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WHY DO U.S. PARENTS PREFER PRIVATE TO FOSTER CARE ADOPTIONS? THE ROLE OF ADOPTION SUBSIDIES, GENDER, RACE, AND SPECIAL NEEDS

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WHY DO U.S. PARENTS PREFER PRIVATE TO FOSTER CARE ADOPTIONS? THE ROLE OF ADOPTION SUBSIDIES, GENDER, RACE, AND SPECIAL NEEDS

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We analyze the demand behavior of adoptive parents in the U.S.A. For the theory, we apply vertical product differentiation to characterize the demand for domestic private, foster care and international adoptions. Then, we use the 2007 U.S. National Survey of Adoptive Parents and apply the control-function approach to a mixed logit model. We find interesting insights into the relationship between adoption choices and an adoptive parent's preferences over gender, race, and special needs. The government needs to pay an additional $735 ($506) a month to make a parent feel indifferent between international (domestic private) and foster care adoptions. (*JEL* O12, D10, L13)

I. INTRODUCTION

The fact that the demand for foster care adoption in the United States is far less than its supply should not come at a surprise. According to the Adoption and Foster Care Analysis and Reporting System, merely 33% of all adoptable children in foster care achieved permanency in 2011 as compared to 28% a decade ago, despite increasing efforts from federal and state governments to encourage adoptive placement (Hansen 2007). The challenges lie in the attributes inherent in foster children (Blackstone et al. 2008; Landes and Posner 1978). Typically, foster children are more likely to be abused or neglected, and many of them have special needs. Moreover, they are of older age, belong to ethnic minority groups, and are with physical and/or psychological disabilities (Barbell and Freundlich 2001; Bernal et al. 2007). In 2011, special needs adoptions accounted for over 84% of public adoptions in the United States and Puerto Rico (U.S. Children's Bureau, 2011). According to the Stoltzfus (2018), the federal government's budget for Title IV-E foster care and permanency totaled $8.2 billion and might increase by $111 million to more than $8.3 billion in 2018.[1] Of all the increases, spending on adoption assistance and kinship guardianship assistance were expected to increase by $195 million, while obligations for foster care were projected to decline by $85 million. It appears that the government is increasing spending on programs that help foster children to get permanent homes rather than on caring for them at foster care facilities. This could mean getting permanent homes for those kids is the ultimate

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1. The child welfare funding authorized under Title IV-E of the Social Security Act is to support children in foster care, including ensuring that they are afforded certain protections while in care, and for assistance to children who leave foster care for new permanent families via adoption or legal guardianship.

ABBREVIATIONS

CPI: Consumer Price Index
NSAP: National Survey of Adoptive Parents
OLS: Ordinary Least Squares
USDA: U.S. Department of Agriculture

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goal of the government and the welfare gains from doing so outweigh the costs.

While there are over 100,000 children in foster care system waiting to be adopted each year, many prospective parents prefer other adoption alternatives. This reality is reflected in the observed excess demand for domestic private and cross-border adoptions (Children's Bureau 2012; Graff 2008). In 2004, the number of children adopted globally by U.S. parents peaked at about 23,000 which is approximately half of all international adoptions worldwide (Selman 2006). The high demand leads to prolonged waiting time, ranging from 2 to 4 years for domestic private, and 10 months to 2 years for international adoptions, respectively. In addition, the monetary costs for private adoptions can be substantial: these are estimated to be between $5,000 and $40,000 for domestic private adoptions and $7,000 and $30,000 for international adoptions, as compared to less than $2,500 for public adoptions (Bernal et al. 2007). Similar to domestic private adoptions, the majority of U.S. international adoptions from many sending nations are of relinquished infants. In Guatemala, for instance, relinquished babies constituted 98% of U.S. adoptions from that country in 2007 (Graff 2008).

There are only a few theoretical studies that analyze the phenomenon of child adoption, and those examine domestic public adoptions (Blackstone et al. 2008; Boudreaux 1995; Landes and Posner 1978) and domestic private adoptions (Balding 2010) in isolation. Khun and Lahiri (2017), on the other hand, model the supply of adoptable children in international markets. However, observed child adoptions in the United States, as discussed above, point to the existence of some degree of substitutability among alternatives. Furthermore, holding all else constant, it is plausible that prospective parents would always prefer a child with more "desirable attributes" relating to health, age, race, and so on. On the other hand, the presence of heterogeneity in households' income implies different willingness to pay by different households, and hence diverse adoption choices. In addition, disparity in child attributes offered by each adoption alternative renders adoption agencies some market power. Thus, considering all these, analyzing demand under a unified framework is crucial for understanding the observed phenomenon of child adoption in the United States. In particular, the observed behavior can be elucidated under the framework of vertical product differentiation.

Just as in the theoretical literature on adoptions, the existing empirical literature examining demand factors in child adoptions is sparse. Baccara et al. (2014), for instance, look at the preferences for child attributes in U.S. private adoptions, while many others investigate the effect of monthly subsidy on the demand for public adoptions (e.g., Avery and Mont 1992; Hansen 2007; Hansen and Hansen 2006). Others explore the substitutability between the demand for foster care adoptions and that for assisted reproductive technology (e.g., Cohen and Chen 2010; Gumus and Lee 2012). Khun and Lahiri (2017) investigate the effects of income and household size in sending countries on the level of U.S. cross-border adoptions.

The present study is the first attempt to model, both theoretically and empirically, the demand for child adoptions, which is particularly relevant for current policy discussions. First, we examine the characteristics of adoption demands and the extent of substitutability among adoption alternatives under the framework of vertical product differentiation. We do not consider a child as a product; rather the framework is used to identify different agencies offering a child with different characteristics for adoption. Prospective adoptive parents adopt a child from either public adoption (foster care) or private adoption. For private adoption, the parents can adopt either domestically or internationally. Parents who adopt from foster care receive some subsidy, while any adoption from private agencies incurs additional costs associated with waiting time. These parents derive utility from the consumption of goods and services and from the adoption of a child. By calculating the levels of income at which a parent is indifferent between public and private adoptions and between no adoption and public adoption, we derive the standard downward-sloping demands for these two types of adoption alternatives. We also assume that there are also two types of adoption agencies, public and private: the public agent operates domestically, while the private agent operates both domestically and internationally. Under this framework, we investigate the effect of one of the important tools of federal policies—subsidy for

foster care adoptions—and of prolonged waiting time.[2] The comparative statics results show that as adoption subsidy is increased to encourage foster care adoption, its demand increases at the expense of the other two alternatives. Also, an increase in the opportunity cost associated with waiting time decreases adoption demand through the private system, while increasing public adoption.

The main part of the paper carries out an empirical analysis based on the 2007 National Survey of Adoptive Parents (NSAP), the first and the only nationally representative sample of adopted children in the United States. We apply a discrete choice regression model to jointly estimate demand for three alternatives: international, foster care, and domestic private adoptions. The richness of the data allows us to examine both the characteristics of a child and those of adoptive parents. Our analysis accounts for potential correlations in unobserved utility across alternatives by utilizing a mixed logit model, and addresses the possibility of endogeneity of the price variable with the use of the control function approach. Our empirical results unambiguously derive the conventional downward-sloping demand curves for child adoptions across different income groups, with the higher income group being less sensitive to price increases. The results also provide evidence in support of our theoretical predictions. Adoptive parents are less likely to adopt special needs children from private agencies than foster care facilities. Evaluating at the average age of special needs children of 2.5 years old, we calculate that the government needs to pay an additional $735 a month to make a parent indifferent between international and foster care adoptions or an additional $506 a month to make a parent indifferent between domestic private and foster care adoptions. This subsidy payment could increase with the age of the special needs child and/or with time the child has spent in a foster care facility. According to Zill (2011), for the fiscal year 2010, the total of maintenance and administrative costs per child per year in foster care facilities was estimated at $25,782, while the total of adoption assistance payments and administrative costs per child per year was estimated at $10,302.[3] Based on these estimates, our proposal for increased subsidy would still cost less to the government to get a 2.5 year-old special needs child adopted than keeping the child in the foster care facility.

The results also show that a longer waiting time reduces the probability of international adoption. Adoptive parents who adopt from an international market are willing to spend an additional $311 to reduce the waiting time by 1 day. In addition, the evidence also suggests that there is a preference for boys over girls in the domestic private market, and that prospective parents who want to adopt a boy are more likely to go to a domestic private agent than a foster care agent, paying an additional cost of more than $20,000. Between the two domestic options, there is no evidence of any difference in transracial adoptions. However, adoptive parents who want to adopt a transracial child are more likely to adopt outside the United States, paying more than $160,000 relative to a foster care adoption.

The study contributes to the literature and to the current public policy debate related to child adoptions in many ways. First, the study is the first to model the demand for child adoption, considering all of the three adoption choices in a unified framework. We provide both theoretical and empirical analyses on the issue. Second, in addition to the characteristics of adopted children, the study is also the first to consider the characteristics of adoptive parents, which has not been studied in the adoption literature. Finally, the model provides estimates of the effects of adoption subsidy and of the opportunity cost of waiting time. It also examines adoptive parents' preferences over gender and race, which are useful for public policy discussions.

The plan of the paper is as follows: Section II presents the theoretical analysis of adoption demand. An empirical investigation forms the subject matter of Section III. Section IV discusses parents' willingness to pay, preferences over gender, race and special needs, and adoption subsidy. The robustness tests are carried out in Section V. Finally, some concluding remarks are given in the last section.

2. Although adoption assistance may take many forms including, but not limited to, monthly payment for the ongoing expenses associated with caring for the child or one-time reimbursement at the time of adoption, our theoretical analysis focuses on the latter assuming that adoptive parents internalize all the relevant pecuniary cost and benefit of upbringing the child.

3. These figures were calculated from state and federal costs under Title IV-E of the Social Security Act, excluding the allocations of Medicaid, Temporary Assistance for Needy Families, and Food Stamps.

II. THEORETICAL ANALYSIS

In this section, we develop a very simple theoretical framework that unifies parents' different adoption alternatives. The model is constructed based on a product differentiation framework similar to that of Shaked and Sutton (1982).

A. The Basic Framework

Adoptive Parents. The model features a continuum of adoptive parents identical in consumption and adoption preferences but differing in incomes, which are uniformly distributed over the interval [0, 1]. Prospective adoptive parents adopt a child from one of the alternatives: no adoption, public adoption (foster care) or private adoption. We denote the attribute of a child offered for adoption by q, where $q = 0, 1, 2$, representing no adoption, public adoption, and private adoption, respectively. We assume that for a given cost and household income, adoptive families exhibit a preferences for private over foster care adoption.[4] We also assume a utility function similar to the ones in Pliskin, Shepard, and Weinstein (1980) and Shaked and Sutton (1982):

$$U(c, q) = c.u_q, \tag{1}$$

where c is the consumption of goods and services, u_q is the subutility received from adopting a child with attribute q. We have assumed that $u_2 > u_1 > u_0$.

Adoption, whether public or private, involves investment in time and money. We denote by p_q the agency cost incurred by families for adopting a child with attribute q with the assumption that $p_2 > p_1 > p_0 = 0$. We denote y as household income and additional cost associated with waiting time (γ) is taken to be proportional to household income where $0 < \gamma < 1$. That is, additional cost associated with waiting time is γy when $q = 2$, and is normalized to zero when $q = 1$. Parents who adopt from the public facility receive subsidy (s).

We define an income level y^0 such that an adoptive parent is indifferent between no adoption and public adoption. That is, at the income y^0, we have:

$$U(y^0, q_0) = U(y^0 - p_1 + s, q_1).$$

Using (1) and then solving for y^0, we get:

$$y^0 = \frac{(p_1 - s)u_1}{u_1 - u_0}. \tag{2}$$

We further define an income level y^* such that an adoptive parent is indifferent between private and public adoptions. That is, at the income y^*, we have:

$$U(y^* - p_2 - \gamma y^*, q_2) = U(y^* - p_1 + s, q_1).$$

Using (1) and then solving for y^*, we get:

$$y^* = \frac{p_2 u_2 - (p_1 - s)u_1}{u_2(1 - \gamma) - u_1}. \tag{3}$$

The denominators of Equations (2) and (3) represent utility premia of public and private adoptions, respectively, while the numerators reflect additional costs associated with it. Given adoption prices and associated utilities, adoptive parents with income $y^0 < y < y^*$ obtain greater utility from public adoption than no adoption, that is, $(u_1 - u_0)y > (p_1 - s)u_1$; thus, they prefer public adoption to no adoption. Those with income $y > y^*$ obtain greater utility from private adoption than public adoption, that is, $[u_2(1 - \gamma) - u_1]y > p_2 u_2 - (p_1 - s)u_1$; thus, they prefer private adoption to public adoption. In other words, families with income $y^0 < y < y^*$ make up the demand for public adoptions and those with income $y > y^*$ make up the demand for private adoptions while the remaining families constitute no adoptions. Therefore, we can derive the inverse demand functions for public and private adoptions as follows:

$$p_1 = -\frac{u_1 - u_0}{u_1} D_1 + \frac{u_1 - u_0}{u_1}(1 - D_2) + s, \tag{4}$$

$$p_2 = \frac{(1 - \gamma)u_2 - u_0}{u_2}(1 - D_2) - \frac{u_1 - u_0}{u_2} D_1, \tag{5}$$

where D_1 and D_2 denote public and private adoption demand, respectively.

The waiting time, γ, in Equation (5) is endogenous. To be specific, we assume that the waiting time is reduced with greater supply of children for adoption. We assume a simple linear relationship between waiting time and the number of children offered for adoption:

$$\gamma = -\varphi D_2 + \phi, \tag{6}$$

where $\varphi > 0$ is a parameter that relates the number of children and the waiting time and

4. This assumption reflects the fact that U.S. market for foster care adoption is characterized by excess supply when there is excess demand for private adoption.

$0 < \phi < 1$ represents an exogenous shock which may include foreign governments' policy to restrict adoption, causing the delay in the adoption process.

Note that the demand functions are downward-sloping with the negative own price effect and the cross price effect is positive, indicating the substitutability of adoption alternatives.[5]

Adoption Agencies. We also assume that there are two types of adoption agencies, public and private. Public agencies (foster care facilities) operate domestically to provide adoption of foster care children while private agencies operate in both domestic and international markets. We further assume an integrated international market for private adoption. Generally, adoption agencies are nonprofit organizations who care about the welfare of the parents. However, their operations also incur costs which need to be minimized. To reflect these, we assume that these adoption agencies maximize an objective function which is a weighted sum of profits and consumers' surplus.[6] The objective functions are given by:

$$V_1 = p_1 x_1^d - C_1(x_1^d) + \theta_1 S_1(p_1), \tag{7}$$

$$V_2 = p_2(x_2^d + x_2^f) - C_2(x_2^d + x_2^f) + \theta_2 S_2(p_2), \tag{8}$$

where x_q^i represents the number of children with characteristic q where $q = 1, 2$ made available for adoption domestically ($i = d$) or internationally ($i = f$), and at the equilibrium $x_1^d = D_1$ and $x_2^d + x_2^f = D_2$ with x_1^f assumed to be zero (i.e., there are no foster care, international adoptions). C_q is the cost function which is assumed to satisfy $C_q' > 0$ and $C_q'' > 0$. S_q is the consumers' surplus with $dS_q = -D_q\, dp_q$, and $0 < \theta_q < 1$ is the weight on consumers' surplus.

The optimal behavior of each agency implies the following first-order conditions[7]:

$$(1 - \theta_1)\frac{\partial p_1}{\partial x_1^d} x_1^d + p_1 - \frac{\partial C_1}{\partial x_1^d} = 0, \tag{9}$$

$$(1 - \theta_2)\frac{\partial p_2}{\partial x_2^i}\left(\sum_i x_2^i\right) + p_2 - \frac{\partial C_2}{\partial x_2^i} = 0, \quad i = d, f, \tag{10}$$

where from (4) and (5), we have

$$\frac{\partial p_1}{\partial x_1^d} = -\frac{u_1 - u_0}{u_1}, \tag{11}$$

$$\frac{\partial p_2}{\partial x_2^i} = -\frac{(1-\gamma)u_2 - u_0}{u_2} + \varphi\left(1 - \sum_i x_2^i\right), \quad i = d, f. \tag{12}$$

The inverse demand functions (4) and (5), together with the first-order conditions (9) and (10) determine the equilibrium values of prices and the number of children adopted from each alternative as a function of s and ϕ. This completes the description of the basic framework. The comparative statics exercises provide two important propositions.[8]

Proposition 1. *An exogenous increase in public adoption subsidy has the following effects*: (*i*) *it raises foster care adoption while lowering the level of private adoption, and* (*ii*) *the price of public adoption goes up*, *but that of private one goes down*.

Proposition 2. *A policy shock that causes longer waiting time in the private market leads to a higher level of public adoption*, *a lower level of private adoption*, *a lower price of private adoption*, *and a higher price of public adoption*.

The above results are intuitive, and explanations are omitted to save space.

III. EMPIRICAL ANALYSIS

In this section, we first discuss the model used to estimate the demand for adoption equations. We explain in detail how we address a possible endogeneity problem and the presence of correlations in utility over alternatives. The construction of some of the variables is presented, and finally, we discuss the estimated results.

5. See Appendix A for the proof of the downward-sloping demand functions.

6. Note that the mixed oligopoly literature takes this approach, where the government partially owns one of the firms (see, e.g., Matsumura 1998; Kopel 2015).

7. The second-order conditions are given by $(1 - \theta_q)\left(\sum_i x_q^i\right)\frac{\partial^2 p_q}{\partial (x_q^i)^2} + (2 - \theta_q)\frac{\partial p_q}{\partial x_q^i} - \frac{\partial^2 C_q}{\partial (x_q^i)^2} < 0$ for $i = d, f$ and $q = 1, 2$.

8. The derivation of the comparative statics is provided in Appendix B.

A. Model Specification

Given the nature of our data, we specify a discrete choice model to estimate the demand for adoption equations. The equations are also used to test the two propositions derived in the preceding section. Three unordered alternatives j are considered available to adoptive parents: (1) international adoption, (2) domestic foster care adoption, and (3) domestic private adoption. We shall take foster care adoption as the base group. Denoting by Y_m the adoptive parent m's chosen alternative i, the standard logit model (McFadden 1974) is given by

$$P(Y_m = i) = \frac{e^{U_{mi}}}{\Sigma_{j=1}^{3} e^{U_{mj}}}, \tag{13}$$

where

$$U_{mj} = \lambda cprice_{mj} + \chi cprice_{mj} \times income_m + \beta X_{mj} + cS_m + u_{mj}, \tag{14}$$

U_{mi} being the utility that an adoptive parent m obtains from alternative i, and this consists of observed and unobserved components.[9] We provide brief descriptions of the variables here, while details are presented in the next subsection. Specifically, $cprice_{mj}$ represents the consumer price of adoption, that is, net adoption cost including agency fees, traveling expenses and legal fees, present value of future expenses on the adopted child, and (minus) the present value of monthly subsidies. Additionally, we allow consumer price to vary by five income levels of adoptive households. The interaction term, $cprice_{mj} \times income_m$, captures different price effects across these income groups. X_{mj} is a vector of a child's observed attributes. S_m is the observed characteristics of adoptive parents. u_{mj} is the unobserved utility, which is normally assumed to be independent of the observed variables in a standard logit model. In our case however, this assumption of independence is not appropriate because the consumer price of adoption is endogenous in consumer-level demand models. For example, omitted or unobserved attributes in an adoption alternative may simultaneously affect its utility and price, thus causing a correlation between price $cprice_{mj}$ and unobserved utility u_{mj}. In order to deal with this issue, we utilize the control function approach (see Petrin and Train 2010; Train 2003). Train (2003) contends that a part of the price that cannot be explained by observed attributes contains information about the value of the unobserved attributes. This method involves, first, to regress consumer price for each chosen alternative against observed attributes and alternative-specific instruments:

$$cprice_{mj} = \omega_0 + \omega_1 X_{mj} + \omega_2 S_{mj} + \omega_3 Z_n + resid_{mj}, \tag{15}$$

where X_{mj} and S_{mj} are vectors of variables defined earlier. Z_n represents a vector of instruments, where the subscript n denotes sending countries. Petrin and Train (2010) suggest that aggregate variables (e.g., aggregate demographics) can serve as extra instruments to estimate the disaggregate demand functions because they correlate with the market price and are independent of both error terms (i.e., $resid_{mj}$ and u_{mj}). In our case, information on the geographical location of respondents (i.e., the name of the states of their residence) is unavailable due to reasons of confidentiality. However, our data can identify the country from which a child was adopted in the case of an international adoption and the United States. Thus, time-varying macro variables or those varying by sending countries can be plausible instruments. We elect to use consumer price index (CPI) as an instrument for all alternatives in addition to sending country dummies for international adoptions. The main identification assumption is that these variables do not directly affect individual demand except through their impact on $cprice$.[10] The error terms, $resid_{mj}$, are factors that affect $cprice$, but are not captured by regressors, thus representing unobserved attributes. Thus, we can obtain the predicted values of $resid_{mj}$ for each chosen alternative by regressing Equation (15) using ordinary least squares (OLS) (Petrin and Train 2010). Then, these predicted residuals are included individually in the second-stage demand equations as explanators. The utility is now re-written as

$$U_{mj} = \lambda cprice_{mj} + \chi cprice_{mj} \times income_m + \beta X_{mj} + cS_m + \theta resid_{mj} + \epsilon_{mj}, \tag{16}$$

where u_{mj} in (14) is replaced with $\theta resid_{mj} + \epsilon_{mj}$.

Given the nature of the problem at hand, there is another problem with the above formulation.

9. Supposedly, U_{mj} is similar to u_q in the theory section.

10. Consider two households with similar characteristics who live in the same state but decide to adopt a child in different markets. Part of the price difference that drives the decisions of the two households can be attributeable to the difference in the cost of living of sending countries.

That is, the model does not capture possible correlations in utility over alternatives. This is typically called the property of independence from irrelevant alternatives (iia). The iia property states that the probability of choosing alternative i over alternative l should be independent of the existence and attributes of any other alternatives. In other words, a change in the attributes of one alternative affects other alternatives proportionally, so that the ratio of their probabilities remains unchanged (Brownstone and Train 1999). While this substitution pattern is realistic in some situations, it might not in our context. Consider, for example, a moratorium on international adoption in the United States. The model predicts that the demands for both foster care and domestic private adoptions will experience proportional increases. However, as international adoption offers children with attributes (i.e., age, health) closely related to those adopted through domestic private adoption, one might expect that in this case the probability of domestic private adoption rises by a greater proportion than that of domestic foster care adoption. To allow for correlations in unobserved utility among domestic adoptions (i.e., domestic private and domestic public adoption), and among private adoptions (i.e., international and domestic private adoption), we employ Train's (2003) mixed logit model and the utility is specified as

$$U_{mj} = \lambda cprice_{mj} + \chi cprice_{mj} \times income_m + \beta X_{mj} + cS_m + \theta resid_{mj} + \sum_{h=1}^{2} \varphi_h k_m d_{jh} + \epsilon_{mj}. \quad (17)$$

Two error components, $k_m d_{jh}$, are added to (16) where h is a nest which is 1 for domestic adoption and 2 for private adoption, and d_{jh} is a binary variable taking value one for j falling in nest h and zero, otherwise. φ_h is the coefficient of the error component, reflecting the degree of correlations among the alternatives, and k_m's are iid standard normal deviates. For the standard logit model, $k_m \equiv 0$. With this addition, we can then estimate a mixed logit model which allows correlations over alternatives depending on the distribution of k. Let $f(k|\eta)$ denote the density of the distribution of k, where η is the fixed parameter of the distribution. Then, the choice probability becomes:

$$P(Y_m = i) = \int \frac{e^{U_{mi}+\varphi k d_i}}{\Sigma_{j=1}^{3} e^{U_{mj}+\varphi k d_j}} f(k|\eta) dk. \quad (18)$$

Because k is not given, the choice probability is the integral of the logit formula over all values of k weighted by its density, $f(k|\eta)$. The integral does not have a closed-form solution in general, and thus it is solved using an iterative simulation. For a given value of η, a value of k is drawn from the standard normal density and the logit method is applied. The process is repeated for numerous draws, and the results are averaged to obtain the simulated probability. We use 250 Halton (1960) draws, which are found to out-perform independent random draws (Bhat 2001; Hensher 2001; Munizaga and Alvarez-Daziano 2001; Train 2000, 2003).[11]

B. Data

This paper utilizes data from NSAP, the first and only nationally representative survey of U.S. adoptive families across adoption types.[12] The survey is conducted through a complex sample design involving clustering within households and stratification by state. The NSAP sample is composed of all children who are identified as adopted and living in English-speaking households, except for children living with both an adoptive parent and a biological parent (those children were most likely adopted by a step parent, and they were excluded from the NSAP). A random digit-dial telephone survey was conducted and 74.4% completed the survey. The completed sample consists of 2,089 children aged 0–11 and older (up to 17), who were adopted through international, U.S. foster care, or domestic private adoptions. There is approximately the same number of cases across the three chosen alternatives. There were 545 children adopted internationally, 763 adopted through foster care and 781 adopted in the domestic private market. The survey was conducted between 2007 and 2008 which covers children who have been adopted since 1990 and contains information, in categorical or binary form, on adoptive parents' characteristics as well as on the attributes of adopted children.

The data are conducive to the analysis of adoption demand in general, and to achieving the objective of the current study in particular for a number of reasons. First, it surveys

11. See Hole (2007) for the Stata commands used for the estimations.

12. The questionnaire, data set, data dictionary and the guidelines for data users can be accessed at https://www.cdc.gov/nchs/slaits/nsap.htm (accessed on February 23, 2012 and recently on October 26, 2019).

parents adopting from various alternatives, permitting the analysis of demand under a unified framework. Second, as far as this study is concerned, it encompasses a wide range of crucial survey questions including those on adopted children's and adoptive parents' characteristics, the cost of adoption, and adoption subsidy. These are indispensable microlevel variables that cannot be accounted for in studies based on aggregate data (e.g., Bernal et al. 2007; Cohen and Chen 2010; Hansen and Hansen 2006). Finally, the fact that adoptions from different time periods are identified makes it possible for the study to incorporate essential macro instruments, although the geographical locations of respondents are not made available due to concerns of confidentiality.

Table 1 shows some of the characteristics of the adopted children across the three chosen alternatives. American families adopted fewer boys than girls from other countries while gender mix was approximately the same for both foster care and domestic private adoptions. Out of all internationally adopted children, only 33% were boys and the most adopted kids were Asians, followed by Caucasians and Hispanics. There were very few Black children and children of other races adopted internationally. The main destination country for these adoptive parents was China followed by Russia, Guatemala, and South Korea. For domestic adoption, most adopted children were Caucasians, 48% from foster care and 59% from private adoption, followed by Blacks, other non-Hispanics and Hispanics. There were only six Asian children adopted from foster care and only five adopted through private agents. These data show that there seem to be distinct choices of the alternatives between domestic and international adoptions in terms of the race characteristics of the adopted children. This supports our use of mixed logit rather than the standard logit regression method, given the closer substitutability between foster care and private adoptions than between foster care and international adoptions.

There are other important characteristics to note. More than half of the children adopted from foster care had special needs, while only 28% of international adoptions and one-third of private adoptions had special needs. Most of the kids were adopted as babies. More than 70% of children adopted from international markets and more than 60% of private adoptions were under the age of one, while only 35% of foster care adoptions were kids less than a year old. More than 70% of those who were adopted through foster care received monthly subsidy.

TABLE 1
Child Characteristics Across Three Chosen Adoption Alternatives

	Adoption Alternatives		
Cases	**(1) International 545**	**(2) Foster Care 763**	**(3) Domestic Private 781**
Child characteristics			
Male	33.21%	49.54%	51.09%
Special needs child	28.44%	50.98%	33.80%
Transrace	80.92%	26.87%	20.87%
Race (cases)			
Hispanic	102	94	96
Caucasian	131	367	458
Black	22	189	117
Asian	273	6	5
Other	17	107	105
Age (cases)			
0 years	219	151	404
1 year	166	118	90
2 years	55	100	45
3 years	38	73	35
4–5 years	26	106	67
6–7 years	21	78	52
8–10 years	9	81	44
11 years and older	9	50	37
Child's country of origin			
China (Mainland)	165		
Russia	92		
Guatemala	62		
South Korea	51		
Africa	16		
Other Asia	62		
Europe	40		
Central America	12		
South America	30		
Child monthly subsidy			
$0		223	
$0–300		74	
$301–400		91	
$401–500		83	
$501–600		62	
$601–750		54	
$751–1,000		42	
More than $1,000		18	
Adoption cost			
$0		403	
Less than $5,000	7	189	280
$5,000–10,000	35	70	106
$10,001–15,000	63	80	95
$15,001–20,000	139		64
$20,001–25,000	119		34
$25,001–30,000	65		25
$30,001–35,000	49		14
$35,001–40,000	27		7
More than $40,000	21		8

Notes: Transrace is whether the child's race/ethnicity differs from that of both parents (or differs from that of the single parent) or not. Adoption cost includes a home study, travel, and legal fees. Parents who answered no cost for international and private adoptions were dropped. There are 8 observations for international adoptions and 124 for domestic private adoptions. The adoption cost for foster care is adjusted by reimbursements. There are 43 households receiving full reimbursements and 64 receiving some reimbursements.

TABLE 2
Parent Characteristics Across Three Chosen Adoption Alternatives

	Adoption Alternatives		
Cases	**(1) International 545**	**(2) Foster Care 763**	**(3) Domestic Private 781**
Parent characteristics			
Already have kids	49.91%	54%	36.75%
Couple	75.78%	64.48%	60.82%
Friend used to adopt	79.08%	44.43%	39.05%
Employer's assistance	17.65%	6.58%	11.17%
Know prior adoption	3.49%	41.94%	42%
Full-time employed	88.62%	72.48%	69.53%
Income (cases)			
At or below 100% poverty level	2	68	91
Above 100%–200% poverty level	23	136	109
Above 200%–300% poverty level	58	156	127
Above 300%–400% poverty level	84	99	98
Above 400% poverty level	335	255	309

Notes: In this survey, each household is interviewed about an adopted child. Thus, each case represents each household as well as each child. The variable "Already have kids" is related to the question "Any other children living in household?" The variable "Couple" is related to the question "What is your relationship to [S.C.]'s other adoptive parent who lives in this household?" Couple takes value 1 for (1) spouse/husband/wife and (2) partner/boyfriend/girlfriend and zero otherwise. The variable "Friend used to adopt" is related to the question "Did any of your [or your spouse's/partner's] friends or acquaintances adopt in the same manner [foster care/international/private adoption] as you did?". The variable "Employer's assistance" is related to the question "At the time of S.C.'s adoption, did your [or your spouse's/partner's] employer provide financial assistance for the adoption?" The variable "Know prior adoption" is related to the question 'Did you [or your spouse/partner] know [S.C.] before you considered adopting [him/her]?" The variable "Full-time employed" is related to questions "Last week were you and/or your spouse/partner working full time, working part time, temporarily not working, unemployed, retired, going to school, keeping house, or something else?" The variable takes value 1 if both or either of the parents worked full time and zero otherwise.

The subsidy ranges from a category of less than $300 to more than $1,000. The recipients seemed to be uniformly distributed among the first three categories, roughly 10% receiving less than $300, $300–$400, or $400–$500, and only 2% received more than $1,000. These characteristics show a closer substitutability between international and private adoptions than between domestic private and foster care adoptions.

The most important variable is the adoption cost which includes a home study, travel, agency and legal fees. There are nine categories involving positive costs and one category of no cost. More than 50% of foster care adoptive parents paid no cost of adoption while about a quarter of them paid less than $5,000. The maximum cost of a foster care adoption was less than $15,000 whereas about 50% of international adoptive parents paid between $15,000 and $25,000, 26% in the $15,000 and $20,000 category and 22% in the $20,000 and $25,000 category. There were 21 cases of international adoptions in which parents paid more than $40,000. While the cost of a domestic private adoption was also more than $40,000 in a few cases, about 50% of private adoptions incurred a cost of less than $10,000 and about 15% of them paid no cost at all.[13]

Table 2 shows the characteristics of the adoptive parents.[14] The majority of these adoptive parents were couples at the time of adoption. In about 76% of the cases in international adoptions, the parents were either married or living together as partners. For foster care and domestic private adoptions these figures were about 64% and 61%, respectively. Roughly 50% of the parents who adopted from international markets and those who adopted from foster care already had some kids in the household, while only 37% of the parents who went through private domestic adoptions had some kids. Very few parents (about 3%) who adopted internationally knew the adopted child beforehand. However, about 42% of those who adopted domestically from either a public facility or the private market had prior

13. We cleaned up the data by dropping no costs for international and private adoptions. We also adjusted the costs for foster care adoption with reimbursements. See notes in Table 1.

14. In this survey, each household is interviewed about an adopted child. Thus, each case represents each household as well as each child.

knowledge of the child. Not surprisingly given the characteristics of the children, 80% of international adoptions were transracial whereas only a little more than 20% of respective domestic adoptions were transracial. One of the important variables is parental income which is grouped into five categories, ranging from at or below 100% the poverty line to above 400% poverty line.[15] More than 60% of parents adopting internationally fell in the fifth category while about 33% of foster care adoptive parents and 39% of domestic private adoptions fell in this category. As for employment status, either or both parents were full-time employed in 89% of the cases in international adoptions, followed by about 72% in foster care adoptions and 70% in domestic private adoptions.

C. Construction of some of the Variables

In spite of the richness of the data, additional assumptions and data generations have been required for our particular analytical approach. First of all, estimating a mixed logit model necessitates not only the data for the chosen alternatives, but also those for the nonchosen alternatives. This choice of the model requires, for instance, the costs of adoption that were actually paid for the chosen alternatives as well as the costs from other alternatives if they had been chosen. This is because the choice process involves comparisons of attributes across alternatives. Given that the revealed preference data such as NSAP do not provide data for subsidies and prices for the nonchosen alternatives, we attempt to estimate the necessary information based on the characteristics of adopted children and adoptive parents, assuming that they wish to adopt a child with specific attributes regardless of alternatives (i.e., the preferences are assumed to be constant across alternatives). This assumption reflects the fact that adoptive placement typically occurs when an adoptee's attributes represent a good match with parents' preference.[16] Second, when adoptive parents decide on an adoption, they are faced with not just the adoption cost but total costs which include the costs of raising the kid. Thus, we construct the consumer price (net adoption cost) variable by defining it as adoption costs plus the present value of future expenses on raising the child, minus the present value of subsidy.

To begin, we estimate the subsidies for the nonchosen foster care alternative based on their observed choices. The observed category of subsidy is regressed on the adoption year and on parent and child characteristics, using OLS. The results are presented in Table 3. The variables that determine the amount of subsidy in a statistically significant way are adoption year, parents' income, child's age, special needs, and the race dummies including Hispanic, Asian, and Black. The statistical significance of the race dummies is consistent with the fact that there are more African American than Caucasian children waiting to be adopted at foster care facilities. Also, the importance of parents' income, child age, and special needs is consistent with the eligibility of federal or state adoption assistance (see Child Welfare Information Gateway 2011). We re-estimate the subsidy regression by only including adoption year, parents' income, child age, dummy for special needs and two race dummies. Then, the equation is used to estimate the subsidy category for the nonchosen foster care alternative based on their income and characteristics of the chosen child. The predicted values, rounded off to the nearest integer, are obtained to represent the levels of subsidy that would have been received if parents who adopted from the international and domestic private markets had chosen to adopt a foster child instead. Note that the subsidy is only provided to foster care adoptions, so it takes value zero for both alternatives of private adoption.

Next, we estimate the cost of adoption for the nonchosen alternatives of each adoptive parent.

15. The poverty level of the household is based on DHHS Poverty Guidelines. At or below 100% poverty level refers to income at or below the poverty threshold, above 100% to at or below 200% poverty level refers to income ranging from above the poverty threshold to two times the threshold, above 200% to at or below 300% poverty level refers to income ranging from above two times the threshold to three times the threshold, above 300% to at or below 400% poverty level refers to income ranging from above three times the threshold to four times the threshold, and above 400% poverty line refers to income above four times the poverty threshold.

16. There may be two possible concerns about this assumption. First, adoptive parents may not seek a special needs child in particular and they may end up choosing a special needs child for other (idiosyncratic) reason. In fact, NSAP shows that 35% of parents who adopted special needs children indicated that either of the parents knew the child before considering adopting and 77% indicated that they received and reviewed the child's medical history before adoption. Second, some adoptive parents, specifically gay couples, may be excluded from potential matches. This information is not available in our data set. However, this data set contains postadoption information, which means that any parent who answered the survey has successfully adopted a child from one of the alternatives. So, our results may not specifically apply to cases such as gay couples.

TABLE 3
Subsidy and Adoption Cost Equations

	Subsidy Equations		Adoption Cost Equations		
	(1)	(2)	(1) International	(2) Foster Care	(3) Domestic Private
Year of adoption	0.133***	0.152***	0.053	−0.180***	0.088*
	(0.042)	(0.037)	(0.066)	(0.028)	(0.051)
Income	−0.091*	−0.098**	0.286***	0.090***	0.197***
	(0.049)	(0.039)	(0.067)	(0.022)	(0.051)
Couple	−0.131	—	—	—	—
	(0.175)				
Already have kids	0.217	—	—	—	—
	(0.160)				
Employer's assistance	−0.282	—	—	0.410***	—
	(0.286)			(0.143)	
Know prior adoption	—	—	−0.900*	−0.423***	−1.114***
			(0.470)	(0.060)	(0.207)
Friend used to adopt	—	—	—	—	0.467***
					(0.162)
Child age	0.298***	0.308***	−0.148***	−0.141***	−0.122***
	(0.038)	(0.037)	(0.046)	(0.016)	(0.038)
Male	0.219	—	0.192	0.128**	−0.108
	(0.159)		(0.168)	(0.064)	(0.133)
Special needs	0.571***	0.656***	—	−0.109*	—
	(0.157)	(0.151)		(0.065)	
Transrace	—	—	0.455**	0.167*	0.155
			(0.210)	(0.091)	(0.205)
CPI	—	—	0.034***	0.024***	0.026***
			(0.007)	(0.003)	(0.006)
Hispanic	0.538*	0.540**	—	−0.109	0.09
	(0.290)	(0.241)		(0.125)	(0.286)
Caucasian	0.056		—	0.254**	0.087
	(0.204)			(0.115)	(0.248)
Asian	2.170*		—	0.184	0.896
	(1.286)			(0.316)	(1.394)
Black	0.598**	0.581***	—	−0.14	−0.213
	(0.232)	(0.189)		(0.116)	(0.282)
Source country dummies	—	—	Yes	—	—
Stratum dummies	No	No	No	Yes	Yes
Observations	597	597	485	686	563
Adj. R^2	0.628	0.627	0.923	0.595	0.758

Notes: The dependent variable in the subsidy equation is monthly subsidy in category and the dependent variable in the adoption cost equations is gross adoption cost which includes a home study, travel, and legal fees. It is also a category variable. These equations are estimated without a constant. The robust standard errors are in parentheses. *Significant at the 90% confidence leve; **significant at the 95% confidence level; ***significant at the 99% confidence level.

Using the observed data of the chosen alternatives, we regress the cost of adoption on both parent and child characteristics for each alternative, separately. It is to be noted that this cost of adoption for foster care is a gross cost which does not include subsidy, but is adjusted for some or full reimbursements. We also add the adoption year and CPI), in all regressions to capture possible economy-wide shocks over time.[17] We apply a similar procedure as the subsidy regressions. We drop those parent and child characteristics that are not statistically significant. The final results are also presented in Table 3. For international adoption, we control for the adopted child's country of birth with source country dummy variables. This control is to capture both the distance and the race of the child. So, the race dummies are not included due to collinearity problems, but they are included in the foster care and domestic private adoption regressions. The results from the three regressions show that adoption cost is determined by parents' income, prior knowledge of the child, child age, gender, special needs,

17. The CPI is taken from World Development Indicators and OECD Statistics. 2010 is the base year. The CPI for Africa, Asia, Europe, Central America, South America, and others (Oceania, North America, and Caribbean) are weighted by each country's share of adoption in 1998.

transrace, and CPI. The income coefficients are larger for private adoptions (largest for international adoptions) than that for foster child adoption, as expected. Also, across the three alternatives, an adoptive parents' prior knowledge of the child significantly reduces the cost of adoption, and the younger a kid is the more expensive it is to adopt. The results for the gender coefficient show that it costs more to adopt a boy than a girl from the foster care system, while this gender cost gap is not significant for the private adoption markets.

The results also show that it is more costly to adopt a transracial child than a child with the same race and the difference is much larger for international adoptions. The coefficients of source country dummies for international adoption indicate that it costs more to adopt a child from Russia, Guatemala, Other Asia, Europe, or South America than from China (base group) while it costs less to adopt from South Korea than from China.[18] The costs of adoption from China, Africa, or Central America are not statistically different. On the other hand, for foster care adoptions, it costs more to adopt a Caucasian child than a Hispanic child (base group); the costs of adopting other races are not statistically different.

Other notable findings are that those who receive financial assistance from their employers incur higher costs for foster care adoptions, while those who adopt a special needs child pay less. In addition, for domestic private adoption, those whose friends adopted the same way pay more. Finally, an increase in CPI raises the costs of adoption across the three chosen alternatives.

The cost of adoption for the nonchosen alternative is predicted based on the chosen child characteristics and given parent characteristics. For nonchosen international adoption, we choose the country of adoption randomly from a uniform distribution. The predicted values are rounded to the nearest integers.

Finally, we calculate the consumer prices of the three possible alternatives for each adoptive parent. The consumer price is the net adoption cost which is defined as the gross adoption cost plus the present value of future expenses on raising the child, minus the present value of subsidy. The gross adoption cost was defined earlier to include a home study, travel, legal fees, and other expenses. Because this consumer price variable also includes the expenses on raising the child, there are significant variations in this variable, which is also driven by the age of the adopted child. With the same adoption cost and subsidy, this price is higher for a child adopted at a younger age than an older one. The categories for costs of adoption and subsidies are converted into their mid dollar values as shown in Table 1. The estimated annual expenditure on a child is taken from the U.S. Department of Agriculture (USDA). Pairing that with the NSAP data, we calculate the present value of the cost of raising a child until he or she reaches the age of 21.[19] We choose an annual discount rate of 12% to calculate the present value of the cost of raising a child and a monthly discount rate of 1% to calculate the present value of subsidy. It is also worth noting that the USDA data vary by parents' income, child age, year, the number of the children in a household, and by whether or not the adoptive parents are couples. Because the categories differ between the two data sets, we manage to match them to the extent possible. We start by identifying whether the adoptive parents are couples and whether they have a child before adoption. We further break down those adoptive parents based on their income levels, year of adoption, and the age of adopted child. Then, the associated annual cost is assigned accordingly. Table 4 presents the paired variables for the two data sets.

D. Empirical Results

We estimate the demand function for child adoption by U.S. parents from the NSAP who adopted a child from either one of three alternatives—international, domestic private and foster care adoption markets. We employ Train's (2003) control function approach to deal with the endogeneity of the price variable. This approach requires two-stage estimations. The first step is to estimate the price equations to extract the residuals which will be included in the control function in the choice model. The consumer price in each adoption market is regressed on all observed parent and child characteristics and price instruments. Then, the second step is to estimate the demand equation using the mixed logit model with the control function.

In the first stage, as explained in the previous subsection, we use CPI of the child's country

18. Coefficients for source country dummies are not reported to save space.

19. The choice for age at 21 is also consistent with the subsidy policy of the government.

TABLE 4
Pairing NSAP and USDA

NSAP		
Questions	**Responses**	**USDA**
Poverty level of the household based on DHHS poverty guidelines	<100% poverty line	Low income
	Above 100%–200% poverty line	Low income
	Above 200%–300% poverty line	Mid income
	Above 300%–400% poverty line	High income
	>400% poverty line	High income
Year of adoption	1990–1992	1991
	1993–1995	1994
	1996–1997	1996
	1998–2000	1999
	2001–2002	2001
	2003–2004	2003
	2005–2006	2005
	2007–2008	2007
Child's age when adoption finalized	0 years	0–2 years
	1 year	0–2 years
	2 years	0–2 years
	3 years	3–5 years
	4–5 years	3–5 years
	6–7 years	6–8 years
	8–10 years	9–11 years
	11 years and older	12–14; 15–17 years

Notes: For child age, the last response category is matched with the average cost of raising children aged 12–14 and 15–17 in USDA data.

as the price instrument.[20] For the consumer price of international adoption, we add the sending country dummies to capture travel costs which also presumably affect the choice through price but not directly. The results of the price equations are presented in Table 5. The results are as expected. For example, the point estimates for household income, which includes the cost of raising the child up to 21 years old, are positive and significant at the 99% confidence level for all alternatives, suggesting that higher income families pay relatively more, regardless of alternatives. Obviously, it is more expensive for higher income families to raise a child. However, price discrimination, especially among private agents, may also play a role (Blackstone et al. 2008; Child Welfare Information Gateway 2011). The point estimates for couples are negative and statistically significant at the 99% confidence level for all three regressions. This suggests that couples paid less than single parents overall.

The coefficient for parents already having kids is negative and significant at the 99% confidence level for international adoption while they are insignificant for the other two choices. This suggests that parents who already have kids pay less than those who do not when adopting from an international market. On the other hand, the coefficients for employer's assistance are positive and significant at the 90% confidence level for domestic adoption while it is not significant for international adoption. This evidence indicates that adoptive parents who receive employer's assistance may be willing to spend more on adoption fee in the U.S. We also find that parent age, having a friend who used to adopt the same way, or parents' employment do not have statistically significant effect on the consumer price.

For child characteristics, there are some interesting results that deserve careful explanations. The estimates for child age are negative and statistically significant for both the domestic alternatives; however, that for the international adoption is not statistically significant. First, this result is consistent with the fact that an older child costs less than younger ones to adopt. Second,

20. The CPI variable is averaged according to the range of adoption years for each respective country. For regions such as Africa, Asia, Europe, Central America, South America, and Other, CPI is weighted by the 1998 adoption shares of countries in each region before being averaged according to the range of adoption years.

TABLE 5
First-Stage Price Equations for Three Adoption Alternatives

	International Adoption		Foster Care Adoption		Private Domestic Adoption	
	Coefficient	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**
Income	16.3739***	(1.0259)	18.1372***	(0.6087)	17.5998***	(0.5832)
Parent age	−2.1287	(1.6954)	−0.6421	(1.1938)	−0.6714	(1.1124)
Parent age squared	0.0159	(0.0200)	−0.0004	(0.0137)	0.0027	(0.0134)
Already have kids	−5.1976***	(1.6726)	−0.2846	(1.6848)	−0.2846	(1.4918)
Employer's assistance	2.4280	(2.0316)	4.7207*	(2.4774)	3.6961*	(1.9971)
Friend used to adopt	2.1751	(1.8897)	1.0710	(1.4891)	2.0846	(1.4837)
Full-time employed	4.3059	(3.0163)	0.9544	(2.1839)	−0.8755	(2.0698)
Couple	−12.7557***	(2.0844)	−10.7920***	(2.0695)	−5.1135***	(1.8776)
Child age	−0.4927	(1.8231)	−3.4918**	(1.5628)	−6.1328***	(1.6575)
Child age squared	−0.2847	(0.2460)	0.1064	(0.1704)	0.2094	(0.2005)
Male	5.0628***	(1.9477)	0.2891	(1.4991)	−2.2301*	(1.3110)
Special needs	−1.1544	(1.7024)	−1.0114	(1.5026)	0.1609	(1.3179)
Transrace	5.0919**	(2.2676)	0.7023	(2.3258)	1.4789	(2.0625)
Waiting time	−0.1251***	(0.0346)				
Pre. val. of subsidy			−0.0010***	(0.0000)		
Russia	−13.5305**	(6.1517)				
South Korea	−6.2147**	(3.0210)				
Africa	−17.8284**	(7.1088)				
Other Asia	9.3331**	(3.7455)				
Europe	−4.5257	(4.8833)				
Central America	−12.2947*	(7.3983)				
South America	3.5983	(4.5571)				
CPI	−0.1519	(0.0942)	1.5433***	(0.1325)	1.8788***	(0.1247)
Constant	123.0073***	(38.2026)	−54.0319*	(27.6015)	−76.1563***	(25.5675)
Stratum dummies	Yes		Yes		Yes	
Race dummies	Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes	
Observations	424		558		558	
Adj. R^2	0.7447		0.8491		0.8041	

Notes: The dependent variable is net adoption cost (consumer price) which is defined as gross adoption cost plus the present value of future expenses of raising a child to 21 years old minus the present value of subsidy. The robust standard errors are in parentheses. *Significant at the 90% confidence level; **significant at the 95% confidence level; ***significant at the 99% confidence level.

the expenses to raise the kids till the age of 21 years are also less when the child is adopted at an older age. For the gender of the child, the estimate is positive and significant at the 99% confidence level for international adoption, while it is negative and significant at the 90% confidence level for domestic private adoption. This result suggests that a boy is more expensive to adopt than a girl for international adoption. This could be due to the fact that discrimination and gender bias against daughters in many countries such as China, India, South Korea and many others leave more girls than boys for adoption (Croll 2000; Williamson 1976). The estimates for special needs are not statistically significant, suggesting no price differences between adopting a child with and without special needs.

The point estimate for transrace is positive and statistically significant for international adoption while insignificant for the domestic alternatives. This suggests that when adoptive parents adopt from foreign countries, the adoption price is higher if both parents and the child belong to different races. The waiting time variable for international adoption shows a negative sign that is statistically significant at the 99% confidence level, suggesting that the shorter the waiting time is, the higher is the price. This result is consistent with our theoretical predictions, as given in Proposition 2. For foster care adoptions, the variable subsidy also shows a negative sign that is statistically significant at the 99% confidence level. This result is straightforward: subsidy helps reduce the price of adoption including the cost of raising the child.

For the instrumental variable, CPI, the coefficients are positive and statistically significant for the two domestic adoption alternatives, indicating the rising cost of adoption and raising a child over time. The insignificance of CPI coefficient for international adoptions is not a major problem because we also use sending country dummies as

additional instruments and most of them are statistically significant.

As proposed in Train (2003), the residuals from the price equations of these three adoption markets are extracted to be included in the mixed logit model as a control function. Table 6 presents the demand equations for child adoption. The variables are listed in three groups: (1) alternative-specific variables—those that vary across both cases and alternatives, (2) case-specific variables—those that vary only across cases, and (3) the additional variables that are included to correct for endogeneity. For comparison among different models, panel 1 reports the parameters estimated from McFadden's (1974) alternative-specific conditional logit choice model. Panel 2 reports the parameters estimated from Train's (2003) mixed logit model that includes induced error components, and panel 3 reports the estimated parameters when the control function approach is applied in the mixed logit model.

The result of the standard logit model shows that the price coefficient is −0.0222 and statistically significant at the 99% confidence level. This price effect is allowed to vary by income groups. The variation is given by the interaction term between the consumer price variable and income groups. The estimated price coefficients from the first (at or below 100% poverty level) to the fifth (above 400% poverty level) income group are −0.0171, −0.0120, −0.0069, −0.0018, and 0.0033, respectively. While the first four coefficients respect the law of demand, the coefficient turns positive for the fifth income group which contain the majority of cases, making the model implausible for important policy and welfare analysis.

In the second model, we include two error components that capture possible correlations in unobserved utility among domestic adoptions and among private adoptions. The error component for domestic adoptions is statistically significant at the 99% confidence level, indicating that there is a correlation in unobserved utility between foster care and domestic private adoptions; however, its standard deviation is not statistically significant, indicating that the correlation does not vary in the population. The result also shows that the price coefficient is slightly higher while that for the interaction term remains unchanged, that is, the problem of non-downward sloping demand function for the fifth income group is still not resolved.

In the third model, we employ the control function approach where the residuals from the three price equations estimated in Table 5 are included. The residual for international adoption is positive and statistically significant at the 99% confidence level. This is important because more than 60% of international adoption cases are households in the fifth income group and the positive sign of this residual suggests that there are desirable attributes of international adoption that are not captured by the previous models. Moreover, the error component for domestic adoption remains statistically significant.

More importantly, the control function approach has resolved the non-downward sloping demand function for the fifth income group. The estimated price coefficients are all negative for all five income groups. The estimate for the price coefficient is −0.0184 and the estimated coefficient of the price-income interaction term decreases to 0.0033. As a result, the estimated price coefficients from the first to fifth income groups are −0.0151, −0.0118, −0.0085, −0.0052, and −0.0019, respectively. Therefore, we now have a downward sloping demand curve for child adoption across different income groups. The price effects on the demand decrease as income rises, supporting the conventional wisdom that richer households are less susceptible to price changes. In particular, households with an income of 400% above the poverty level are the least responsive to price changes. Recall that our price variable is a consumer price which includes the cost of raising a child, so this price is higher for a younger child. So, the result for the fifth income group also indicates that child age is less likely to deter the adoption demand for richer parents. In other words, the very rich adoptive parents tend to adopt very young kids.

We calculate the direct and cross price elasticities from the result of the mixed logit model with the control function approach. The estimated elasticities which are reported in Table 7, show that a 1% increase in the consumer price of international adoption reduces the probability of adopting a child from an international market by 0.397% while increasing the probability of foster care adoption by 0.118% and that of domestic private adoption by 0.121%. In addition, a 1% increase in the consumer price of domestic private adoption reduces the probability of adopting a child from a domestic private agency by 0.306% while increasing the probability of international

TABLE 6
Demand Equations for Child Adoption

	(1) Conditional Logit		(2) Mixed Logit		(3) Mixed Logit with Control Function Approach	
	Coefficient	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**
(1) *Alternative-specific variables*						
cprice in $1,000	−0.0222***	(0.0054)	−0.0225***	(0.0054)	−0.0184***	(0.0054)
cprice × income	0.0051***	(0.0014)	0.0051***	(0.0014)	0.0033**	(0.0015)
(2) *Case-specific variables (foster care adoption is the base group)*						
(2.a) International adoption						
Parent characteristics						
Parent age	0.4333**	(0.1755)	0.4342**	(0.1757)	0.3618*	(0.2054)
Parent age squared	−0.0053***	(0.0020)	−0.0054***	(0.0020)	−0.0046*	(0.0024)
Already have kids	−0.2758	(0.1949)	−0.2799	(0.1954)	−0.3293	(0.2156)
Employer's assistance	0.9729***	(0.2891)	0.9809***	(0.2896)	0.8872***	(0.3066)
Friend used to adopt	1.2179***	(0.2085)	1.2316***	(0.2087)	1.3014***	(0.2285)
Full-time employed	0.2735	(0.2781)	0.2638	(0.2787)	0.2103	(0.3101)
Couple	−0.2791	(0.2413)	−0.2769	(0.2418)	−0.2282	(0.2757)
Child characteristics						
Male	0.0741	(0.1869)	0.0808	(0.1873)	0.2142	(0.2128)
Special needs	−1.1692***	(0.1886)	−1.1662***	(0.1892)	−1.2003***	(0.2063)
Transrace	2.9516***	(0.2963)	2.9595***	(0.2966)	3.0874***	(0.3233)
Asian	6.3160***	(0.7154)	6.3162***	(0.7152)	6.4067***	(0.7398)
Black	0.4271	(0.4473)	0.4337	(0.4479)	0.5572	(0.4872)
Hispanic	2.0999***	(0.3938)	2.1039***	(0.3943)	1.1917***	(0.4417)
Caucasian	3.0161***	(0.4329)	3.0251***	(0.4331)	3.2305***	(0.4786)
Constant	−13.1777***	(3.8191)				
(2.b) Private adoption						
Parent characteristics						
Parent age	−0.0356	(0.1097)	−0.0341	(0.1089)	−0.0267	(0.1084)
Parent age squared	−0.0001	(0.0013)	−0.0001	(0.0013)	−0.0001	(0.0012)
Already have kids	−0.7820***	(0.1393)	−0.7843***	(0.1389)	−0.7941***	(0.1387)
Employer's assistance	0.6364***	(0.2368)	0.6452***	(0.2352)	0.6472***	(0.2363)
Friend used to adopt	−0.0287	(0.1377)	−0.0024	(0.1371)	0.0102	(0.1367)
Full-time employed	−0.1461	(0.1838)	−0.1636	(0.1833)	−0.1288	(0.1807)
Couple	−0.0775	(0.1671)	−0.0724	(0.1661)	−0.0201	(0.1760)
Child characteristics						
Male	0.3797***	(0.1349)	0.3892***	(0.1341)	0.3829***	(0.1340)
Special needs	−0.8741***	(0.1441)	−0.8661***	(0.1430)	−0.8357***	(0.1413)
Transrace	0.0914	(0.1921)	0.1011	(0.1921)	0.1306	(0.1933)
Asian	0.1719	(0.7973)	0.1723	(0.7963)	0.4427	(0.8193)
Black	−0.9182***	(0.2826)	−0.8951***	(0.2803)	−0.8673***	(0.2791)
Hispanic	−0.0809	(0.2712)	−0.0771	(0.2712)	−0.0475	(0.2716)
Caucasian	0.3045	(0.2530)	0.3156	(0.2531)	0.3305	(0.2531)
Constant	2.3805	(2.3736)				
(3) *Variables to correct for endogeneity*						
Resid for international adoption					0.0365***	(0.0102)
Resid for foster care adoption					0.0063	(0.0104)
Resid for private dom. adoption					0.0031	(0.0100)
Error component for domestic adoption			15.574***	(3.7129)	13.6615***	(4.3167)
Error component for private adoption			2.4301	(2.3552)	2.1916	(2.3425)
SD						
Error component for domestic adoption			0.0008	(0.0184)	−0.0049	(0.0344)
Error component for private adoption			0.0539	(0.2823)	−0.0013	(0.0386)
Stratum dummies	Yes		Yes		Yes	
Year dummies	Yes		Yes		Yes	
Log likelihood	−1,112.02		−1,118.58		−1,047.94	
Observations	4,746		4,768		4,514	

Notes: (1) reports McFadden's (1974) alternative-specific conditional logit choice model. (2) reports Train's (2003) mixed logit model that includes induced error components. (3) reports the control function approach applied in the mixed logit model. Foster care adoption is the base group. The robust standard errors are in parentheses. *Significant at the 90% confidence level; **significant at the 95% confidence level; ***significant at the 99% confidence level.

TABLE 7
Estimated Price Elasticities

Description	Elasticity
Net adoption cost (or consumer price) of international adoption	
Share of international adoption	−0.397
Share of foster care adoption	0.118
Share of domestic private adoption	0.121
Net adoption cost (or consumer price) of domestic private adoption	
Share of international adoption	0.166
Share of foster care adoption	0.163
Share of domestic private adoption	−0.306

Note: These direct and cross price elasticities are calculated from the estimates of the mixed logit model with the control function approach given in Table 6.

adoption by 0.166% and that of foster care by 0.163%.

We now turn to the observed characteristics of the adoptive parents in Table 6. The signs and significance of these variables do not change as the correction of price endogeneity is made from model to model, though the magnitudes of the coefficients change quite a bit. The results show that parent age has an important implication for the adoption choices and the relationship is nonlinear. Up to about 39 years of age, older parents are more likely to go international markets than domestic ones for adoption; however, as age progresses above 39 years, the likelihood reverses. Parents who already have kids are less likely to adopt from domestic private market than from foster care facilities. With employer's assistance, parents are more likely to adopt from the private markets, either domestic or international, than from foster care facilities. The results also show that having a friend who has adopted internationally, is more likely to encourage international adoption, while it is not significant for domestic adoptions. Finally, employment status and being couples are not significant factors determining adoption choices.

As for the characteristics of the child, gender preference is not the reason why U.S. parents are going outside the United States for adoption; however, parents who want a boy are more likely to use domestic private agents than going to foster care facilities. Also, U.S. adoptive parents are less likely to adopt a child with special needs from any private markets than from foster care facilities. Another interesting result is that transracial adoptions are more likely to happen in the international market than in the domestic markets and there is no evidence of transracial adoptions in the domestic markets, either private or foster care. When parents want to adopt an Asian, Hispanic, or Caucasian child, they are more likely to go outside the United States. Finally, adopting a Black child is more likely to happen at foster care facilities.

IV. DISCUSSION

A. Waiting Time for International Adoption

We add a new variable, waiting time for international adoption, in the mixed logit model. We also assume that waiting time for domestic adoptions, both foster care and private markets, is zero due to the unavailability of data.[21] This inclusion does not significantly affect the results. The result is presented in panel 1 of Table 8. The inclusion of waiting time for international adoption only marginally changes the significance and magnitude of a few variables. Most importantly, the waiting time variable is negative and statistically significant as it is expected. The result indicates that longer waiting time reduces the probability of adoption in the international markets. This empirical finding is consistent with our theoretical prediction for the demand of international adoption given in Proposition 2.

The ratio of some of the coefficients to the coefficient of price provides an economically useful information. That is, all coefficients, especially those associated with parent and child characteristics, can be expressed in dollar terms. Since the price variable is measured in thousand dollars, the dollar coefficients are calculated by multiplying the ratio of each of the coefficients to the price coefficient with $1,000. The result is reported in column WTP in panel 1 of Table 8. For the waiting time variable, the result shows that when adopting from international markets, U.S. adoptive parents are willing to spend $311 to reduce the waiting time by 1 day. In other words, it costs an adoptive parent on average $311 to wait another day for the adoption to finalize. From the data, adoptive parents waits 224 days to complete an adoption from China and on average 222 days to complete an adoption from Russia while they wait much longer to adopt from other countries or regions, 258 days from Africa, 313 days from Europe, and 328 days from South America. That means, with every other things being the same, an

21. Waiting time is a country-specific macro variable which is constant for all adoptions from a specific country. This variable is missing for Guatamala possibly due to problems of corruption and coercion in this market during the time.

TABLE 8
Demand for Child Adoption and Willingness to Pay (WTP)

	Mixed Logit with Control Function Approach					
	(1)			(2)		
	Coefficient	**SE**	**WTP**	**Coefficient**	**SE**	**WTP**
(1) *Alternative-specific variables*						
cprice in $1,000	−0.0185***	(0.0054)	−$1,000	−0.0183***	(0.0054)	−$1,000
cprice × income	0.0031**	(0.0014)	169	0.0030**	(0.0014)	164
Waiting time	−0.0057***	(0.0018)	−311	−0.0055***	(0.0018)	−301
(2) *Case-specific variables (foster care adoption is the base group)*						
(2.a) International adoption						
Parent characteristics						
Parent age	0.3497*	(0.2049)	18,951	0.3432*	(0.2065)	18,772
Parent age squared	−0.0045*	(0.0024)	−243	−0.0044*	(0.0024)	−241
Already have kids	−0.3368	(0.2150)	−18,250	−0.3272	(0.2140)	−17,895
Employer's assistance	0.8369***	(0.3049)	45,354	0.8652***	(0.3037)	47,318
Friend used to adopt	1.3520***	(0.2311)	73,267	1.3557***	(0.2332)	74,149
Full-time employed	0.1991	(0.3084)	10,791	0.2094	(0.3098)	11,455
Couple	−0.2409	(0.2761)	−13,057	−0.2124	(0.2756)	−11,619
Child characteristics						
Male	0.2166	(0.2136)	11,737	0.2364	(0.2154)	12,931
Special needs	−1.2069***	(0.2086)	−65,407	−1.2195***	(0.2109)	−66,697
Transrace	3.0374***	(0.3200)	164,603	–		
Asian	6.4102***	(0.7377)	347,388	6.5036***	(0.7442)	355,700
Black	0.5843	(0.4854)	31,664	1.4056*	(0.7478)	76,874
Hispanic	1.1968***	(0.4440)	64,859	1.2150***	(0.4420)	66,450
Caucasian	3.1577***	(0.4742)	171,125	3.2949***	(0.4840)	180,211
ParentsNonBlackChildDiffRace	–			3.1892***	(0.3484)	174,425
NonBlackParentBlackChild	–			2.2815***	(0.6517)	124,780
(2.b) Private adoption						
Parent characteristics						
Parent age	−0.0250	(0.1086)	−1,356	−0.0276	(0.1091)	−1,511
Parent age squared	−0.0002	(0.0013)	−9	−0.0001	(0.0013)	−7
Already have kids	−0.7961***	(0.1389)	−43,143	−0.8007***	(0.1392)	−43,794
Employer's assistance	0.6454***	(0.2357)	34,978	0.6457***	(0.2362)	35,314
Friend used to adopt	0.0107	(0.1367)	583	0.0090	(0.1371)	490
Full-time employed	−0.1278	(0.1808)	−6,924	−0.1314	0.1813	−7,185
Couple	−0.0131	(0.1762)	−712	−0.0171	(0.1780)	−934
Child characteristics						
Male	0.3847***	(0.1342)	20,851	0.3830***	(0.1346)	20,948
Special needs	−0.8319***	(0.1411)	−45,083	−0.8293***	(0.1411)	−45,357
Transrace	0.1384	(0.1938)	7,502	–		
Asian	0.5096	(0.8163)	27,614	0.5068	(0.8216)	27,717
Black	−0.8611***	(0.2787)	−46,667	−1.0618***	(0.3515)	−58,071
Hispanic	−0.0452	(0.2720)	−2,449	−0.0564	(0.2726)	−3,085
Caucasian	0.3375	(0.2534)	18,290	0.2647	(0.2730)	14,479
ParentNonBlackChildDiffRace	–			0.0369	(0.2422)	2,019
NonBlackParentBlackChild	–			0.4536	(0.3522)	24,811
(3) *Variables to correct for endogeneity*						
Resid for international adoption	0.0385***	(0.0102)		0.0393***	(0.0102)	
Resid for foster care adoption	0.0075	(0.0104)		0.0090	(0.0104)	
Resid for private dom. adoption	0.0042	(0.0099)		0.0051	(0.0100)	
Error component for domestic adoption	11.5234***	(4.3191)		11.7426***	(4.3798)	
Error component for private adoption	2.1492	(2.3474)		2.2812	(2.3609)	
SD						
Error component for domestic adoption	−0.0019	(0.0235)		−0.0053	(0.0285)	
Error component for private adoption	−0.0012	(0.0326)		−0.0018	(0.0323)	
Stratum dummies	Yes			Yes		
Year dummies	Yes			Yes		
Log likelihood	−1,042.25			−1,039.97		
Observations	4,514			4,514		

Notes: ParentNonBlackChildDiffRace denotes a dummy variale for parents adopting a non-Black child, which is equal to 1 for Transrace = 1 and Black = 0. NonBlackParentBlackChild denotes a dummy variable for non-Black parents adopting a Black child, which is equal to 1 for Transrace = 1 and Black = 1. Foster care adoption is the base group. The robust standard errors are in parentheses. *Significant at the 90% confidence level; **significant at the 95% confidence level; ***significant at the 99% confidence level.

adoptive parent is willing to spend about $30,000 more adopting from China or Russia than from Europe or South America.

B. Adoption Choices and Preferences over Child Characteristics

Gender. Before discussing the result from our mixed logit model, it is important to recall that in our data set there are more girls than boys adopted from outside the United Ststes, while the gender compositions for the domestic private adoption market and foster care adoption are about even. Girls made up about 67% of the 545 cases of international adoptions in the survey.[22] However, the result from panel 1 of Table 8 shows that there is no significant preference of adoptive parents for girls over boys in the international market, ceteris paribus. That is, if we consider parents with the same characteristics and the child also with the similar characteristics, adoptive parents are indifferent between the two sexes. This result is striking given the imbalance we observed in the data itself and it is also important to remind ourselves that other factors may also influence adoption decisions.

On the other hand, while the survey data show that there are approximately the same gender mix for domestic adoptions, the mixed logit result (under panel 1 of Table 8) indicates that with everything else (including the characteristics of the adoptive parents and other characteristics of the child) being the same, adoptive parents show significant preference for a boy in the domestic private market and are willing to pay more. The difference in this willingness to pay is economically large. Adoptive parents are willing to pay around $20,000 more for an adoption of a boy rather than a girl from a domestic private agency relative to a foster care facility, ceteris paribus. This preference for boys in the private adoption market is consistent with the well-documented evidence in the study of preferences over the gender of biological children. Dahl and Moretti (2008) find that having a first-born son reduces the odds of women to remarry, of a couple to divorce, and of a family to have more kids. However, in the study of adoption matching, Baccara et al. (2014) find that a non-African American girl is more likely to receive an application than a non-African American boy, but there is no significant difference in gender preferences for the adoption of African American children.[23]

Race. Homophily, or that birds of a same feather flock together, has been well documented in social network studies (see Ibarra 1992; McPherson, Smith-Lovin, and Cook 2001). This phenomenon suggests that adoptive parents tend to adopt a child of a similar race, so that the kid appears as their biological child. Baccara et al. (2014) use a matching data set to show that there is a desirability of Caucasian parents in adopting non-African American children over African American children. These parents are willing to pay $37,639 more in finalization costs. However, they also fail to provide evidence for a racial preference for or against adopting Hispanic children. Our data set with parents of different races and different adoption alternatives provides richer results.

Our result from panel 1 of Table 8 shows that U.S. adoptive parents who desire a child of a different race are more likely to choose international adoption relative to foster care. On average, adoptive parents are willing to pay an additional $164,603 to adopt a child of different race outside the United States relative to the foster care. Additional evidence from the race dummy variables shows that in the international market relative to foster care, an Asian child costs an additional $347,388 to adopt which is followed by a Caucasian child at an additional $171,125 and a Hispanic child at an additional $64,859.

When we compare private and foster care adoptions, the insignificant transrace coefficient suggests that there is no evidence that U.S. parents are willing to pay any additional amount to adopt a child of a different race. Moreover, the result from the race dummy variables shows that while there is no willingness to pay more for an Asian, Hispanic, or Caucasian child between the two domestic adoption options, adopting a Black child from domestic private adoption is associated with costs that are $46,667 lower than adopting from a foster care facility. The less desirability to adopt a Black child in the private

22. This number seems consistent with that reported in the news as being calculated from the data of the U.S. Immigration and Naturalization Service (https://slate.com/news-and-politics/2004/01/why-do-adoptive-parents-prefer-girls.html).

23. It is not easy to draw an explanation for such inconsistency between our result and that of Baccara et al. (2014) given the differences in the nature of data and the methodology applied. Although it may not be the important reason, an interesting thing to note is that the data set used in Baccara et al. (2014) also consists of an unknown gender group and does not include adoptive parents' characteristics.

domestic market is consistent with findings by Baccara et al. (2014).

While the evidence suggests that there is homophily in the domestic market, it does not account for parents' preferences for the same race in general because parents who desire a child of different race are willing to pay more to adopt from an international market given the alternatives. With the abundance of African American children in foster care, the question is whether or not the preference for a child of different race in the international adoption market may be a case of a specific aversion toward Black children in foster care. To test this, we examine if the transracial adoptions in the international market are driven by the preferences not only of parents adopting a non-Black child of different race, but also of non-Black parents adopting a Black child. Using the Transrace and Black variables, we construct two dummy variables[24]:

1. Parents adopting a non-Black child of different race (ParentNonBlackChildDiffRace), which is equal to 1 for both parents and child having different race (Transrace = 1) and the adopted child is non-Black (Black = 0), and zero, otherwise. This category constitutes 34% in the sample. Examples of this category include Caucasian parents adopting an Asian child, Black parents adopting a Hispanic child, or Hispanic parents adopting a Caucasian child.

2. Non-Black parents adopting a Black child (NonBlackParentBlackChild), which is equal to 1 for both parents and child having different race (Transrace = 1) and the adopted child is Black (Black = 1), and zero, otherwise. This category constitutes about 5% of the sample.

To test the above-stated hypothesis, we re-estimate the mixed logit model by including dummy variables (1) ParentNonBlackChildDiffRace and (2) NonBlackParentBlackChild, and excluding Transrace to avoid multicollinearity. The result reported in panel 2 of Table 8 shows that parents adopting a non-Black child of different race from their own are more likely to do so in the international market than from a foster care and they are willing to pay an additional $174,425. Similarly, non-Black parents adopting a Black child are also more likely to do so in the international market than a foster care. They are willing to pay an additional $124,780. This evidence provides support for the conjecture that there is a case of a specific aversion toward African American children in foster care.

Special Needs. Some children who are relinquished for adoption, especially in the foster care facility, tend to have some special needs including physical and/or mental disabilities. To get a child with special needs adopted has been a challenge and government policies such as subsidies have been used to get these children to a foster home and finally to a permanent home. In our data, the monthly subsidy ranges from a mid value of $150 to more than $1,000. One of the first studies that examines the adoption data of special needs children in the state of New York in 1990 shows that subsidy does not increase the adoption placement rate, except for children with mental disabilities (Avery and Mont 1992). However, two other studies, although they do not consider special needs children specifically, find that subsidy affects adoption rates positively. Using state level data, Hansen (2007) shows that an increase in monthly subsidy by $100 results in an additional 80 children adopted in a state in a fiscal year. On the other hand, Duncan and Argys (2007) use individual-level data of children entering foster care in 1998 and show that a $100 increase in subsidy reduces the number of children placed in group homes by 28.7%, with more children going to nonrelative foster homes than relative homes.

Our result from panel 1 of Table 8 shows that adoptive parents are less likely to adopt a special needs child. When adoptive parents want to adopt a special needs child, they are less likely to choose international or private adoptions than foster care. Put in monetary terms, the willingness to pay for international adoption of a special needs child is $65,407 less relative to foster care adoption and that for private adoption is $45,083 less. Because our consumer price includes the cost of raising a child, this result may not be a surprise if the child adopted from international and private agencies is older than the child adopted from foster care. However, in our data the average age of a special needs child adopted from international markets is 2.5 years old and from private domestic markets is 2.8 years old compared to 4.3 years old from a foster care. We think that this result is very interesting. Using an average age of a special needs child at 2.5, the decrease in consumer price can be translated into an equivalent monthly subsidy payment of $735 for international adoption and $506 for

24. From the data, we know the race of the child, but not of the adopting parents. However, the variable Transrace tells us if the adoption was transracial.

TABLE 9
Tobit Results: Subsidy and Adoption Cost Equations

	Subsidy Equation	Adoption Cost Equations		
	(2) Foster Care	(1) International	(2) Foster Care	(3) Domestic Private
Year of adoption	0.277***	0.379***	−0.079	−0.165
	(0.069)	(0.061)	(0.735)	(0.927)
Income	−0.192**	0.207***	0.256***	0.403***
	(0.086)	(0.079)	(0.066)	(0.102)
Employer's assistance		−0.129	0.836**	0.204
		(0.189)	(0.326)	(0.292)
Know prior adoption		−0.999*	−1.041***	−2.338***
		(0.547)	(0.193)	(0.460)
Friend used to adopt		0.037	0.200	0.959***
		(0.173)	(0.178)	(0.250)
Child age	0.508***	−0.133***	−0.318***	−0.244***
	(0.058)	(0.048)	(0.050)	(0.088)
Male		0.135	0.277	−0.136
		(0.163)	(0.176)	(0.223)
Special needs	1.016***	−0.002	−0.233	0.099
	(0.237)	(0.169)	(0.180)	(0.226)
Transrace		0.484**	0.515**	0.311
		(0.231)	(0.254)	(0.329)
CPI		−0.003	−0.020	0.099
		(0.006)	(0.156)	(0.197)
Caucasian	−0.942***	0.708**	0.986***	0.100
	(0.357)	(0.289)	(0.326)	(0.356)
Black	0.123	−1.972***	−0.067	−0.586
	(0.392)	(0.325)	(0.321)	(0.412)
Asian	1.884	−1.177***	0.626	1.206
	(2.245)	(0.230)	(0.642)	(1.851)
Others	−1.055**	−1.094***	0.118	0.081
	(0.436)	(0.421)	(0.327)	(0.447)
Constant	−0.761	2.847***	1.979	−5.766
	(0.748)	(0.562)	(9.039)	(11.402)
Stratum dummies	Yes	Yes	Yes	Yes
Observations	597	482	664	561

Notes: The dependent variable in the subsidy equation is monthly subsidy in category and the dependent variable in the adoption cost equations is gross adoption cost which includes a home study, travel, and legal fees. It is also a category variable. The subsidy equation is censored between 0 and 7; the adoption cost equation for international and domstic private adoptions is censored between 1 and 9; and the adoption cost equation for nonchosen foster care is censored between 0 and 3. The robust standard errors are in parentheses. *Significant at the 90% confidence level; **significant at the 95% confidence level; ***significant at the 99% confidence level.

private domestic adoption.[25] This result is consistent with our theoretical prediction about government subsidy given in Proposition 1.

V. ROBUSTNESS TESTS

In order to estimate the choice model, our data necessitated generating observations on variables for the nonchosen alternatives. In the empirical section above, we use an OLS estimation method to estimate two variables, namely, subsidy for nonchosen foster care adoptions and adoption costs for the three nonchosen alternatives. In this section, we perform a robustness test by re-estimating the values of the two variables using a Tobit estimation method. The Tobit model allows us to censor both the upper and lower limits of the dependent variables, and this may be important as some of our variables are categorical. The subsidy equation is censored between 0 and 7; the adoption cost equations for international and domestic private adoptions are censored between 1 and 9; and the adoption cost equation for foster care is censored between 0 and 3. The results of the Tobit model are presented in Table 9 and they are largely unchanged.[26] For the subsidy equation, household income, child age, and

25. This subsidy payment should increase with the age of the special needs child.

26. Different from the OLS result, the adoption cost equation for international adoptions includes race dummies

special needs are still the important determinants of monthly subsidy payments. For the adoption cost equations, household income, prior knowledge of the child, child age, and transrace are the main determinants of adoption costs.

The Tobit equations are used to estimate the categorical values of subsidy and adoption costs for the nonchosen alternative, which are then used to calculate the consumer price (net adoption cost) to be used in the mixed logit regression. We estimated two equations of the mixed logit model with control functions. The results are presented in Table 10. In panel 1, the same set of instrumental variables as those in the main results (Table 8) is used while in panel 2 the distance between the United States and the sending countries is used in place of the sending country dummies due to possible concerns that parents might favor certain countries, thus violating the exclusion restriction assumption of the instrumental variables.

Overall, the results are consistent with the main findings. The signs of the coefficients and their statistical significance remain largely the same although the estimated willingness to pay for some of the explanatory variables differs slightly. Although all three included residuals from the consumer price equations are not statistically significant, the downward-sloping demand curves for all income groups remain valid. In fact, the larger price coefficients make the demand curves more elastic for all the income groups. The error component for domestic adoption which is included to correct for the iia problem remains significant.

Because our results rely on the estimated values of subsidy and adoption costs for the nonchosen alternatives, one has to be cautious in interpreting the magnitude of the coefficients. For instance, the cost associated with waiting for another day for international adoption is equivalent to $239 in panel 1 or $227 in panel 2, compared to $311 in the main results (see panel 1 of Table 8). For a child with special needs aged 2.5 years old, the additional monthly subsidy needed to make a prospective parent indifferent between international and foster care adoptions is $549 in panel 1 or $611 in panel 2, and between domestic private and foster care adoptions the figure is $386 in panel 1 or $414 in panel 2, compared to $735 and $506 in the main results, respectively.

rather than source country dummies; however, these two variables are very highly correlated.

VI. CONCLUSION

Every year, 10 of thousands of children are adopted by U.S. parents either domestically or internationally through public or private agencies. As adoptions for the most part are driven by the demand for children rather than by humanitarian response to the need for homes, parents choose an adoption alternative which offers them the desired attributes of a child that they seek. Even though there is an oversupply of adoptable children in the U.S. foster care system, the demand for adoption through private agencies is huge, relatively speaking. Thanks to the availability of seemingly countless sending countries to adopt from, age, gender and race preferences may well be reflected in their selected adoption destinations where supply is abundant. Foster children, on the other hand, are more likely to have been abused or neglected and many of them have special needs, and therefore less advantaged characteristics might deter potential adoptive parents. After all, it is conceivable that prospective parents would always prefer a child with more "desirable attributes."

In this paper, we model the demand for U.S. child adoptions under a framework of vertical product differentiation. With the assumption that parents are identical in preferences but heterogeneous in income, we derive demand functions where high income families opt for private, domestic or international, adoptions while low income parents choose to adopt from foster care. By studying adoption subsidy and waiting-time costs, we establish two theoretical propositions. The first is that an increase in adoption subsidy encourages more foster care adoption at the expense of other adoption alternatives. Second, an increase in the cost associated with waiting time in private adoption decreases its demand, leading to higher demand for public adoption.

The paper is mostly empirical and applies discrete choice regression models to jointly estimate demand for the three adoption alternatives: international, domestic foster care, and domestic private adoptions. Our analysis addresses the issue of endogeneity of adoption price (net cost of adoption) using the control function approach and allows for potential correlations in unobserved utility over alternatives using a mixed logit model. We use data from the NSAP, the first and the only nationally representative sample of adopted children in the United States. The results unambiguously reveal a conventional downward-sloping demand of adoption when the unobserved

TABLE 10
Robustness Tests: Demand for Child Adoption

	Mixed Logit with Control Function Approach					
	(1)			(2)		
	Coefficient	**SE**	**WTP**	**Coefficient**	**SE**	**WTP**
(1) *Alternative-specific variables*						
cprice in $1,000	−0.0233***	(0.0054)	−$1,000	−0.0218***	(0.0055)	−$1,000
cprice × income	0.0032**	(0.0014)	136	0.0028*	(0.0050)	127
Waiting time	−0.0056***	(0.0018)	−239	−0.0050**	(0.0020)	−227
(2) *Case-specific variables (foster care adoption is the base group)*						
(2.a) International adoption						
Parent characteristics						
Parent age	0.3794*	(0.1990)	16,279	0.4502**	(0.2220)	20,658
Parent age squared	−0.0048**	(0.0023)	−206	−0.0055**	(0.0026)	−253
Already have kids	−0.2703	(0.2149)	−11,599	−0.2028	(0.2267)	−9,303
Employer's assistance	0.8673***	(0.3068)	37,216	1.1778***	(0.3065)	54,041
Friend used to adopt	1.3036***	(0.2284)	55,935	1.3159***	(0.2438)	60,375
Full-time employed	0.1736	(0.3041)	7,451	0.2318	(0.3273)	10,637
Couple	−0.2052	(0.2723)	−8,806	−0.0746	(0.3044)	−3,424
Child characteristics						
Male	0.1484	(0.2091)	6,369	0.1475	(0.2198)	6,769
Special needs	−1.1388***	(0.2049)	−48,862	−1.1850***	(0.2164)	−54,369
Transrace	3.0155***	(0.3178)	129,389	3.3352***	(0.3424)	153,025
Asian	6.5152***	(0.7742)	279,553	7.0710***	(0.7564)	324,427
Black	0.6797	(0.4718)	29,164	0.3523	(0.5720)	16,162
Hispanic	1.2610***	(0.4454)	54,105	1.6809***	(0.4756)	77,122
Caucasian	3.1018***	(0.4624)	133,091	3.6656***	(0.5205)	168,184
(2.b) Private adoption						
Parent characteristics						
Parent age	−0.0314	(0.1091)	−1,348	−0.0290	(0.1090)	−1,329
Parent age squared	−0.0001	(0.0013)	−3	−0.0001	(0.0013)	−4
Already have kids	−0.7920***	(0.1392)	−33,983	−0.7979***	(0.1391)	−36,607
Employer's assistance	0.6456***	(0.2353)	27,702	0.6716***	(0.2367)	30,814
Friend used to adopt	0.0184	(0.1371)	789	0.0203	(0.1370)	932
Full-time employed	−0.1123	(0.1816)	−4,818	−0.1009**	(0.1818)	−4,629
Couple	−0.0720	(0.1793)	−3,091	−0.0703	(0.1788)	−3,225
Child characteristics						
Male	0.3933***	(0.1350)	16,875	0.3947***	(0.1354)	18,107
Special needs	−0.8005***	(0.1407)	−34,350	−0.8040***	(0.1403)	−36,888
Transrace	0.1236	(0.1930)	5,302	0.1291	(0.1948)	5,924
Asian	0.5429	(0.8517)	23,293	0.4251	(0.8963)	19,503
Black	−0.8161***	(0.2789)	−35,017	−0.8206***	(0.2771)	−37,648
Hispanic	−0.0196	(0.2712)	−840	−0.0224	(0.2715)	−1,026
Caucasian	0.3279	(0.2531)	14,069	0.3262	(0.2546)	14,966
(3) *Variables to correct for endogeneity*						
Resid for international adoption	0.0136	(0.0109)		0.0144	(0.0111)	
Resid for foster care adoption	−0.0010	(0.0107)		−0.0010	(0.0109)	
Resid for private dom. adoption	−0.0018	(0.0103)		−0.0018	(0.0105)	
Error component for domestic adoption	12.4165***	(4.1899)		14.8675***	(4.7316)	
Error component for private adoption	2.4131	(2.3577)		2.3643	(2.3565)	
SD						
Error component for domestic adoption	−0.0016	(0.0225)		0.0179	(0.0312)	
Error component for private adoption	−0.0018	(0.0382)		−0.0406	(0.0387)	
Stratum dummies	Yes			Yes		
Year dummies	Yes			Yes		
Log likelihood	−1,049.73			−1,002.09		
Observations	4,514			4,365		

Notes: In (1), the same set of instrumental variables as those in the main results (Table 8) is used while in (2) the distance between the United States and the sending countries is used in place of the sending country dummies. Foster care adoption is the base group. The robust standard errors are in parentheses. *Significant at the 90% confidence level; **significant at the 95% confidence level; ***significant at the 99% confidence level.

attributes are accounted for and the correlations in unobserved utility are allowed. The estimates of the price elasticities show that a 1 % increase in the consumer price of international adoption reduces the probability of adopting a child from an international market by 0.397%, while increasing the probability of foster care adoption by 0.118% and that of domestic private adoption by 0.121%. A 1 % increase in the consumer price of domestic private adoption reduces the probability of adopting a child from a domestic private agency by 0.306%, while increasing the probability of international adoption by 0.166% and that of foster care by 0.163%. In addition, the model leads to the sensible finding that the demand slope is diminishing in income, suggesting that higher income families are less sensitive to a price increase.

The results also provide a few other very interesting findings that have important policy implications. First, consistent with our theoretical prediction, the results show that a longer waiting time reduces the probability that an adoptive parent chooses international markets as an adoption alternative. They are willing to spend $311 to reduce the waiting time by 1 day. Second, we find evidence that there is a preference for boys over girls and that prospective parents who want to adopt a boy are more likely to go to a domestic private agency than a foster care facility; the additional associated cost is a little more than $20,000. Third, interestingly we find that adoptive parents who already have kids are less likely to adopt from a domestic private market than from a foster care; they are willing to pay $43,000 less. This should suggest that the federal policy to find permanent home for foster children could be designed to target adoptive parents with kids in the family. Fourth, we find no evidence of significant transracial adoptions in the domestic markets; however, transracial adoptions are more likely to happen in the international market. Even non-Black parents who want to adopt a Black child are more likely to do so in the international market and they are willing to pay an additional $120,000. However, the encouraging evidence is that between the two domestic adoption options, parents who want to adopt a Black child are less likely to adopt from a private market than a foster care; they are willing to pay about $46,000 less in the domestic private market.

Finally, there is also evidence that a special needs child is less likely to be adopted. When a special needs child is adopted, parents pay about $65,000 less adopting from outside the United States or $45,000 less adopting from a domestic private agent, relative to the cost of adopting a special needs child from a foster care facility. These costs can be translated into a monthly subsidy which is used as a policy to encourage foster care adoption. Given that the average age of a special needs child is 2.5 years, the results suggest that the government needs to pay an additional $735 a month (or $8,900 a year) to make a parent feel indifferent between choosing international and foster care adoptions or an additional $506 a month (or $6,200 a year) to make a parent feel indifferent between choosing domestic private and foster care adoptions. According to Zill (2011), for the fiscal year 2010, the total of maintenance and administrative costs per child per year in foster care facilities was estimated at $25,782, while the total of adoption assistance payments and administrative costs per child per year was estimated at $10,302. Based on these estimates, our proposal for increased subsidy would still cost less to the government to get a 2.5 year-old special needs child adopted than keeping the child in the foster care facility.

APPENDIX A: PROOF OF DOWNWARD-SLOPING DEMAND FUNCTIONS

Totally differentiating (4) and (5), and solving for dp_1 and dp_2, we get:

$$\text{(A1)}\quad dp_1 = -\frac{u_1 - u_0}{u_1}(dx_2^d + dx_2^f) - \frac{u_1 - u_0}{u_1}dx_1^d + ds,$$

$$\text{(A2)}\quad dp_2 = \left[-\frac{(1-\gamma)u_2 - u_0}{u_2} + \varphi(1 - x_2^d - x_2^f)\right](dx_2^d + dx_2^f) - \frac{u_1 - u_0}{u_2}dx_1^d - (1 - x_2^d - x_2^f)d\phi.$$

Thus, $\frac{\partial p_1}{\partial x_1^d} = -\frac{u_1 - u_0}{u_1} < 0$ for all $u_1 > u_0$ while for $i = d, f$, $\frac{\partial p_2}{\partial x_2^i} = -\frac{(1-\gamma)u_2 - u_0}{u_2} + \varphi(1 - x_2^d - x_2^f) < 0$ if $x_2^d + x_2^f > \frac{1}{2}$, which is consistent with the data. The proportion of private adoption in our sample is more than 63%.

APPENDIX B: COMPARATIVE STATICS

Totally differentiating (9) and (10), together with (A1) and (A2), we can write the system in the following matrix form:

$$A\begin{bmatrix} dp_1 \\ dp_2 \\ dx_1^d \\ dx_2^d \\ dx_2^f \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -(1 - x_2^d - x_2^f) & 0 \\ 0 & 0 \\ -(1-\theta_2)(x_2^d + x_2^f) & 0 \\ -(1-\theta_2)(x_2^d + x_2^f) & 0 \end{bmatrix}\begin{bmatrix} d\phi \\ ds \end{bmatrix},$$

where the determinant of the coefficient matrix

$$A = \begin{vmatrix} 1 & 0 & -\frac{\partial p_1}{\partial x_1^d} & -\frac{\partial p_1}{\partial x_1^d} & -\frac{\partial p_1}{\partial x_1^d} \\ 0 & 1 & -\frac{u_1}{u_2}\frac{\partial p_1}{\partial x_1^d} & -\frac{\partial p_2}{\partial x_2^d} & -\frac{\partial p_2}{\partial x_2^d} \\ 1 & 0 & \Omega_1^d & 0 & 0 \\ 0 & 1 & 0 & (1-\theta_2)\Delta_2 - \frac{\partial^2 C_2}{\partial (x_2^d)^2} & (1-\theta_2)\Delta_2 \\ 0 & 1 & 0 & (1-\theta_2)\Delta_2 & (1-\theta_2)\Delta_2 - \frac{\partial^2 C_2}{\partial (x_2^f)^2} \end{vmatrix}$$

$< 0,$

where $\Delta_2 = \frac{\partial^2 p_2}{\partial (x_2^i)^2}(x_2^d + x_2^f) + \frac{\partial p_2}{\partial x_2^i} < 0$ and $\Omega_1^d = (1-\theta_1)\frac{\partial p_1}{\partial x_1^d} - \frac{\partial^2 C_1}{\partial (x_1^d)^2} < 0$.

Using Cramer's rule gives the following comparative statics.

B.1. Adoption Subsidy

$$\frac{dx_1^d}{ds} = \frac{\left((1-\theta_2)\Delta_2 + \frac{\partial p_2}{\partial x_2^d}\right)\Lambda_2 - \Psi_2}{A} > 0$$

$$\frac{dx_2^d}{ds} = -\frac{u_1}{u_2}\frac{\frac{\partial p_1}{\partial x_1^d}\frac{\partial^2 C_2}{\partial (x_2^f)^2}}{A} < 0$$

$$\frac{dx_2^f}{ds} = -\frac{u_1}{u_2}\frac{\frac{\partial p_1}{\partial x_1^d}\frac{\partial^2 C_2}{\partial (x_2^d)^2}}{A} < 0$$

$$\frac{dp_1}{ds} = \frac{\Omega_1^d\left[\Psi_2 - \left((1-\theta_2)\Delta_2 + \frac{\partial p_2}{\partial x_2^d}\right)\Lambda_2\right]}{A} > 0$$

$$\frac{dp_2}{ds} = \frac{u_1}{u_2}\frac{\partial p_1}{\partial x_1^d}\frac{(1-\theta_2)\Delta_2\Lambda_2 - \Psi_2}{A} < 0,$$

where $\Lambda_2 = \frac{\partial^2 C_2}{\partial (x_2^f)^2} + \frac{\partial^2 C_2}{\partial (x_2^d)^2}$ and $\Psi_2 = \frac{\partial^2 C_2}{\partial (x_2^d)^2}\frac{\partial^2 C_2}{\partial (x_2^f)^2}$.

B.2. Cost Associated with Waiting Time

$$\frac{dx_1^d}{d\phi} = -\frac{(2-\theta_2)(x_2^d + x_2^f) - 1}{A}\frac{\partial p_1}{\partial x_1^d}\Lambda_2 > 0$$

$$\frac{dx_2^d}{d\phi} = \frac{(2-\theta_2)(x_2^d + x_2^f) - 1}{A}\frac{\partial^2 C_2}{\partial (x_2^f)^2}\left(\Omega_1^d + \frac{\partial p_1}{\partial x_1^d}\right) < 0$$

$$\frac{dx_2^f}{d\phi} = \frac{(2-\theta_2)(x_2^d + x_2^f) - 1}{A}\frac{\partial^2 C_2}{\partial (x_2^d)^2}\left(\Omega_1^d + \frac{\partial p_1}{\partial x_1^d}\right) < 0$$

$$\frac{dp_1}{d\phi} = \frac{(2-\theta_2)(x_2^d + x_2^f) - 1}{A}\Omega_1^d\frac{\partial p_1}{\partial x_1^d}\Lambda_2 > 0$$

$$\frac{dp_2}{d\phi} = \frac{\begin{aligned}(1-\theta_2)\Bigg[\Bigg[(1-x_2^d - x_2^f)\Delta_2 + (x_2^d + x_2^f)\frac{\partial p_2}{\partial x_2^d}\Bigg] \\ \times\left(\Omega_1^d + \frac{\partial p_1}{\partial x_1^d}\right) - (x_2^d + x_2^f)\frac{u_1}{u_2}\left(\frac{\partial p_1}{\partial x_1^d}\right)^2\Bigg] \\ \times\Lambda_2 - (1 - x_2^d - x_2^f)\left(\Omega_1^d + \frac{\partial p_1}{\partial x_1^d}\right)\Psi_2\end{aligned}}{A} < 0,$$

where $(2-\theta_2)(x_2^d + x_2^f) - 1 < 0$ given $x_2^d + x_2^f > \frac{1}{2}$ and $0 < \theta_2 < 1$.

REFERENCES

Avery, R., and D. Mont. "Financial Support of Children Involved in Special Needs Adoption: A Policy Evaluation." *Journal of Policy Analysis and Management*, 11(3), 1992, 419–41.

Baccara, M., A. C. Wexler, L. Felli, and L. Yariv. "Child Adoption Matching: Preferences for Gender and Race." *American Economic Journal: Applied Economics*, 6(3), 2014, 133–58.

Balding, C. "A Modest Proposal for a Two-Sided Market Clearing Institution under Asymmetric Supply Constraints with Skewed Pricing: The Market for Adoption and Abortion in the United States." *Journal of Public Economic Theory*, 12(6), 2010, 1059–80.

Barbell, K., and M. Freundlich. *Foster Care Today*. Washington, DC: National Centre for Resource Family Support: Casey Family Programs, 2001.

Bernal, R., L. Hu, C. Moriguchi, and E. Nagypal. "Historical Trends and the Determinants of Adoption Demand and Supply, 1951–2002." 2007.

Bhat, C. "Quasi-Random Maximum Simulated Likelihood Estimation of the Mixed Multinomial Logit Model." *Transportation Research*, 35(7), 2001, 677–93.

Blackstone, E. A., A. J. Bucka, S. Hakima, and U. Spiegel. "Market Segmentation in Child Adoption." *International Review of Law and Economics*, 28(3), 2008, 220–5.

Boudreaux, D. J. "A Modest Proposal to Deregulate Infant Adoption." *The Cato Journal*, 15(1), 1995, 117–35.

Brownstone, D., and K. Train. "Forecasting New Product Penetration with Flexible Substitution Patterns." *Journal of Econometrics*, 89, 1999, 109–29.

Child Welfare Information Gateway. *Adoption Assistance for Children Adopted from Foster Care*. Washington, DC: U.S. Department of Health and Human Services, Children's Bureau, 2011.

Children's Bureau. "The AFCARS Report No. 20. U.S. Department of Health and Human Services: Administration for Children and Families, Administration on Children, Youth and Families." 2012.

Cohen, I. G., and D. L. Chen. "Trading-off Reproductive Technology and Adoption: Does Subsidizing IVF Decrease Adoption Rates and Should it Matter?" *Minnesota Law Review*, 95, 2010, 486–574.

Croll, E. *Endangered Daughters: Discrimination and Development in Asia*. London: Routledge, 2000.

Dahl, G. B., and E. Moretti. "The Demand for Sons." *Review of Economic Studies*, 75(4), 2008, 1085–120.

Duncan, B., and L. Argys. "Economic Incentives and Foster Care Placement." *Southern Economic Journal*, 74(1), 2007, 114–42.

Graff, E. J. "The Lie we Love." *Foreign Policy Magazine*, 2008.

Gumus, G., and J. Lee. "Alternative Paths to Parenthood: IVF or Child Adoption?" *Economic Inquiry*, 50(3), 2012, 802–20.

Halton, J. "On the Efficiency of Evaluating Certain Quasi-Random Sequences of Points in Evaluating Multi-Dimensional Integrals." *Numerische Mathematik*, 2(1), 1960, 84–90.

Hansen, M. E. "Using Subsidies to Promote the Adoption of Children from Foster Care." *Journal of Family and Economic Issues*, 28(3), 2007, 377–93.

Hansen, M. E., and B. A. Hansen. "The Economics of Adoption of Children from Foster Care." *Child Welfare League of America*, 85, 2006, 559–83.

Hensher, D. "The Valuation of Commuter Travel Time Savings for Car Drivers in New Zealand: Evaluating Alternative Model Specifications." *Transportation*, 28(2), 2001, 101–18.

Hole, A. R. "Fitting Mixed Logit Models by Using Maximum Simulated Likelihood." *Stata Journal*, 7(3), 2007, 388–401.

Ibarra, H. "Homophily and Differential Returns: Sex Differences in Network Structure and Access in an Advertising Firm." *Administrative Science Quarterly*, 37(3), 1992, 422–47.

Khun, C., and S. Lahiri. "The Economics of International Child Adoption: An Analysis of Adoptions by U.S. Parents." *Quarterly Review of Economics and Finance*, 64, 2017, 22–31. https://doi.org/10.1016/j.qref.2016.07.001.

Kopel, M. "Price and Quantity Contracts in a Mixed Duopoly with a Socially Concerned Firm." *Managerial and Decision Economics*, 36(8), 2015, 559–66.

Landes, E. M., and R. A. Posner. "The Economics of the Baby Shortage." *The Journal of Legal Studies*, 7(2), 1978, 323–48.

Matsumura, T. "Partial Privatization in Mixed Duopoly." *Journal of Public Economics*, 70(3), 1998, 473–83.

McFadden, D. "Conditional Logit Analysis of Qualitative Choice Behavior," in *Frontiers in Econometrics*, edited by P. Zarembka. New York: Academic Press, 1974, 105–42.

McPherson, M., L. Smith-Lovin, and J. M. Cook. "Birds of a Feather: Homophily in Social Networks." *Annal Review of Sociology*, 27(1), 2001, 415–44.

Munizaga, M., and R. Alvarez-Daziano. "Mixed Logit Versus Nested Logit and Probit." Santiago, Chile: Departmento de Ingeniera Civil, Universidadde Chile, 2001.

National Survey of Adoptive Parents. 2007. Available at https://www.cdc.gov/nchs/slaits/nsap.htm

Petrin, A., and K. Train. "A Control Function Approach to Endogeneity in Consumer Choice Models." *Journal of Marketing Research*, 47(1), 2010, 3–13.

Pliskin, J. S., D. S. Shepard, and M. C. Weinstein. "Utility Functions for Life Years and Health Status." *Operations Research*, 28(1), 1980, 206–24.

Selman, P. "Trends in Intercountry Adoption 1998–2004: Analysis of Data from 20 Receiving Countries." *Journal of Population Research*, 23(2), 2006, 183–204.

Shaked, A., and J. Sutton. "Relaxing Price Competition Through Product Differentiation." *Review of Economic Studies*, XLIX, 1982, 3–13.

Stoltzfus, E. "Congressional Research Service Report. Child Welfare Funding in FY 2018." Congress Research Service 7-5700, 2018. Available at www.crs.gov.

Train, K. "Halton Sequences for Mixed Logit." Working Paper No. E00-278, Department of Economics, University of California, Berkeley, 2000.

———. *Discrete Choice Methods with Simulation*. New York: Cambridge University Press, 2003.

U.S. Children's Bureau, 2011. Child is identified as a special needs adoption: October 1, 2010 to September 30, 2011 (FY 2011). U.S. Department of Health and Human Services, Administration for Children and Families.

Williamson, N. *Sons or Daughters?* Beverley Hills, CA: Sage Publication, 1976.

Zill, N. "Better Prospects, Lower Cost: The Case for Increasing Foster Care Adoption." Adoption Advocate No. 35, 1-7, National Council for Adoption, 2011.