalization costs. Similarly, the increase in desirability of a non-African-American baby with respect to an African-American baby (both of unknown gender) is equivalent to a decrease of at least \$38,000 in adoption finalization cost. Second, adoption outcomes are somewhat fragile to the timing at which birth mothers enter the process, with adoptive parents preferring children who are unborn, but relatively close to birth. Third, adoption finalization costs impact demand significantly. An increase in adoption finalization costs of \$10,000 decreases the aggregate probability of receiving an application from 8.6% to 6.8%.

Different categories of adoptive parents—straight, gay, lesbian, single, or foreign—have different behaviors in the matching process. We find that gays men and lesbian couples submit applications to 16.5% and 19.3% of children, respectively, while straight couples submit applications to only 7.2% of children. However, we do not find evidence that same-sex couples or single women are less biased than straight couples. If anything, they seem to have stronger biases in favor of girls and against African-American children. On the other hand, foreign adoptive parents exhibit weaker gender and racial preferences with respect to other parents categories.

The chances that a child put up for adoption will be successfully matched to adoptive parents depend on several crucial characteristics—namely, how selective the birth mother is about the categories of parents she is willing to consider; the rate at which potential adoptive parents express interest in adopting the child; and whether the child’s gender is known (presumably, proxying for medical monitoring such as ultrasound exams). Furthermore, successful matches are associated with higher adoption finalization costs.

These observations feed into important policy debates regarding the inclusion of specific categories of parents in the adoption process. First, the recent political shifts allowing for more households comprised of gay and lesbian partners has triggered discussion over the impacts of gay and lesbian participation on the domestic adoption process. A simple counterfactual experiment banning same-sex parents from our sample lowers the number of adopted children by about 6%. Therefore, such a ban could increase the fraction of children in foster care, which has well documented detrimental effects. In a different sphere, the recent ratification of the Hague Convention has made international adoption far more challenging and raised international controversy on the impacts of these new barriers. Again, a simple counterfactual test banning foreign parents, who are shown to be rather flexible in terms of preferences over children’s attributes, reveals an estimated 33% decrease in match probabilities.

While adoption is far-reaching in the U.S. (2.5% of all children are adopted in an industry that generates 2 – 3 billion dollars annually), it is still an unexplored territory for economists. In our context, the domestic adoption process is unique in that it allows us to answer fundamental questions regarding preferences over race and gender in a situation in which outcomes entail significant commitment. Thus, standard models of search and matching can be used for estimation purposes.

Our study suggests that the adoption industry can be further investigated in several directions. For example, our results are consistent with adoption agencies carrying an important role in the setting of finalization costs and the generation of successful matches between adoptive parents and birth mothers. In particular, the difference in adoption finalization costs across genders is difficult to explain with the mere difference in BMOs’ expenses. This is suggestive of the limited regulation the adoption industry is subject to. Accounting for particular agencies’ effects would be especially

useful for understanding the operation of the adoption process. From an institutional-design perspective, our analysis opens the door for contemplating alternative mechanisms geared at minimizing the chances that children remain unmatched. For instance, one could consider a more centralized design in which both adoptive parents and birth mothers submit preferences to a clearinghouse (much as in several countries throughout the world, such as Germany, Italy, and the United Kingdom).

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## Appendix

Variable	Mean	Std. Dev.	Min.	Max.	N
Already Born	0.111	0.315	0	1	619
Number of Interested PAPs	3.158	2.217	1	15	619
Number of Interested Same-Sex PAPs	0.672	1.042	0	9.5	323
Number of Interested Single PAPs	0.362	0.643	0	4	323
PAP Arrival Rate Per Day	0.235	0.37	0.003	4	590
Gender Unknown	0.523	0.500	0	1	618
Girl	0.235	0.424	0	1	618
Boy	0.243	0.429	0	1	618
African-American	0.387	0.404	0	1	619
Caucasian	0.375	0.382	0	1	619
Hispanic	0.143	0.286	0	1	619
Same-Sex PAPs Allowed	0.186	0.39	0	1	323
Single PAPs Allowed	0.588	0.493	0	1	323
Foreign PAPs Allowed	0.87	0.337	0	1	323
Matched on the Website	0.186	0.389	0	1	619
Days on Site	45	67	1	469	590
Days from Presentation to Birth	66	123	-1657	575	583

**Table 6:** Summary Statistics of BMOs if **matched**

	2004	2005	2006	2007	2008	2009
<b>PAP</b>						
Total Number of PAPs	135	278	149	116	84	82
Foreign PAP	0.575	0.563	0.588	0.603	0.503	0.374
Gay PAP	0.030	0.065	0.067	0.085	0.101	0.089
Lesbian PAP	0.061	0.058	0.056	0.093	0.117	0.100
Single PAP	0.179	0.127	0.114	0.083	0.193	0.154
<b>BABY</b>						
Number of Babies	139	239	141	129	117	126
Same-Sex PAP Allowed	0.302	0.180	0.156	0.736	0.333	0.333
Single PAP Allowed	0.784	0.644	0.518	0.868	0.598	0.643
Foreign PAP Allowed	0.892	0.891	0.887	0.968	0.782	0.651
African-American	0.447	0.460	0.370	0.329	0.350	0.329
Girl	0.302	0.205	0.234	0.0698	0.231	0.254
Boy	0.252	0.378	0.376	0.0923	0.393	0.333
Months to Birth	0.621	0.755	1.22	0.128	0.414	2.41
Finalization Cost	20522	22834	26543	27081	31076	31780

**Table 7:** Trends from 2004 to 2009

Dependent Variable: PAP Applies for Baby Activity Window: 90 Days	All	Straight PAP	Gay PAP†	Lesbian PAP†	Single PAP	Foreign PAP †
Already Born (d)	-0.009 (-1.80)	-0.013* (-2.46)	-0.062 (-1.67)	-0.052 (-0.88)	0.027 (1.08)	-0.016* (-2.21)
Months to Birth	-0.001** (-2.85)	-0.001** (-2.75)	-0.002 (-1.17)	-0.001 (-0.37)	-0.001 (-1.06)	-0.001* (-2.06)
Finalization Cost in \$10,000s	-0.014*** (-5.83)	-0.013*** (-5.04)	-0.019 (-1.04)	-0.075** (-2.66)	-0.018* (-2.50)	-0.019*** (-5.90)
African-American Girl	-0.039*** (-6.12)	-0.035*** (-5.04)	-0.147** (-2.75)	-0.144* (-2.47)	-0.039* (-2.17)	-0.030*** (-3.49)
African-American Boy	-0.052*** (-7.47)	-0.050*** (-6.68)	-0.048 (-0.95)	-0.070 (-0.99)	-0.057** (-2.59)	-0.046*** (-4.96)
African-American Unknown Gender	-0.053*** (-8.07)	-0.051*** (-7.13)	-0.077 (-1.39)	-0.071 (-1.30)	-0.054*** (-3.51)	-0.048*** (-5.49)
Non-African-American Girl	0.022*** (4.29)	0.019*** (3.57)	0.111 (1.78)	0.187** (2.64)	0.023 (1.33)	0.019* (2.45)
Non-African-American Boy	-0.005 (-1.06)	-0.007 (-1.33)	0.008 (0.18)	0.085 (1.79)	0.003 (0.16)	0.002 (0.26)
Hispanic	0.002 (0.26)	0.003 (0.47)	0.071 (1.14)	-0.013 (-0.15)	-0.016 (-0.79)	0.004 (0.45)
Year 2004 (d)	-0.030*** (-7.27)	-0.023*** (-4.98)	-0.031 (-0.67)	-0.114** (-3.07)	-0.002 (-0.11)	-0.036*** (-5.47)
Year 2005 (d)	-0.029*** (-6.20)	-0.018*** (-3.35)	-0.052 (-1.31)	-0.083* (-2.16)	-0.012 (-0.72)	-0.032*** (-4.18)
Year 2006 (d)	-0.020*** (-4.40)	-0.007 (-1.29)	0.063 (0.95)	-0.068 (-1.50)	-0.030* (-2.24)	-0.016* (-2.08)
Year 2007 (d)	-0.026*** (-6.36)	-0.013* (-2.44)	0.005 (0.11)	-0.179*** (-7.53)	-0.007 (-0.30)	-0.021** (-3.05)
Year 2008 (d)	-0.003 (-0.72)	0.003 (0.52)	-0.013 (-0.48)	0.016 (0.49)	0.034 (1.81)	0.003 (0.44)
Gay PAP	0.050*** (5.27)					
Lesbian PAP	0.075*** (8.09)					
Single PAP	0.001 (0.10)					
Foreign PAP	0.058*** (7.30)					
Probability for Mean Attributes	0.066	0.052	0.126	0.158	0.0572	0.068
Probability for Base Case ♡	0.060	0.093	0.153	0.255	0.086	0.118
$\chi^2$	385.90	148.51	30.36	63.20	42.60	105.94
Log-Likelihood	-224071.1	-185977.4	-28673.5	-32214.2	-26979.0	-229591.9
Observations	1088210	944423	80828	74422	125246	969035
PAP-Babies	33403	29277	2698	2440	3484	31245

(d) for discrete change of dummy variable from 0 to 1. (d) for discrete change of dummy variable from 0 to 1. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Standard Errors Clustered by PAP-Baby Pair. ♡ Note that the omitted category is a gender unknown, non-African-American, unborn child, less than one month to birth, with finalization cost of \$26,000 in 2009. †: Gay, lesbian, and foreign estimated using weighted probit.

**Table 8:** Determinants of PAPs Applications (Activity Window of 90 Days) – Marginal Effects for Probit

Dependent Variable: PAP Applies for Baby	All	Straight PAP	Gay PAP†	Lesbian PAP†	Single PAP	Foreign PAP †
<b>♣ Application at Some Point in Time</b>						
Already Born (d)	-0.006 (-1.40)	-0.008* (-1.98)	-0.028 (-0.79)	0.029 (0.49)	0.021 (1.11)	-0.010 (-1.70)
Months to Birth	-0.000 (-1.12)	-0.000 (-1.14)	0.000 (0.03)	0.001 (0.98)	-0.001 (-0.91)	-0.000 (-0.64)
Finalization Cost in \$10,000s	-0.012*** (-6.55)	-0.011*** (-5.91)	0.008 (0.45)	-0.029 (-1.24)	-0.016* (-2.45)	-0.015*** (-6.28)
African-American Girl	-0.034*** (-6.88)	-0.029*** (-5.47)	-0.134** (-2.77)	-0.119* (-2.16)	-0.059*** (-3.65)	-0.029*** (-4.29)
African-American Boy	-0.052*** (-9.86)	-0.050*** (-8.81)	-0.068 (-1.63)	-0.096 (-1.85)	-0.071*** (-3.76)	-0.049*** (-7.08)
African-American Unknown Gender	-0.043*** (-9.46)	-0.042*** (-8.55)	-0.119*** (-3.62)	-0.039 (-0.94)	-0.039** (-2.73)	-0.040*** (-6.65)
Non-African-American Girl	0.016*** (3.71)	0.013** (3.06)	-0.053 (-0.94)	0.033 (0.50)	0.037* (2.26)	0.010 (1.72)
Non-African-American Boy	-0.011** (-2.77)	-0.011** (-2.64)	-0.062 (-1.62)	0.060 (1.33)	-0.025 (-1.68)	-0.005 (-0.94)
Hispanic	-0.005 (-1.20)	-0.001 (-0.31)	0.072 (1.27)	-0.052 (-0.73)	-0.043* (-2.26)	-0.005 (-0.93)
Year 2004 (d)	-0.033*** (-9.92)	-0.025*** (-6.84)	-0.036 (-1.02)	-0.109** (-3.09)	-0.017 (-1.03)	-0.026*** (-4.68)
Year 2005 (d)	-0.027*** (-7.09)	-0.017*** (-4.32)	-0.017 (-0.41)	-0.054 (-1.25)	-0.009 (-0.60)	-0.017** (-2.76)
Year 2006 (d)	-0.022*** (-6.54)	-0.012** (-2.99)	0.164* (1.99)	-0.099** (-2.76)	-0.041*** (-3.74)	-0.011 (-1.69)
Year 2007 (d)	-0.031*** (-9.28)	-0.021*** (-4.27)	-0.048 (-1.26)	-0.160*** (-7.27)	-0.027 (-1.50)	-0.024*** (-3.65)
Year 2008 (d)	0.012* (2.26)	0.019** (3.24)	0.043 (1.05)	-0.002 (-0.05)	0.030 (1.37)	0.039*** (3.95)
Gay PAP	0.044*** (5.78)					
Lesbian PAP	0.062*** (9.71)					
Single PAP	0.010* (2.40)					
Foreign PAP	0.058*** (9.16)					
Probability for Mean Attributes	0.060	0.048	0.126	0.153	0.061	0.062
Probability for Base Case ♡	0.056	0.088	0.164	0.260	0.109	0.095
$\chi^2$	624.32	264.07	53.36	36.77	39.19	199.20
Log-Likelihood	-5987.7	-4974.9	-703.9	-822.5	-695.3	-6163.1
PAP-Babies	30457	26679	2162	1963	3183	27913

(d) for discrete change of dummy variable from 0 to 1. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Standard Errors Clustered by PAP-Baby Pair. ♡ Note that the omitted category is gender unknown, non-African-American, unborn child who is less than one month to birth, with finalization cost of \$26,000 in 2009. †: Gay, lesbian and foreign estimated using weighted probit. ♣ PAP submits an application at some point when the BMO is available on the website. Activity window of 90 days.

**Table 9:** Determinants of PAPs' Applications (Application at Some Point in Time) – Marginal Effects for Probit

Dependent Variable: PAP Applies for Baby Activity Window: 10 Days	All	Straight PAP	Gay PAP†	Lesbian PAP†	Single PAP	Foreign PAP †
Already Born (d)	-0.013 (-1.88)	-0.018** (-2.71)	-0.045 (-0.81)	-0.053 (-0.68)	0.024 (0.74)	-0.022* (-2.39)
1 Month Before Birth (d)	-0.000 (-0.07)	-0.002 (-0.59)	0.043 (1.09)	0.001 (0.03)	0.003 (0.25)	-0.002 (-0.70)
2 Month Before Birth (d)	0.000 (0.08)	-0.001 (-0.33)	0.059 (1.42)	0.004 (0.09)	-0.009 (-0.74)	-0.002 (-0.45)
3 Month Before Birth (d)	-0.006 (-1.49)	-0.007 (-1.79)	0.056 (1.22)	-0.007 (-0.16)	-0.017 (-1.32)	-0.010 (-1.84)
4 Month Before Birth (d)	-0.016*** (-3.89)	-0.015*** (-3.57)	-0.048 (-1.43)	-0.060 (-1.43)	-0.020 (-1.42)	-0.021*** (-3.98)
5 Month Before Birth (d)	-0.024*** (-5.60)	-0.024*** (-5.27)	-0.066 (-1.88)	-0.083 (-1.89)	-0.022 (-1.45)	-0.028*** (-4.74)
6 Month Before Birth (d)	-0.029*** (-5.43)	-0.028*** (-5.01)	-0.061 (-1.33)	-0.115** (-2.91)	-0.020 (-1.07)	-0.033*** (-4.52)
7 Month Before Birth (d)	-0.045*** (-7.83)	-0.045*** (-7.75)	0.067 (0.63)	-0.155*** (-3.55)	-0.054*** (-4.15)	-0.062*** (-10.90)
8 Month Before Birth (d)	-0.050*** (-7.46)	-0.046*** (-6.07)	-0.014 (-0.11)	-0.196*** (-9.39)	-0.066*** (-8.65)	-0.069*** (-9.83)
Month After Birth	-0.000 (-0.65)	-0.001 (-1.60)	-0.002 (-0.60)	-0.005 (-1.58)	0.000 (0.45)	-0.001 (-0.94)
Finalization Cost in 10 000's of \$	-0.019*** (-6.37)	-0.018*** (-5.58)	-0.017 (-0.76)	-0.090** (-2.61)	-0.022* (-2.34)	-0.026*** (-6.54)
African-American Girl	-0.064*** (-7.54)	-0.056*** (-6.12)	-0.205** (-3.20)	-0.245*** (-3.34)	-0.065** (-2.68)	-0.054*** (-4.78)
African-American Boy	-0.081*** (-8.99)	-0.077*** (-7.98)	-0.065 (-1.13)	-0.151 (-1.77)	-0.087** (-3.13)	-0.075*** (-6.40)
African-American Unknown Gender	-0.079*** (-9.28)	-0.075*** (-8.14)	-0.113 (-1.69)	-0.144* (-2.20)	-0.081*** (-3.88)	-0.073*** (-6.57)
Non-African-American Girl	0.019** (2.79)	0.016* (2.23)	0.076 (0.98)	0.169 (1.89)	0.023 (0.97)	0.014 (1.41)
Non-African-American Boy	-0.015* (-2.34)	-0.017* (-2.47)	-0.014 (-0.26)	0.058 (0.94)	-0.007 (-0.34)	-0.007 (-0.83)
Hispanic	-0.003 (-0.45)	-0.001 (-0.12)	0.088 (1.16)	-0.081 (-0.72)	-0.029 (-1.12)	-0.002 (-0.20)
Gay PAP	0.059*** (4.70)					
Lesbian PAP	0.093*** (7.76)					
Single PAP	0.004 (0.57)					
Foreign PAP	0.076*** (7.26)					
Years (d)	X	X	X	X	X	X
Probability for Mean Attributes	0.086	0.072	0.161	0.194	0.080	0.092
Probability for Base Case ♡	0.092	0.143	0.182	0.357	0.121	0.188
$\chi^2$	462.43	256.42	65.40	73.67	65.67	210.93
Log-Likelihood	-206421.9	-171588.1	-26844.0	-29869.6	-25557.9	-210405.7
Observations	825982	715179	67210	61560	97418	742059
PAP-Babies	29364	25746	2416	2161	3164	27431

(d) for discrete change of dummy variable from 0 to 1. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Standard Errors Clustered by PAP-Baby Pair. ♡ Note that the omitted category is gender unknown non-African-American unborn child with finalization cost of 26 000 dollars in 2009 who is less than one month from birth. †: Gay, lesbian, and foreign estimated using weighted probit, with weights corresponding to probability that PAP is gay, lesbian or foreign respectively.

**Table 10:** Determinants of PAPs' Applications (Activity Window of 10 days) – Marginal Effects for Probit

Dependent Variable	Full Sample		Unborn		Born	
	I	II	III	IV	V	VI
Finalization Cost in \$1, 000s						
Already Born	-1.14 (-1.41)	-0.65 (-0.83)				
Month to Birth	-0.50** (-3.14)	-0.28 (-1.78)	-0.56** (-3.05)	-0.41* (-2.32)	-0.11 (-0.31)	0.23 (0.59)
African-American Girl	-8.77*** (-7.38)	-7.99*** (-6.83)	-9.55*** (-7.41)	-8.52*** (-6.69)	-5.32 (-1.69)	-5.52 (-1.77)
African-American Boy	-7.63*** (-6.69)	-7.41*** (-6.66)	-8.32*** (-6.50)	-8.27*** (-6.64)	-6.05* (-2.29)	-5.21 (-1.98)
African-American Unknown Gender	-7.74*** (-7.38)	-7.71*** (-7.55)	-8.59*** (-7.62)	-8.35*** (-7.60)	-3.91 (-1.36)	-4.60 (-1.61)
Non-African-American Girl	-0.03 (-0.03)	-0.11 (-0.11)	-0.37 (-0.34)	-0.22 (-0.21)	1.72 (0.60)	0.81 (0.28)
Non-African-American Boy	-1.93* (-2.19)	-1.90* (-2.22)	-2.13* (-2.26)	-1.95* (-2.13)	-0.63 (-0.24)	-1.31 (-0.51)
Hispanic	0.29 (0.28)	0.19 (0.19)	-0.36 (-0.30)	-0.54 (-0.47)	2.88 (1.13)	2.91 (1.16)
Asian	2.23 (0.92)	1.12 (0.47)	1.80 (0.73)	0.83 (0.35)	7.32 (0.54)	5.07 (0.38)
Year 2004	-10.63*** (-10.76)	-10.51*** (-10.73)	-10.90*** (-10.68)	-10.67*** (-10.58)	-5.40 (-0.83)	-4.66 (-0.72)
Year 2005	-9.01*** (-10.30)	-9.55*** (-10.94)	-9.27*** (-10.46)	-9.77*** (-11.03)	-2.95 (-0.43)	-2.70 (-0.40)
Year 2006	-6.05*** (-6.08)	-6.54*** (-6.66)	-6.19*** (-5.96)	-6.74*** (-6.56)	-1.71 (-0.26)	-0.58 (-0.09)
Year 2007	-5.58*** (-5.42)	-4.44*** (-4.26)	-4.90*** (-4.15)	-4.17*** (-3.60)	-1.86 (-0.28)	0.02 (0.00)
Year 2008	-0.57 (-0.54)	-1.37 (-1.32)	-0.17 (-0.16)	-0.96 (-0.92)	-0.83 (-0.12)	-1.02 (-0.14)
Single PAP Allowed		0.50 (0.82)		0.44 (0.67)		-0.02 (-0.01)
Same-Sex PAP Allowed		-4.44*** (-6.40)		-4.51*** (-6.03)		-4.40* (-2.11)
Foreign PAP Allowed		0.44 (0.58)		0.10 (0.12)		3.23 (1.40)
Constant	35.86*** (37.69)	36.58*** (37.19)	36.42*** (36.86)	37.15*** (36.41)	29.25*** (4.35)	30.56*** (4.51)
$R^2$	0.38	0.42	0.43	0.47	0.17	0.22
Adjusted- $R^2$	0.36	0.40	0.41	0.46	0.08	0.10
F-Stat	26.4	25.8	28.2	27.1	1.8	1.9
Babies	623	623	500	500	123	123

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Note that the omitted category is gender unknown non-African-American unborn child in 2009.

**Table 11: Adoption Finalization Cost Regressions**



Dependent Variable	Same-Sex PAPs	Foreign PAPs	Single PAPs
	Allowed	Allowed	Allowed
Already Born	0.090 (1.71)	-0.087* (-2.16)	0.075 (1.29)
Months to Birth	-0.001 (-0.38)	-0.004 (-0.94)	0.000 (0.06)
Finalization Cost in \$10,000s	-0.020*** (-6.77)	0.000 (0.11)	-0.007* (-2.36)
African-American Girl	-0.043 (-0.57)	0.052 (0.88)	0.212* (2.42)
African-American Boy	-0.133 (-1.82)	0.016 (0.28)	0.112 (1.46)
African-American Unknown Gender	-0.002 (-0.03)	0.019 (0.37)	0.147* (2.01)
Non-African-American Girl	-0.088 (-1.24)	-0.044 (-0.94)	-0.076 (-1.12)
Non-African-American Boy	-0.077 (-1.25)	0.006 (0.14)	-0.008 (-0.14)
Hispanic	-0.085 (-1.10)	0.075 (1.34)	0.026 (0.36)
Year 2004 (d)	-0.187*** (-4.13)	0.121*** (4.63)	0.094 (1.42)
Year 2005 (d)	-0.303*** (-7.73)	0.157*** (5.66)	-0.028 (-0.43)
Year 2006 (d)	-0.230*** (-6.21)	0.133*** (5.93)	-0.204** (-2.81)
Year 2007 (d)	0.166* (2.02)	0.179*** (9.63)	0.175** (2.86)
Year 2008 (d)	-0.038 (-0.64)	0.089** (3.27)	-0.017 (-0.26)
Probability for Mean Attributes <sup>♡</sup>	0.280	0.868	0.672
$\chi^2$	142.38	63.20	76.06
Log-Likelihood	-341.8	-266.6	-399.0
Babies	683	683	683

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . <sup>♡</sup> Note that the omitted category is gender unknown non-African-American unborn child with finalization cost of \$26,000 in 2009.

**Table 12:** Determinants of Restrictions: Marginal Effects for Probit

Dependent Variable: Chosen PAP	I	II	III	IV
Same-Sex PAP	0.09 (0.94)			
Single PAP	-0.08 (-0.64)	-0.08 (-0.69)	-0.27 (-1.71)	
Gay PAP		-0.04 (-0.32)	-0.23 (-1.41)	
Lesbian PAP		0.24 (1.55)	0.29 (1.53)	
Foreign PAP			-0.06 (-0.41)	-0.03 (-0.15)
Baseline	0.507	0.506	0.427	0.484
$\chi^2$	1.41	3.91	5.13	0.02
Log-Likelihood	-144.9	-143.6	-90.7	-95.0
Observations	517	517	323	329

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Table 13:** Marginal Effect (at Fixed Effect=0) of Multinomial Logit of Chosen PAP.