Do Immigrants Free Ride More Than Natives?*

Una Okonkwo Osili† Jia Xie‡

January 2007

Abstract

Are immigrants a burden on host societies, because they receive benefits from, but do not contribute to, the provision of public goods and services? Questions like these have shaped public debate on immigration policy in the United States and Western Europe, and have fueled a large body of research. In this paper, we investigate theoretically and empirically the implications of immigration for the private provision of public goods. We do not find evidence that immigrants free ride more than the native-born. Moreover, immigrants are less likely to receive assistance from non-government sources compared to similar native-born households.

*We gratefully acknowledge funding from the Center on Philanthropy at Indiana University. We have benefited greatly from comments from Mark Wilhelm, Rich Steinberg, and participants at the 2003 ARNOVA conference. Xiaojun Feng and Jeanne Ruan provided excellent research assistance

†Contact Information: Department of Economics, Indiana University-Purdue University Indianapolis, Indianapolis, IN 46202; phone: (317)278-7219, email: uosili@iupui.edu.

‡Contact Information: Department of Economics, Indiana University, Bloomington, IN 47405; email: jiaxie@indiana.edu.

1 Introduction

In August 1996, the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), combined with the 1996 Immigration Reform Act, greatly reduced federal welfare eligibility for U.S. immigrants. The policy reform as initially conceived had far reaching consequences for the ability of immigrants to access public assistance and other federal entitlement programs. More than a decade later, the locus of the policy debate on the costs and benefits of immigration for the public sector has shifted —with more emphasis on the impact of immigration on key aspects of public good provision including health care, education, and social services funded by state, local, and non-profit institutions.

Are immigrants a burden on host societies, because they receive benefits from, but do not contribute to the provision of public goods and services? Concerns about immigrants' free riding have grown as the proportion of foreign born in the U.S. population has risen, reaching 12 percent - the highest level since 1930.[1] Although there is extensive research on U.S. immigrants' use of means-tested welfare programs (Fix and Passel, 2002; Borjas, 2006; Hu, 1998) it is not known whether immigrants free ride, or enjoy benefits from the voluntary contributions of others without contributing to the provision of those benefits. Beyond the relevance of this question to current policy debates, the extent to which households differ in their willingness to contribute to public goods is of fundamental interest to economists and social scientists (Bergstrom, Blume and Varian, 1986; Roberts, 1984; Samuelson, 1954; Warr, 1982). [2]

U.S. charitable organizations have gained visibility in the recent debate on immigration policy because some researchers have argued that the services that charitable organizations provide to immigrants may have grown after welfare reform (Ku and Freilich, 2001; Hungerman, 2005).[3]Media reports have highlighted the role of private, charitable, and faith-based groups in providing assistance to immigrants.[4] Moreover, the U.S. depends heavily on private contributions or on a mixture

[1]The concern that immigrants could place a burden on host societies is not a new one. During the colonial period, immigration laws restricted the entry of non-citizens likely to become dependent on public charity. In 1645, the Massachusetts enacted the earliest public charge laws. Immigration laws were strengthened in the early twentieth century to allow the deportation of non-citizens who became a public burden.

[2]To date, much of the existing literature on contributions to public goods has emphasized the role of gender. For example, Andreoni, Brown, and Rischall (2003) find strong evidence that men and women have different preferences towards charitable contributions.

[3]Nonprofit charitable organizations are not legally required to verify immigration status, when they provide assistance or when they receive voluntary contributions.

[4]"Bill on Illegal-Immigrant Aid Draws Fire," *New York Times*, December 30, 2005, Section A, Page 24, Column

of public and private contributions, perhaps more than in any other industrialized nation for the financing of social services, health care, higher education, and disaster relief, and other public goods. In 2006, nearly 90 percent of U.S. households gave money or volunteered time to the United Way, the American Red Cross, the Salvation Army, faith-based institutions, and many other charitable causes, with total monetary contributions amounting to about 295 billion dollars, nearly 2.2 percent of GDP (Source: Giving USA, 2006).

To address the question of whether immigrants free ride in their voluntary contributions behavior, this paper uses a new philanthropy supplement to the 2001 wave of the Panel Study of Income Dynamics (PSID) and the September 2003 supplement of the Current Population Survey (CPS). The new PSID data represent the largest one-time study of monetary and time contributions toward public good provision in the United States and also provide information on private transfers to non-household members and the receipt of benefits from non-government organizations, providing a comprehensive picture of transfer behavior. We use the CPS data to study time contributions. Taken together, these data sources provide a unique opportunity to examine whether immigrant and the native-born households differ in their likelihood of contributing toward public good provision and of receiving assistance from non-government sources.

We do not find evidence that immigrants free ride more than the native-born. First, immigrant households are significantly less likely to receive assistance from non-government sources compared to similar native-born households. Second, immigrant status has no statistically significant impact on both the likelihood and the level of monetary contributions toward public good provision. Third, we find that though immigrant status has negative and significant impacts on incidence and level of time contributions, the immigrant-native differences in time contributions tend to diminish over time as immigrants acquire U.S. experience. Finally, we examine the behavior of second-generation immigrants to study the long-term impact of immigration, and we find no significant differences between the children of immigrants and third or higher generations of Americans in their voluntary contributions of money and time. Our results are robust to income and wealth controls and alternative empirical specifications.

The remainder of the paper is organized as follows: Section 2 provides the background of this

1 "Illegal Immigrants: Are they Freebies or Freeloaders?" The San Diego Union Tribune, June 2 2006, "The Gospel vs. H.R. 4437," *New York Times* March 3, 2006, Section A, Page 22, Column 1

study, Section 3 presents an overview of the econometric methods used in this paper. Section 4 describes the data. Section 5 discusses the results. Section 6 presents the conclusions, and Section 7 is the mathematical appendix.

2 Conceptual Framework

The key question that we address in this section is why conceptually immigrants would differ from the native-born in their willingness to free ride. We consider several potential explanations through which immigrant status may affect voluntary contributions. The first channel that we explore is that resource constraints differ across immigrants and the native-born inducing differences in voluntary contributions to public goods. More specifically, we assume that immigrants have lower initial wealth holdings compared to the native born, i.e., $A_0^i < A_0^n$, where A_t^j stands for the household j's wealth at time t.[5] We examine the impact of lower initial wealth holdings on the voluntary contributions of immigrants compared to similar native-born households.

A second channel through which immigrant status can impact voluntary contribution occurs if immigrant households face different incentives to contribute to private transfer networks comprising of extended family members leading to them to free ride on the voluntary contributions of the native born. Several researchers have noted the importance of private transfer networks and coresidence among immigrant households (Becker and Toms, 1979; Glick and Van Hook, 2007). It may be reasonable to assume that the extended family wealth holdings may be lower for immigrant households. To investigate the role of household's participation in private transfer networks on contributions to public goods, we study private transfers to the extended family for immigrants compared to similar natives.

We also consider a third channel if immigrants and the native-born

The household j's utility function that serves as the basis for our analysis is defined as:

$$U(x_t^j, l_t^j, ; g_t^j, v_t^j; G_t, V_t) + \beta U_F(A_F{}_t^j)$$

[5] $j = i$ stands for the immigrant household, while $j = n$ stands for the native household

where $0 < \beta < 1$, and $U(x_t^j, l_t^j; g_t^j, v_t^j; G_t, V_t)$ and $U_F(\ A_F{}_t^j)$ satisfy the typical assumptions[6] and Inada Condition.

In the first part of the utility function, the household j's own utility depends on private consumption, x_t^j, leisure, l_t^j, the warm-glow effect of own monetary and time contributions (Andreoni, 1989), g_t^j and v_t^j, and the aggregate public monetary and time contributions to the community, G_t and V_t.

Households face monetary and time constraints at each time t. We assume that the household j can allocate income toward private consumption (x_t^j), monetary contributions toward public good provision (g_t^j), private transfers to the extended family (e_t^j), and savings (s_t^j). Due to the tax deduction associated with charitable giving, the cost of monetary contribution is $1 - \tau$, where τ is the tax rate. In addition, each household has the same time endowment, L, and allocates it across the following activities: work (n_t^j), leisure (l_t^j), and voluntary time contributions (v_t^j), i.e. $n_t^j + l_t^j + v_t^j = L$. The household j's resource constraint is as follows:

$$\dot{A_t^j} = wn_t^j + rA_t^j - x_t^j - (1-\tau)g_t^j - e_t^j.$$

The second part of the utility function captures the household's preference over the well-being of the extended family, $U_F(A_F{}_t^j)$, which for simplification, is assumed to depend only on the extended family's wealth $A_F{}_t^j$. We assume that transfers play an important role in the extended family's wealth accumulation process.

$$\dot{A_F{}_t^j} = e_t^j$$

A closely related question is whether differences between immigrants and the native-born are likely to persist over time. We turn to the theoretical model for insights on this question.

First, immigrant households provide lower monetary and time contributions than the native-born due to their lower initial wealth. However, both the immigrants and the native-born increase their monetary and time contributions over time. Moreover, the immigrant-native gap in monetary(time) contributions diminishes over time if the rate at which the marginal utility of monetary(time) contributions declines for immigrant households does not exceed a fixed multiple of the

[6]Utility functions are continuously differentiable, and increase at decreasing rates for each argument. In addition, cross partials on utility functions are zeros.

corresponding rate of decline for native-born households, where the multiple is pre-determined by the initial wealth of both households.[7]

Second, as to private transfers, we note that if the utility on extended family's wealth, $U_F(A_{Ft})$ satisfies that $R'(A) > 0$ and $R''(A) \leq 0$ on $A \in R_+$, then the immigrant household has a higher level of private transfers to extended family networks than the native-born household does. Moreover, under certain conditions,[8] private transfers decrease over time for both households over time, and the immigrant-native gap in private transfers diminishes over time.

In the empirical work, we investigate immigrant-native differences in monetary and time contributions. To examine the long-term impact of immigration, we turn to the children of immigrants

3 Empirical Specification

To study contributions and free riding behavior, we examine monetary and time contributions, private transfers, as well as receipt of assistance for both immigrants and native-born households.[9] Our framework is designed to incorporate the following features. First, household can contribute money and time to public goods, and also to extended family members. Second, we account for the fact that monetary and time contributions, as well as private transfers to extended family members may be affected by the same unobservable factors -such as prices, generosity and altruism towards others. We also observe a large proportion of households that do not contribute to charitable organizations transfer behaviors. In other words, in our regression models, large proportions of the dependent variables are zero (Table 1), thus OLS parameter estimators tend to be biased toward zero. Given these features, multivariate probit and tobit models are appropriate for our study.

[7] More formally, A sufficient condition for diminishing immigrant-native gap in monetary(time) contributions is that $\frac{U_{g_t^n g_t^n} - U_{g_t^i g_t^i}}{U_{G_t G_t}} \geq 2(1 - \frac{\lambda_0^i}{\lambda_0^n})$ or $U_{g_t^i g_t^i} > \frac{\lambda_0^i}{\lambda_0^n} U_{g_t^n g_t^n}$, $\left(\frac{U_{v_t^n v_t^n} - U_{v_t^i v_t^i}}{U_{V_t V_t}} \geq 2(1 - \frac{\lambda_0^i}{\lambda_0^n}) \text{ or } U_{v_t^i v_t^i} > \frac{\lambda_0^i}{\lambda_0^n} U_{v_t^n v_t^n}, \right) \forall t \geq 0$. Refer to the Appendix for more details.

[8] More formally, A sufficient condition for diminishing immigrant-native gap in private transfers over time is that $R'(A) \geq 0$ and $R''(A) < 0$ or that $R'(A) > 0$ and $R''(A) \leq 0$ on $A \in R_+$.

[9] We define monetary and time contributions as contribution behavior, and monetary contributions and private transfers as transfer behavior. Here monetary contributions belong to both behaviors.

3.1 Multivariate Probit Model

The general formulation is given in terms of a 3-function system as follows:

$$Y^* = \mathcal{X}'\beta + e \tag{1}$$

$$Y^* = \begin{bmatrix} Y_M^* \\ Y_P^* \\ Y_T^* \end{bmatrix}, \quad \mathcal{X}' = \begin{bmatrix} X_M' & 0 & 0 \\ 0 & X_P' & 0 \\ 0 & 0 & X_T' \end{bmatrix}, \quad \beta = \begin{bmatrix} \beta_M \\ \beta_P \\ \beta_T \end{bmatrix}, \quad e = \begin{bmatrix} e_M \\ e_P \\ e_T \end{bmatrix}.$$

Y^* is a vector of latent variables, with Y_M^* for monetary contributions, Y_P^* for private transfers, and Y_T^* for time contributions. X_M, X_P, and X_T are vectors of household characteristics which have real explanatory power to monetary contributions, private transfers, and time contributions, respectively. Here we assume $X_M = X_P = X_T = X = (1, I, duration * I, \mathbb{X})$[10], where I is an indicator of immigrant status, *duration* captures the duration effect, and $\mathcal{X}$ represents a vector of all other characteristics including head's age, sex, marital status, etc;[11] β is a vector of coefficients; e is a vector of error terms following a multivariate normal distribution, that is,

$$e \sim N(0, \Omega) \qquad \Omega = \begin{bmatrix} 1 & \rho_{M,P} & \rho_{M,T} \\ \rho_{P,M} & 1 & \rho_{P,T} \\ \rho_{T,M} & \rho_{T,P} & 1 \end{bmatrix}$$

We do not observe the vector of latent variables Y^*, but only the choice made by the household $Y = (Y_M, Y_P, Y_T)'$. The relationship between latent and observed variables can be represented by

$$Y_c = \begin{cases} 1 & \text{if } Y_c^* > 0 \\ 0 & \text{otherwise} \end{cases} \qquad c = M, P, T$$

The joint probability of $Y_{M,i} = m$, $Y_{P,i} = p$, and $Y_{T,i} = t$ (m,p,t=0 or 1) for household i is given

[10] That is, we have the same explanatory variables in regressions of monetary contributions, private transfers, and time contributions.

[11] To control for community-level variables, we include state-fixed effects in all specifications.

by

$$P(m,p,t|X_i) = \int_{-\infty}^{S(m)X_i'\beta_M} \int_{-\infty}^{S(p)X_i'\beta_P} \int_{-\infty}^{S(t)X_i'\beta_T} \phi(e_{M,i}, e_{P,i}, e_{T,i}; \Omega) de_{M,i} de_{P,i} de_{T,i}, \quad m,p,t = 0 or 1$$

where

$$S(c) = \begin{cases} 1 & \text{if} \quad c = 1 \\ -1 & \text{if} \quad c = 0 \end{cases} \qquad \text{where} \quad c = m,p,t$$

and $\phi(e_{M,i}, e_{P,i}, e_{T,i}; \Omega)$ is the density function of the trivariate normal distribution of e. For example, the conditional probability for household i make time contributions, but no monetary contribution and private transfer $(m = 0, p = 0, t = 1)$ is

$$P(0,0,1|X_i) = \int_{-\infty}^{-X_i'\beta_M} \int_{-\infty}^{-X_i'\beta_P} \int_{-\infty}^{X_i'\beta_T} \phi(e_{M,i}, e_{P,i}, e_{T,i}; \Omega) de_{M,i} de_{P,i} de_{T,i}.$$

The individual log-likelihood function for household i is

$$logl_i(\beta, \Omega) = \sum_{m=0}^{1} \sum_{p=0}^{1} \sum_{t=0}^{1} I_i(m,p,t)\ log[P(m,p,t|X_i)]$$

where

$$I_i(m,p,t) = \begin{cases} 1 & \text{if } Y_i^M = m, Y_i^P = p, \text{ and } Y_i^T = t \\ 0 & \text{otherwise} \end{cases} \qquad (m,p,t = 0 \text{or} 1)$$

The evaluation of multivariate normal integral is not forbidable in most software packages. After evaluating each individual log-likelihood, we simply sum it across households to get the aggregate log-likelihood. Finally, The ML estimators in the multivariate probit model β_{ML} are defined as

$$\beta_{ML} = arg \max_{\beta} logL(\beta, \Omega_{ML}) = arg \max_{\beta} \sum_{i=1}^{N} logl_i(\beta, \Omega_{ML})$$

3.2 Multivariate Tobit Model

The settings in the multivariate tobit model are identical to those in the multivariate probit model, except for the vector of latent variables, which in the multivariate tobit model is defined as follows:

$$Y = \begin{bmatrix} Y_M \\ Y_P \\ Y_T \end{bmatrix} \quad \text{where} \quad Y_c = \begin{cases} Y_c^* & \text{if } Y_c^* > 0 \\ 0 & \text{otherwise} \end{cases} \qquad c = M, P, T$$

In general, the individual likelihood function for a multivariate tobit model is a multiple integral of the probability density function of the vector of error terms. The density function is integrated to all the error terms, with respect to which the dependent variables take values on censoring points. In mathematics language, the individual likelihood function for household i is

$$l_i(\beta, \Omega) = \int_{-\infty}^{-X_i'\beta_M} \phi\big(e_{M,i}, e_{P,i}, e_{T,i}; \Omega\big) de_{M,i} = \int_{-\infty}^{-X_i'\beta_M} \phi\big(e_{M,i}, (Y_{P,i} - X_i'\beta_P), (Y_{T,i} - X_i'\beta_T); \Omega\big) de_{M,i}$$

$$\text{if} \quad Y_{M,i} = 0, Y_{P,i} > 0, Y_{T,i} > 0$$

We take two extreme cases as examples. First, if the values of the 3 dependent variables are all positive ($Y_{M,i} > 0, Y_{P,i} > 0, Y_{T,i} > 0$), then the individual likelihood function is simply the probability density function of the trivariate normal distribution, $N(0, \Omega)$:

$$l_i(\beta, \Omega) = \phi(e_{M,i}, e_{P,i}, e_{T,i}; \Omega) = \phi(Y_{M,i} - X_i'\beta_M, Y_{P,i} - X_i'\beta_P, Y_{T,i} - X_i'\beta_T; \Omega)$$

The other extreme case is with $Y_{M,i} = 0, Y_{P,i} = 0, Y_{T,i} = 0$. That is, household i does not have any contribution or transfer behavior. In this case, the individual likelihood is a triple integral:

$$l_i(\beta, \Omega) = \int_{-\infty}^{-X_i'\beta_M} \int_{-\infty}^{-X_i'\beta_P} \int_{-\infty}^{-X_i'\beta_T} \phi\big(e_{M,i}, e_{P,i}, e_{T,i}; \Omega\big) de_{M,i} de_{P,i} d_{T,i}$$

The rest process is quite similar to that in the probit model. After evaluating each individual likelihood, we take log of it, and sum it across households to get the aggregate log-likelihood. Finally, the ML estimators in the multivariate tobit model β_{ML} are defined as

$$\beta_{ML} = arg \max_{\beta} logL(\beta, \Omega_{ML}) = arg \max_{\beta} \sum_{i=1}^{N} logl_i(\beta, \Omega_{ML})$$

Finally, we examine how immigrant status affects the incidence of receipt of benefits from non-government sources and how the immigrant-native comparison evolves as immigrants gain U.S.

experience. The empirical probit model for receipt of assistance from non-government sources is specified as follow:

$$Receiptofbenefit_i = \beta_0 + \beta_1 I_i + \beta_2 (Duration_i * I_i) + \beta_3 X_i + e_{B,i}. \quad (2)$$

4 Overview of Data Resources

The data on monetary contributions are drawn from a new module of the 2001 wave of the Panel Study of Income Dynamics (PSID). The new 2001 PSID module used in this study is unique because it provides high-quality data on voluntary contributions toward public good provision comparable to the U.S. Individual Taxpayer Return data (Wilhelm, 2006).[12] One challenge for any study of voluntary contributions is the need to fully control for household resources. The PSID contains unusually detailed information on income and wealth, which are typically unavailable within existing data sets on voluntary contributions, allowing us to take into account the household's economic position. Moreover, the PSID provides detailed information on the incidence and levels of private transfers within extended family, and on the incidence of receipt of assistance from non-government sources, including churches, community groups, and families.

Monetary contributions are prevalent in the PSID. Nearly 64% of households contribute money, however only 20% contribute time. Because the mean incidence of volunteering is generally lower, we also examine the 2003 Current Population Survey (CPS) to study voluntary time contributions. The large samples sizes of immigrant and native-born households in the CPS (5773 immigrant households and 50,538 native-born households) allow us to compare results across the two surveys, which serves as an important robustness check.[13] However, the CPS has some disadvantages because it provides much less information on income and wealth.

[12]The PSID philanthropy module is the only data set on giving comparable to the IRS taxpayer data in coverage. However, we should note that the IRS taxpayer database provides a more accurate picture of charitable giving at and above the 90th percentile of charitable giving. The IRS tax data is less suitable for this study because immigrant status and experience is not recorded, and immigrants may be less likely to itemize their deductions.

[13]We also note some differences across the two surveys. The longitudinal nature of the PSID means that recent immigrants that arrived in the U.S. within the last 10 years make up a smaller share of the immigrant sample (16 percent of the PSID immigrant sample is composed of recent arrivals compared to 28 percent for the CPS).

4.1 Immigrant-Native Differences in Transfer and Contribution Behaviors

Table 1 provides summary statistics from the PSID on monetary contributions to public good provision, private transfers to extended family, as well as time contributions.[14] Immigrant households[15] have a lower incidence of monetary contributions compared to native-born households (43 percent of immigrants versus 66 percent for the native-born population contribute money to charitable organizations). Conditional on positive monetary contributions, immigrant households also have lower mean levels of monetary contribution to charitable organizations compared to native-born households. The average monetary contribution level for immigrants is $1243.19 compared to $1918.34 for native-born households. As to private transfers, we find that on average, immigrant households have a higher rate of participation in private transfer networks compared to native-born households. [16] About 18 percent of immigrant households reported sending private transfers compared to 10 percent of native-born households. However, conditional on participating in private transfer networks, immigrant households have lower mean levels of private transfers compared to the native-born. Among those households that participate in private transfer networks, the mean private transfer to non household members is $3025.06 for immigrants and $5117.53 for the native-born. Similar to monetary contributions, statistics on time contributions from both PSID(Table 1) and CPS(Table 2) show that native households are more likely to participate in time contributions, and that conditional on positive time contributions, native households have larger mean amount of time contributions.

In sum, according to the summary statistics, immigrant households, compared with native households, have lower incidences and lower amounts of monetary and time contributions, and have higher incidences but lower amounts of private transfers.

[14] Our key dependent variable on monetary contributions was constructed using the following questions, which was posed to PSID survey respondents: During the year 2000, did you or anyone in your family donate money, assets, or property with a combined value of more than $25 to religious or charitable organizations?

[15] Immigrant households refer to households where either the head or spouse was born outside the United States.

[16] In 2005, U.S. immigrants sent $40 billion to their origin families in Latin America and the Caribbean, according to the Inter-American Development Bank (IADB). According to the World Bank, global remittances amounted to $232 billion in 2005.

4.2 Immigrant-Native Differences in Receipt of Assistance From Non-government Sources

An important issue that has been raised in recent debates on immigration policy and welfare reform is whether immigrants rely on benefits from non-government sources-health care, education and other social services because they face restrictions in accessing government benefits, particularly at the federal level. The PSID provides information on the extent to which households, whether immigrant or native-born, receive assistance from non-government sources-specifically churches and community organizations that provide assistance for needy. In the PSID, households were asked the type of help received in the past two years from non-government sources. For example, households provided information on assistance received in the form of housing, child care, transportation, clothing, health care, job training, and so on. The data available in the PSID covers benefits received over a two-year period. About 2.5 percent of the sample reports receiving assistance from non-government sources. Table 1 indicates that on average, immigrants are less likely than native-born households to receive assistance from non-government sources (2 percent of immigrant households compared to 3 percent of native-born households report receiving assistance).

4.3 Immigrant-Native Differences in Household Characteristics

One key factor that we consider is the role of wealth and income differences in explaining the gap in voluntary contributions among immigrant and native-born households. To this end, we construct a measure of permanent income using the PSID in order to capture a household's economic position, as this factor has been shown to have a larger effect on transfer behavior than transitory income (Auten, Holger-Sieg, & Clotfelter, 2002).[17] Mean permanent household income is lower among immigrant households compared to native-born households (mean permanent income is $42631 for immigrants compared to $62063 for native-born households). The average wealth holdings and average yearly income of immigrant households are also considerably lower compared to the native-born households.

An additional insight from the theoretical model is that variation in extended family resources

[17]Our measure of permanent income is based on average family income from 1997, 1999, and 2001 waves of the PSID. Total family income can contain negative values. The number of households with negative numbers for those variables is relatively small, and we replace these negative values with missing values.

can induce differences in the transfer behavior of immigrant compared to native-born households. We do not have a direct measure of extended family resources. However, to capture extended family's circumstances, we use a proxy variable—the household head father's education. We find striking differences in the educational attainment of extended family members among immigrant and native-born households. Specifically, while 96 percent of heads' fathers for immigrant households have not completed high school, only 36 percent for heads' fathers for native-born households have not completed high school.

Finally, we should note that there are important differences in summary household characteristics between immigrant and native-born households in both PSID(Table 1) and CPS(Table 2). In particular, the heads of immigrant households tend to be younger, more likely to be married, non-white, and tend to have lower levels of educational attainment. Heads of immigrant households are also more likely to be unemployed, suggesting that immigrants tend to be more economically vulnerable than native-born household heads.

4.4 Second and Higher Generation Households

Table 1 also provides summary information for second-generation and higher-generation households.[18] We note that second-generation households comprise about 10 percent of the native-born households in both the PSID and CPS . In PSID by comparing the Columns 1 and 3 in Table 1, we find that in contrast to immigrant households, second generation households have higher incidence and levels of monetary and time contributions, but lower incidence and levels of private transfers and receipt of assistance. On the other hand, we find that the transfer behavior of second-generations is very similar to that of higher generations of the native-born. Interestingly, second-generation immigrants have higher mean levels of education, income, and wealth compared to third or higher generations. In addition the extended family's educational attainment of second generation households are comparable to that of third or higher generation households. We present summary statistics in time contributions and household characteristics for second generation households from the CPS in Table 2.

[18]Second generation households are defined as households where the head has at least one parent who is an immigrant.

5 Results and Discussion

5.1 The Impact of Immigrant Status on Transfer and Contribution Behaviors -Results from Baseline Univariate and Trivariate Models

We now turn to discuss main results from the baseline univariate and trivariate regression analysis on the impacts of immigrant status on monetary contributions, private transfers, and time contributions. Table 3 (Row A in Panels I and II) presents results from the baseline univariate and trivariate Probit and Tobit regressions on monetary contributions. The estimates in all regressions in Table 3 include controls for socio-demographic variables, the price of giving, and log permanent income.[19] We also report marginal effects (calculated at the variable means) for the univariate probit and Tobit estimates.

Results from both univariate and trivariate Probit models show that immigrant status has no significant impact on the likelihood of monetary contributions. Moreover, from the marginal effect in the univariate model, we find that immigrant status reduces the likelihood of monetary contributions by only 0.5 percentage point, and it is insignificant. Similarly, The univariate and trivariate Tobit specifications on monetary contribution levels show that immigrant status has no significant effect on the level of monetary contributions to charitable organizations.

In Table 3 (Row B in Panels I and II), we present results for private transfers to non-household members. In contrast to the results on monetary contributions, immigrant households appear more likely than similar native-born households to participate in private transfer networks, even after we have controlled for economic and demographic variables; In both univariate and trivariate models, the impact of immigrant status on probability of private transfers is significant. Starting at the mean, we find that immigrants are 7.3 percentage points more likely to give private transfers to non-household members compared to similar native-born households, holding other variables constant.

More interestingly, from univariate and trivariate models, we get quite different results on the impact of immigrant status on levels of private transfers, which is highly significant(at 1% level) in the univariate model, but insignificant(even at 10% level) in the trivariate model. We attribute

[19]The control variables in our analysis are age, age squared, education, gender, marital status, nonwhite, Catholic, family size, log permanent income, unemployment and region dummies. For dichotomous variables, the results represent the change in the probability and the percentage change in level of contributions associated with a change in the indicator variable from zero to one.

this discrepancy to the different treatments of error terms in univariate and trivariate models. In univariate models, the unobservable factors in the error term are uncontrolled, so correlation between immigrant status and unobservable factors causes bias in estimation and makes immigrant status significant even if it has no real explanatory power. On the other hand, in trivariate model, common unobservable factors in the error terms of the 3 univariate regressions are controlled through the ML estimation of correlation coefficients of error terms, thus if immigrant status has no real explanatory power, it won't be significant even if it is highly correlated with common unobservable factors in the error terms. In our current case with highly correlated error terms, the trivariate estimations are more accurate. Thus we may conclude that immigrant status has a significant and positive impact on the probability of private transfers, but no significant impact on the level of private transfers, and infer that immigrant status is highly correlated with the common unobservable factors.

The baseline findings from PSID on the impact of immigrant status on time contributions are presented in Table 3 (Row C in Panels I and II). We find that, in both the univariate and the trivariate models, immigrants status has significant and negative impacts on both incidence and level of time contributions. Specifically, the marginal effects from the univariate probit and tobit model indicate that immigrants are 8.6 percentage points less likely to volunteer compared to a similar native-born household, and that volunteer hours for an immigrant household are about 46 percent lower, compared to a similar native-born household. Results from the CPS are discussed in Subsection 5.6.4.

In sum, holding other factors constant, immigrant households are indifferent from native households in probability and level of monetary contribution, and in level of private transfers, but immigrant households are more likely to participate in private transfers networks. Moreover, immigrants are significantly less likely to contribute time and have lower levels of time contributions, compared to similar native-born households.

5.2 The Impact of Immigrant Status on Receipt of Assistance from Non-government Sources-Results from An Univariate Model

The baseline findings from the univariate model on the impact of immigrant status on receipt of assistance from non-government sources, including churches, community groups, and families, are

summarized in Table 3 (Row D in Panel II). The key dependent variable is defined as follows: whether an individual receives some type of assistance–health, housing, transportation, child care from non-government sources, including churches, community groups, and families. We are particularly interested in immigrant-native differences in the receipt of assistance from non-government sources, as this aspect provides a comprehensive picture of free-riding behavior.

We find that immigrants are significantly less likely to receive assistance from non-government sources, compared to similar native-born households. Specifically, immigrant households are 0.6 percentage points less likely to receive assistance compared to a similar native-born household.

5.3 The Impact of Duration of Stay

One key question in this paper is how the voluntary contributions of immigrants evolve as they accumulate U.S. experience, and acquire language skills, information, social norms, and processes of their host communities.[20] The main implications of the theoretical model is that for immigrant households contribution behaviors will tend to increase and private transfers tend to decreases with duration of stay, that is, the immigrant-native gap in contribution and transfer behaviors tend to diminish–if differences in contributions are mainly driven by initial gaps in household and extended family resources.[21] In Table 4, we adopt flexible trivariate probit and tobit specifications in order to examine the impact of immigrants' duration of stay in the U.S. on monetary contributions, private transfers and time contributions, and an univariate probit specification on the incidence of receipt of assistance.

The results in monetary contributions from Table 4 (Panel A) show no significant difference in the likelihood and level of monetary contributions between immigrants and native-born households during all stages of immigrant's duration of stay. [22]

Table 4 (Panel B) allows us to examine the effects of the duration of stay on private-transfer

[20]We should note that there are some limitations because we rely on cross-sectional data on charitable giving. Ideally, longitudinal data would allow us to observe a given household over time, enabling us to separately identify the role of cohort or "time of arrival" effects and duration effects in the assimilation process.

[21]A large number of studies investigate the extent to which immigrants' earnings, skill levels, and occupational attainment converges to the native born (Borjas & Friedburg, 2006; Borjas, 1994; Borjas, 1985; Chiswick, 1978). Chiswick (1978) estimates that the wages of the foreign born converge to the native-born wages after 15 years. Borjas (1985) argues that the use of cross-sectional data may overstate the rate of wage assimilation.

[22]We also examine the inclusion of the immigrant's length of stay (in years) in the U.S interacted with immigrant status (results not shown). The parameter on the duration of stay variable captures how an additional year in the U.S. affects the immigrant's likelihood of giving. From our results, an additional year in the U.S. has a positive effect on charitable giving.

behavior. In the trivariate probit model, we note that immigrant households have a higher likelihood of participating in private transfer networks for the first 20 years. However, for immigrants who have been in the U.S. for 20 years or longer, the immigrant-native gap in private transfers diminishes. In the trivariate tobit model, we note that immigrants are indifferent from natives in amounts of private transfers at all stages of their durations.

Table 4 (Panels C) allows us to examine how duration of stay affects time contributions in PSID. We are particularly interested in time contributions because volunteer activity tends to be closely linked with the private provision of local public goods. The baseline results suggest that immigrants regardless of their duration of stay are less likely to contribute time and contribute less time compared to similar native-born households. However, in the trivarate probit specification, we find that the impact of immigrant status on time contributions does *decrease* with time in the U.S. Specifically, the magnitude and (to some extent) significance of the coefficients on the joint terms of immigrant status and durations decrease; Immigrants with more than 20 years of U.S. experience are not significantly different (at the 5 percent level of significance) from similar native-born households in both incidence and levels of time contributions.

More interestingly, the impact of immigrant status on level of time contributions become insignificant at all stages of duration after we control for the duration of stay.

Finally, Table 4 (Panel D) examines how duration of stay affects the receipt of assistance. We find that the incidence of immigrants' receipt of assistance increases over time. In particular, immigrants with more than 20 years of U.S. experience are not significantly different from similar native-born households in receipt of assistance.

To summarize, the results on the impacts of duration on transfer and contribution behaviors, and the receipt of assistance suggest that the transfer and contribution patterns of immigrant households tend to converge to that of the native-born, as immigrant households gain US experience. More specifically, there are no significant differences between the immigrant and the native in all analyzed behaviors after 20 years since the immigrant's arrival.

5.4 The Impact of Household Characteristics

Now that we have discussed the impact of our main variables of interest—immigrant status and duration of stay, we turn to examine how additional variables other than immigrant status impact

transfer and contribution behaviors, and the receipt of assistance. These results are shown in Appendix Tables 1-3.

The theoretical model provides some insights on how age, price of giving, permanent income, and other household variables affect transfer and contribution behaviors for immigrants and native-born households. Appendix 1 shows results from the baseline trivariate model on monetary contributions, private transfers, and time contributions.

Consistent with other studies on monetary contributions, we find that there are significant life-cycle effects in monetary contributions to charitable organizations. Both the incidence and levels of monetary contributions increase with age, but eventually declines among older households.[23]

We also draw on the literature on voluntary contributions which emphasizes the role of the price of giving and the role of income on monetary contributions (Clotfelter,1985). Because income and the price of giving are measured in logs, we can interpret the coefficients on these variables as elasticities. [24]The price of monetary contributions is calculated by 1 minus the marginal tax rate for itemizers; it is unity for non-itemizers. We calculate the marginal tax rate for itemizers using TAXSIM version 5 (Feenberg and Coutts, 1993).[25]Appendix 1 also presents the full set of regression results for the baseline trivariate model for private transfers and time contributions. Appendix 2 presents full results from the baseline probit and tobit model for time contributions in CPS. Appendix 3 presents full results for the receipt of assistance from non-government sources.

5.5 Robustness and Specification Checks

5.5.1 Including Alternative Income/Wealth controls

In this section, we consider an important issue that emerges from the theoretical model: the need to take into account the resource constraints facing immigrant and native-born households. In

[23]One interesting implication of the theoretical model that we examine is that immigrants will increase their monetary contributions faster than native-born households over time. When we include age and age squared interacted with immigrant status, we do not find these interaction terms to be statistically significant for either the likelihood or levels of monetary contributions.

[24]We have also considered the interaction of the price of giving and immigrant status and do not find this to have a statistically significant impact.

[25]The 18 input variables used to calculate the price of giving include tax year (2000), marital status, number of children in the family unit, number of taxpayers (head and spouse) over 65 years of age, labor income of the head, labor income of the wife, dividend income of head and spouse, property income, pension income, gross social security income, transfer income, rent paid, property taxes paid, itemized deductions (charitable deduction and medical deduction), child care expense, and unemployment compensation.

the baseline specification, we have included a measure of permanent incomes to capture wealth and income differences between immigrant and native-born households. To examine the robustness of the results, we introduce additional controls for wealth and annual household income in order to ensure that our results on the impacts of immigrant status captures more than differences in income and wealth (see Panel I in Table 5).[26] We should mention that when we include controls for yearly income and household wealth in addition to permanent income, the results on the impact of immigrant status on monetary and time contributions, private transfers, and the receipt of assistance are all robust to the inclusion of wealth and alternative income measures. However, with the full control of permanent income, annual household income, and wealth, the magnitude of the impact of immigrant status on level of monetary contributions increases and becomes statistically significant (at the 5 percent level of significance). The results on the impact of U.S. experience are also robust to the inclusion of wealth and alternative income measures. [27]

5.5.2 Censored Least Absolute Deviations (CLAD) Model

In Panel II of Table 5, we estimate the impact of immigrant status on levels of monetary contributions using Powell's Censored Least Absolute Deviations (CLAD) regression model (Powell, 1984). The CLAD model has been regarded as a desirable alternative to Tobit and other maximum likelihood estimation methods due to its robustness to conditional heteroskedasticity and distributional misspecification of the error term. The result on the impact of immigrant status on level of monetary contributions is robust when we estimate it in the CLAD regression model. Specifically, we find that immigrant status has a negative but statistically insignificant impact on the level of charitable donations.

5.5.3 Results on Time Contributions from CPS data

The CPS data contains detailed information on time contributions and immigrant status, allowing us to inspect the impact of immigrant status on time contributions. This serves as an important robustness check to the PSID estimates on time contributions. As noted earlier, a low share of

[26] Results are not reported here. We should note that all measures of income that we have used have a positive impact on the incidences and levels of monetary contributions and private transfers.

[27] Results are not reported here. We should note that all measures of income that we have used positively impact the incidences and levels of monetary contributions and private transfers.

households (20%) volunteer time in both CPS and PSID. For this reason, the large samples of immigrant and the native-born households in the CPS provide an important advantage is in the study of time contributions.

In Panel III of Table 5, we show the main results from CPS. The first set of estimates present the impact of immigrant status on the likelihood and the level of time contributions. The second result is the impact of duration of stay on time contributions. The results from CPS are strikingly similar to those from PSID and increases our confidence in the results reported earlier in the paper. In particular, immigrant status has a negative and significant impact on both the probability and the incidence of time contribution. Moreover, this impact decreases as the immigrant acquires U.S. experience. Specifically, we find that sizeable immigrant-native gaps are only observed for immigrants who have been in the U.S for less than 20 years; after this period, the differences in time contributions are much less significant.[28] We also note one difference between the results from PSID and from CPS: the impact of immigrant status on level of time contributions is significant at all stages of stay in CPS, but insignificant in PSID. We attribute this discrepancy to the different treatments of error terms in the trivariate and univariate models.

5.6 The Long-Term Impact of Immigration on Transfer Behavior

From a policy viewpoint, it would be useful to consider how children of immigrants compare to third or higher generation households in their willingness to contribute to public goods. The theoretical model predicts that immigrant-native gaps will tend to diminish over time if gaps are induced by wealth and extended family resources. We investigate the long-term impact of immigration on transfer and contribution behaviors by examining second-generation immigrants. In this study, the second-generation are defined as households where the head has at least one foreign-born parent. The key variable of interest is second generation status, and we compared the second generation to all other native households (third or higher generations). Immigrant households are excluded from these regressions.

Table 6 provides empirical results from Probit and Tobit models of second generation and higher generation of native-born households. We first discuss results from the PSID. Panel I presents the

[28] In future work, we plan to exploit longitudinal data on time transfers (as this becomes available) to identify "cohort" versus "duration of stay" effects.

univariate results of second generation status on transfer and contributions behaviors, and receipt of assistance. In Panels II and III, We use trivariate and CLAD regressions to check the robustness of the univariate results. Finally, Panel IV presents results on time contributions from CPS, and serves as a robustness check of the corresponding results from PSID.

In general, the results from Table 6 suggest that the children of immigrants are not significantly different in their monetary and time contributions to public goods, their private transfers, and on their receipt of benefits from non-government sources.

6 Conclusions

Since the 1996 welfare reform, policy debates on immigration have increasingly shifted attention from the federal government towards state, local, and non-profit institutions. In the U.S., perhaps more than in any other industrialized nation the financing of social services, health care, higher education, and disaster relief, and other key public goods depends heavily on private contributions or on a mixture of public and private contributions. Under PWORA, U.S. nonprofit charitable organizations are not legally required to verify immigration status, when they provide assistance or when they receive voluntary contributions.

This paper examines new evidence on immigrant and native-born differences in transfer and contribution behaviors, and in the receipt of assistance from non-government sources by using PSID and CPS data. Taken together, the results on voluntary contributions suggest that immigrants and their children are less likely to be a burden on host societies. There is no significant differences between immigrants and natives in monetary contribution behavior. Moreover, compared with similar natives, immigrants are significantly less likely to receive assistance from non-government sources. Though immigrants are more likely to take part in the private transfer networks, are less likely to make time contributions, and averagely provide less time contributions, these differences diminish as their duration of stay in the U.S. increases. General speaking, there are no significant differences between the immigrant and the native in all transfer and contribution behaviors, as well as receipt of benefit, after the immigrant's first 20 years of stay in the U.S.. The results are robust to alternative income and wealth controls and specifications, and robust in different data set.

The above results from comparison of immigrants and natives suggest that immigrants tend to adapt relatively quickly to U.S. institutions. The comparison between behaviors of second-generation (children of immigrants) and higher generation households provides insights into the long-term impact of immigration on transfer and contribution behaviors. We find no significant differences between the children of immigrants and third or higher generations of American in their voluntary contributions or private transfer behavior.

Beyond their role in the private provision of public goods, voluntary contributions of money and time have emerged in the recent literature as key indicators of social capital -defined as trust, norms, and networks that spillover to the market and state and that can improve the efficiency of society by facilitating cooperative outcomes. With this in mind, the results on immigrant-native differences in voluntary contributions to public goods may have implications for understanding the impact of immigration on broader societal outcomes.

7 Appendix

In the appendix, we analyze a formal dynamic differential game between a representative immigrant and a representative native-born household. We first setup the household's maximization problem with upper-index i for the immigrant household, and upper-index n for the native-born household. In each model, we analyze the optimal charitable behavior of the objective household with respect to the other household's choice, and the changes over time in the immigrant-native gap in monetary and time contributions. Finally, in the subsection of comparative statics analysis we present the key theoretical implications of the model: (1) the immigrant-native gap in monetary contributions is in part explained by income effect, instead of the substitution effect between contributions and private transfers; (2) although there is not substitution effect between charitable giving and private transfer, they are positively correlated; and (3) extended family's wealth has positive impacts on monetary and time contributions, but has a negative impact on private transfers.

7.1 The Model

Because both the immigrant and the native-born households face very similar utility maximization problems, we set up one model for both. The household's utility maximization problem is as follows, with upper-index j=i for the immigrant household, and upper-index j=n for the native-born household.

$$\max_{\substack{x_t^j, l_t^j, n_t^j \\ g_t^j, v_t^j, e_t^j}} \int_0^\infty e^{-\rho t}[U(x_t^j, l_t^j; g_t^j, v_t^j; G_t, V_t) + \beta U_F(A_F{}_t^j)]dt$$

$$\text{s.t.} \quad l_t^j + n_t^j + v_t^j = L$$

$$\dot{A_t^j} = wn_t^j + rA_t^j - x_t^j - (1-\tau)g_t^j - e_t^j$$

$$\dot{A_F{}_t^j} = e_t^j$$

$$G_t = g_t^n + g_t^i$$

$$V_t = v_t^n + v_t^i$$

$$\text{with } A_0^j \text{ and } A_F{}_0^j \text{ given, } A_0^i < A_0^n, \; A_F{}_0^i < A_F{}_0^n \text{ and } \rho - r < 0$$

The utility function $U(x_t^i, l_t^i; g_t^i, v_t^i; G_t^i, V_t^i)$ and $U_F(A_F{}_t^i)$ satisfy the typical assumptions[29] and Inada Condition. The state variables are A_t^j and $A_F{}_t^j$.The control variables are $x_t^j, l_t^j, n_t^j, g_t^j, v_t^j$, and e_t^j. The Hamiltonian is

$$H_t^j = U(x_t^j, l_t^j; g_t^j, v_t^j; g_t^n + g_t^i, v_t^n + v_t^i) + \beta U_F(A_F{}_t^j)$$

$$+ \lambda_t^j[wL - wl_t^j - wv_t^j + rA_t^j - x_t^j - (1-\tau)g_t^j - e_t^j] + \delta_t^j e_t^j \tag{3}$$

The maximum principle conditions are:

$$\frac{\partial H_t^j}{\partial x_t^j} = \frac{\partial U}{\partial x_t^j} - \lambda_t^j = 0 \tag{4}$$

[29]Utility functions are continuously differentiable and strictly concave. Utility increases at a decreasing rate for each argument. In addition, cross partials on utility functions are zeros.

$$\frac{\partial H_t^j}{\partial l_t^j} = \frac{\partial U}{\partial l_t^j} - w\lambda_t^j = 0 \tag{5}$$

$$\frac{\partial H_t^j}{\partial g_t^j} = \frac{\partial U}{\partial g_t^j} + \frac{\partial U}{\partial G_t} - (1-\tau)\lambda_t^j = 0 \tag{6}$$

$$\frac{\partial H_t^j}{\partial v_t^j} = \frac{\partial U}{\partial v_t^j} + \frac{\partial U}{\partial V_t^j} - w\lambda_t^j = 0 \tag{7}$$

$$\frac{\partial H_t^j}{\partial e_t^j} = \delta_t^j - \lambda_t^j \leqslant 0, \;\; e_t^j \geqslant 0, \;\; \text{and} \;\; \frac{\partial H_t^j}{\partial e_t^j} e_t^j = 0 \tag{8}$$

$$\dot{A_t^j} = w(L - l_t^j - v_t^j) + rA_t^j - x_t^j - (1-\tau)g_t^j - e_t^j \tag{9}$$

$$\dot{A_{F}{}_t^j} = e_t^j \tag{10}$$

$$\dot{\lambda_t^j} = -\frac{\partial H_t^j}{\partial A_t^j} + \rho\lambda_t^j = (\rho - r)\lambda_t^j \tag{11}$$

$$\dot{\delta_t^j} = -\frac{\partial H_t^j}{\partial A_{F}{}_t^j} + \rho\delta_t^j = \rho\delta_t^j - \beta U'_F(A_{F}{}_t^j) \tag{12}$$

7.2 Dynamic Analysis

We begin our analysis with monetary contributions, g_t^i and g_t^n. Then we briefly conclude for v_t^i and v_t^n, because the analysis is identical to that of monetary contributions. Finally we study the private transfer, e_t^i and e_t^n.

From (11) we get

$$\lambda_t^j = \lambda_0^j e^{(\rho - r)t}. \tag{13}$$

By substituting (13) into (6) we get

$$U_{g_t^j} + U_{G_t} = (1-\tau)\lambda_0^j e^{(\rho - r)t}. \tag{14}$$

By taking total derivative[30] on both sides of (14) and rearranging it, we get the law of motion for g_t^i as a function of $\dot{g_t^n}$

$$\dot{g_t^i} = \frac{(1-\tau)\lambda_0^i e^{(\rho - r)t}(\rho - r) - U_{G_tG_t}\dot{g_t^n}}{U_{g_t^i g_t^i} + U_{G_tG_t}}, \tag{15}$$

[30] We refer to the full derivative with respect to time as the total derivative.

and symmetrically, the law of motion for g_t^n as a function of $\dot{g_t^i}$

$$\dot{g_t^n} = \frac{(1-\tau)\lambda_0^n e^{(\rho-r)t}(\rho-r) - U_{G_tG_t}\dot{g_t^i}}{U_{g_t^n g_t^n} + U_{G_tG_t}}. \tag{16}$$

From (15) and (16), one can further get the reduced forms of law of motion of monetary contributions for both the immigrant and the native-born household:

$$\dot{g_t^i} = \frac{(1-\tau)e^{(\rho-r)t}(\rho-r)[(\lambda_0^i - \lambda_0^n)U_{G_tG_t} + \lambda_0^i U_{g_t^n g_t^n}]}{U_{G_tG_t}(U_{g_t^i g_t^i} + U_{g_t^n g_t^n}) + U_{g_t^i g_t^i} \cdot U_{g_t^n g_t^n}}, \tag{17}$$

$$\dot{g_t^n} = \frac{(1-\tau)e^{(\rho-r)t}(\rho-r)[(\lambda_0^n - \lambda_0^i)U_{G_tG_t} + \lambda_0^n U_{g_t^i g_t^i}]}{U_{G_tG_t}(U_{g_t^i g_t^i} + U_{g_t^n g_t^n}) + U_{g_t^i g_t^i} \cdot U_{g_t^n g_t^n}}. \tag{18}$$

Note that (17) and (18) have the same numerator, which is positive. Further because $\rho - r < 0$, then the signs of $\dot{g_t^i}$ and $\dot{g_t^n}$ depend on the signs of $(\lambda_0^i - \lambda_0^n)U_{G_tG_t} + \lambda_0^i U_{g_t^n g_t^n}$ and $(\lambda_0^n - \lambda_0^i)U_{G_tG_t} + \lambda_0^n U_{g_t^i g_t^i}$, respectively. Recall that λ is the marginal utility of wealth, and the immigrant is assumed to have less initial wealth than the native-born does, so $\lambda_0^i > \lambda_0^n$, then it follows that $(\lambda_0^i - \lambda_0^n)U_{G_tG_t} + \lambda_0^i U_{g_t^n g_t^n} < 0$, and thus $\dot{g_t^i} > 0$.

On the other hand, the sign of $(\lambda_0^n - \lambda_0^i)U_{G_tG_t} + \lambda_0^n U_{g_t^i g_t^i}$ is ambiguous. However, for simplification, we may assume approximately that $U_{G_tG_t} = 0$, because U_G is expected to be very close to 0 compared with U_g. Indeed, people contribute to public good provision mainly because of warm-glow effect rather than expecting the increment in the public good from their contribution will directly improve their own lives greatly; Otherwise, they would prefer to consume their contributions privately, which directly increase their utility more effectively. In addition, one dollar increment in the aggregate public goods brings almost none additional utility to a household. Simply image how little utility a household can get from sharing one dollar with, say, hundreds of other households. The above reasonings justify the approximation that $U_{G_t} = 0$ and $U_{G_tG_t} = 0$. Based on this assumption, we get $(\lambda_0^n - \lambda_0^i)U_{G_tG_t} + \lambda_0^n U_{g_t^i g_t^i} = \lambda_0^n U_{g_t^i g_t^i} < 0$, and thus $\dot{g_t^n} > 0$ as well.

Though both the immigrant and the native-born increase their monetary contributions over time, the more important questions are the immigrant-native gap in monetary contributions and how it develops over time. By subtracting (14) for the native-born($j = n$) from (14) for the

immigrant($j = i$), we get

$$U_{g_t^i} - U_{g_t^n} = (1-\tau)e^{(\rho-r)t}(\lambda_0^i - \lambda_0^n), \tag{19}$$

since $\lambda_0^i > \lambda_0^n$, $U_{g_t^i} - U_{g_t^n} > 0$. Then because second-order cross-partials are zeros, $U_g(\cdot)$ is strictly decreasing in g, thus $g_t^i < g_t^n$, i.e., the immigrant provides less monetary contributions than the native-born does.

Since $g_t^i < g_t^n$, $\dot{g_t^i} > 0$ and $\dot{g_t^n} > 0$, to find out whether the immigrant-native gap in monetary contributions ($g_t^i - g_t^n$) diminishes over time, we only need to find out whether $\dot{g_t^i} > \dot{g_t^n}$ or not.

Proposition 1: *A sufficient condition for diminishing immigrant-native gap in monetary contributions($\dot{g_t^i} > \dot{g_t^n}$) is that*

$$\frac{U_{g_t^n g_t^n} - U_{g_t^i g_t^i}}{U_{G_t G_t}} > 2(1 - \frac{\lambda_0^i}{\lambda_0^n}), \quad \forall t. \tag{20}$$

Proof: By subtracting (18) from (17), and by substituting (14) in, one can easily get

$$\dot{g_t^i} - \dot{g_t^n} = \frac{(\rho - r)[2(U_{g_t^i} - U_{g_t^n})U_{G_t G_t} + (U_{g_t^i} + U_{G_t})U_{g_t^n g_t^n} - (U_{g_t^n} + U_{G_t})U_{g_t^i g_t^i}]}{U_{G_t G_t}(U_{g_t^i g_t^i} + U_{g_t^n g_t^n}) + U_{g_t^i g_t^i} \cdot U_{g_t^n g_t^n}}. \tag{21}$$

Since $\rho - r < 0$,

$$sgn(\dot{g_t^i} - \dot{g_t^n}) = sgn(M_t), \tag{22}$$

where $sgn(\cdot)$ is the sign function, and $M_t = 2(U_{g_t^n} - U_{g_t^i})U_{G_t G_t} + (U_{g_t^n} + U_{G_t})U_{g_t^i g_t^i} - (U_{g_t^i} + U_{G_t})U_{g_t^n g_t^n}$. It is easy to verify that

$$M_t > 2(U_{g_t^n} - U_{g_t^i})U_{G_t G_t} + (U_{g_t^n} + U_{G_t})(U_{g_t^i g_t^i} - U_{g_t^n g_t^n}). \tag{23}$$

Suppose now that $\frac{U_{g_t^n g_t^n} - U_{g_t^i g_t^i}}{U_{G_t G_t}} > 2(1 - \frac{\lambda_0^i}{\lambda_0^n})$. Then by substituting (14) into the last inequality, and though calculation, we get $2(U_{g_t^n} - U_{g_t^i})U_{G_t G_t} + (U_{g_t^n} + U_{G_t})(U_{g_t^i g_t^i} - U_{g_t^n g_t^n}) > 0$. Then from (22) and (23), we know $\dot{g_t^i} - \dot{g_t^n} > 0$. This completes the proof. □

Notice that the right hand side of (20) is a constant pre-determined by the immigrant's and the native-born's initial wealth. *Proposition 1* tells us that as long as $\frac{U_{g_t^n g_t^n} - U_{g_t^i g_t^i}}{U_{G_t G_t}}$ is above the fixed level pre-determined by both households' initial wealth, the immigrant-native gap in monetary

contributions diminishes over time.

Proposition 1 provides a complicated sufficient condition for diminishing immigrant-native gap in monetary contributions. To find other sufficient conditions which are more intuitive and more understandable, we may again assume that $U_{G_t} = 0$ and $U_{G_tG_t} = 0$. In this case, (17) and (18) are simplified to be

$$\dot{g_t^i} = \frac{(1-\tau)e^{(\rho-r)t}(\rho-r)\lambda_0^i}{U_{g_t^i g_t^i}}, \tag{24}$$

$$\dot{g_t^n} = \frac{(1-\tau)e^{(\rho-r)t}(\rho-r)\lambda_0^n}{U_{g_t^n g_t^n}}. \tag{25}$$

Proposition 2: *Another sufficient condition for diminishing immigrant-native gap in monetary contributions($\dot{g_t^i} > \dot{g_t^n}$) is that*

$$U_{g_t^i g_t^i} > \frac{\lambda_0^i}{\lambda_0^n} U_{g_t^n g_t^n} \quad \text{or} \quad \frac{U_{g_t^i g_t^i}}{U_{g_t^n g_t^n}} < \frac{\lambda_0^i}{\lambda_0^n}, \quad \forall t > 0. \tag{26}$$

Proof: The result is obvious from (24) and (25). □

Recall that U_{gg} is the decreasing speed of marginal utility of warm-glow effect from monetary contributions. Intuitively, (26) tell us that the immigrant-native gap in monetary contributions diminishes, as long as the decreasing speed of marginal utility of monetary contributions for the immigrant does not exceed a fixed multiple of the speed for the native-born household.

Corollary 1: *Each of the followings is a sufficient condition for diminishing immigrant-native gap in monetary contributions over time:*

(i) $U_{ggg}(\cdot) \leq 0$.

(ii) $U_{ggg}(\cdot) > 0$, $\left(\frac{U_{g_0^i g_0^i}}{U_{g_0^n g_0^n}}\right)^2 \leq \frac{\lambda_o^i}{\lambda_0^i}$ *and* $U_{gggg}(\cdot) \leq 0$.

Proof: Our strategy is to prove that each condition is sufficient for (26) to be hold.

The sufficiency of Condition (i) is easy to prove, since $\frac{\lambda_0^i}{\lambda_0^n} > 1$.

To prove sufficiency of Condition (ii), we first prove that $U_{ggg}(\cdot) > 0$ and $\left(\frac{U_{g_t^i g_t^i}}{U_{g_t^n g_t^n}}\right)^2 \leq \frac{\lambda_o^i}{\lambda_0^i}$ $\forall t \geq 0$, is a sufficient condition for (26), then we prove that $\left(\frac{U_{g_0^i g_0^i}}{U_{g_0^n g_0^n}}\right)^2 \leq \frac{\lambda_o^i}{\lambda_0^i}$ and $U_{gggg}(\cdot) \leq 0$ guarantee

that $\left(\frac{U_{g_t^i g_t^i}}{U_{g_t^n g_t^n}}\right)^2 \leq \frac{\lambda_o^i}{\lambda_0^i}$, $\forall t \geq 0$.

Firstly, Suppose $U_{ggg}(\cdot) > 0$ and $\left(\frac{U_{g_t^i g_t^i}}{U_{g_t^n g_t^n}}\right)^2 \leq \frac{\lambda_o^i}{\lambda_0^i}$, $\forall t \geq 0$. Then because $U_{gg}(\cdot) < 0$ and $g_t^i < g_t^n$, we get $1 < \frac{U_{g_t^i g_t^i}}{U_{g_t^n g_t^n}} < \left(\frac{U_{g_t^i g_t^i}}{U_{g_t^n g_t^n}}\right)^2 \leq \frac{\lambda_o^i}{\lambda_0^i}$, $\forall t \geq 0$. That is, (26) is satisfied.

Secondly, suppose $U_{gggg}(\cdot) \leq 0$ and $\left(\frac{U_{g_0^i g_0^i}}{U_{g_0^n g_0^n}}\right)^2 \leq \frac{\lambda_o^i}{\lambda_0^i}$. Then one can verify that $\frac{U_{g_0^i g_0^i g_0^i}\lambda_0^i}{(U_{g_0^i g_0^i})^2} \geq \frac{U_{g_0^n g_0^n g_0^n}\lambda_0^n}{(U_{g_0^n g_0^n})^2}$, which is equivalent to $\frac{\dot{U}_{g_0^i g_0^i}}{|U_{g_0^i g_0^i}|} \geq \frac{\dot{U}_{g_0^n g_0^n}}{|U_{g_0^n g_0^n}|}$. That is, the percentage increment of $|U_{g_t^i g_t^i}|$ is greater than the percentage increment of $|U_{g_t^n g_t^n}|$ at $t = 0$. This guarantees that for $\epsilon \to 0^+$, $\left(\frac{U_{g_\epsilon^i g_\epsilon^i}}{U_{g_\epsilon^n g_\epsilon^n}}\right)^2 \leq \left(\frac{U_{g_0^i g_0^i}}{U_{g_0^n g_0^n}}\right)^2 < \frac{\lambda_0^i}{\lambda_0^n}$. By iterating forward, we get $\left(\frac{U_{g_t^i g_t^i}}{U_{g_t^n g_t^n}}\right)^2 \leq \left(\frac{U_{g_0^i g_0^i}}{U_{g_0^n g_0^n}}\right)^2 < \frac{\lambda_0^i}{\lambda_0^n}$, $\forall t \geq 0$. □

Condition (i) is simpler and neater than Condition (ii), yet less desirable, because $U_{ggg}(\cdot) \leq 0$ implies IARA, and the only common utility function satisfying $U_{ggg}(\cdot) \leq 0$ is the quadratic utility function. On the other hand, Condition (ii) is more desirable, because it allows CARA, DARA, and CIES utility functions.

From the analysis above, we can conclude that the immigrant provides less monetary contribution than the native-born does, however, both the immigrant and the native-born households increase their monetary contributions over time. Moreover, the immigrant-native gap in monetary contributions diminishes in time if $\frac{U_{g_t^n g_t^n} - U_{g_t^i g_t^i}}{U_{G_t G_t}} > 2(1 - \frac{\lambda_0^i}{\lambda_0^n})$, or if $U_{g_t^i g_t^i} > \frac{\lambda_0^i}{\lambda_0^n} U_{g_t^n g_t^n}$. In particular, if the household's utility in the warm-glow effect of monetary contributions satisfies either condition in Corrolary 1, the immigrant-native gap in monetary contributions diminishes over time.

The analysis for time contributions is identical to the above analysis for monetary contributions, except that we replace g_t^i with v_t^i, g_t^n with v_t^n, $G_t$with V_t and $1 - \tau$ with w. We can conclude for the time contributions that the immigrant-native gap in time contributions is negative, i.e., the immigrant provides less time contributions compared to the native-born. However, both immigrant and native-born households increase their time contributions over time. Moreover, the immigrant-native gap in time contributions diminishes in time if $\frac{U_{v_t^n v_t^n} - U_{v_t^i v_t^i}}{U_{V_t V_t}} > 2(1 - \frac{\lambda_0^i}{\lambda_0^n})$. In perticular, if the household's utility in the warm-glow effect of time contributions satisfies either condition in modified Corrolary 1, then the immigrant-native gap in time contributions diminishes over time.

Now we turn to analyze the private transfers, e_t^i and e_t^n. We concentrate on the case when both households provide positive private transfers($e_t^j > 0$). From (8) we know $\delta_t^j = \lambda_t^j$ and $\dot{\delta}_t^j = \dot{\lambda}_t^j$. By substituting (11) and (12) into the last equation we get $A_F{}_t^j = U_F'^{-1}(\frac{r}{\beta}\lambda_t^j)$, where $U_F'^{-1}(\cdot)$ is the

inverse function of $U'_F(\cdot)$. Then by taking total derivative on both sides of last equation, we get the policy function for private transfer e_t^j (when $e_t^j > 0$)

$$e_t^j = \dot{A_{Ft}^j} = \frac{r(\rho - r)\lambda_t^j}{\beta U''_F(A_{F}{}_t^j)}. \tag{27}$$

In addition, from (11), (12), and the fact that $\dot{\delta}_t^j = \dot{\lambda}_t^j$ and $\delta_t^j = \lambda_t^j$, we get

$$\lambda_t^j = \frac{\beta U'_F(A_{F}{}_t^j)}{r}. \tag{28}$$

By substituting (28) into (27) we get

$$e_t^j = \frac{(\rho - r)U'_F(A_{F}{}_t^j)}{U''_F(A_{F}{}_t^j)} = (\rho - r)R(A_{F}{}_t^j), \tag{29}$$

where $R(A_{F}{}_t^j) = \frac{U'_F(A_{F}{}_t^j)}{U''_F(A_{F}{}_t^j)}$.

Proposition 3:

If $R'(A) \geq 0$ on $A \in R_+$, then $e_t^i \geq e_t^n, \forall t \geq 0$ (i.e., the immigrant has no less private transfers than the native-born has at any time t.)

If $R'(A) > 0$ on $A \in R_+$, then $e_t^i > e_t^n, \forall t \geq 0$.(i.e., the immigrant has strictly more private transfers than the native-born has at any time t.)

Proof: To prove the first statement, suppose $R'(A) \geq 0$. Then to prove $e_t^i \geq e_t^n, \forall t \geq 0$, we only need to show that $A_{Ft}^i \leq A_{Ft}^n, \forall t \geq 0$. Recall that $A_{Ft}^i - A_{Ft}^n$ is a continuous function in t, and $A_{F0}^i - A_{F0}^n < 0$. Then suppose for contradiction that $\exists \tau > 0$, such that $A_{F\tau}^i - A_{F\tau}^n > 0$. By intermediate value theorem, it must be true that $\exists s < \tau$ such that $A_{Fs}^i - A_{Fs}^n = 0$. However, when $A_{Fs}^i - A_{Fs}^n = 0$, by (29) we know $e_s^i = e_s^n$, thus $\dot{A_{F}{}_t^i} = \dot{A_{F}{}_t^n}$, and $A_{Ft}^i = A_{Ft}^n, \forall t \geq s$. This is a contradiction. So $A_{Ft}^i \leq A_{Ft}^n, \forall t \geq 0$, as required.

To prove the second statement, suppose that $R'(A) > 0$. Then to prove $e_t^i > e_t^n, \forall t \geq 0$, we only need to show that $A_{Ft}^i < A_{Ft}^n, \forall t \geq 0$. Because we have proved in above that $A_{Ft}^i \leq A_{Ft}^n, \forall t \geq 0$, we only need to prove that $A_{Ft}^i \neq A_{Ft}^n, \forall t \geq 0$. Suppose for contradiction that $\exists t$ s.t. $A_{Ft}^i = A_{Ft}^n$, then by (29), $e_t^i = e_t^n$; However, in (27), because $\lambda_t^i \neq \lambda_t^n$, if $A_{Ft}^i = A_{Ft}^n$, it follows that $e_t^i \neq e_t^n$.

This is a contradiction, so $A^i_{Ft} \neq A^n_{Ft}$, and $A^i_{Ft} < A^n_{Ft}, \forall t \geq 0$, as required. □

Proposition 4: *The necessary and sufficient condition for decreasing/constant/increasing private transfers* $(\dot{e^j_t} < 0 \ / = 0 \ / > 0)$ *is that* $R'(A) > 0 / = 0 / < 0$.

Proof: By taking total derivative on both sides of the (29), we get

$$\dot{e^j_t} = (\rho - r)R'(A_F{}^j_t)\dot{A_F{}^j_t} = (\rho - r)R'(A_F{}^j_t)e^j_t. \tag{30}$$

Because $\rho - r < 0$, the results are obvious from (30).□

Proposition 5: *If* $R'(A) \geq 0 \ \big(R'(A) > 0\big)$ *on* $A \in R_+$, *A sufficient condition for decreasing immigrant-native gap in private transfers over time*$(\dot{e^i_t} < \dot{e^n_t}, \forall t \geq 0)$ *is that* $R''(A) < 0 \ \big(R''(A) \leq 0\big)$ *on* $A \in R_+$.

Proof: If $R'(A) \geq 0$ on $A \in R_+$, it follows From *Proposition 3* that $e^i_t \geq e^n_t, \forall t \geq 0$. Then suppose $R''(A) < 0$ on $A \in R_+$. Because $A_F{}^i_t < A_F{}^n_t, \forall t \geq 0$, it follows that $R'(A_F{}^i_t) > R'(A_F{}^n_t), \forall t \geq 0$. Then from (30), it follows that $\dot{e^i_t} < \dot{e^n_t}, \forall t \geq 0$.

Similarly, we can prove the sufficiency of the condition in parenthesis. □

Combining *Propositions 2, 3,* and *4*, we may conclude that if household's preference on extended family's wealth$\big(U_F(\cdot)\big)$ satisfies the condition that $R'(A) > 0$ and $R''(A) \leq 0$ on $A \in R_+$, where $R(A) = \frac{U'_F(A)}{U''_F(A)}$, then the immigrant provides more private transfers than the native-born does over time; private transfers decrease over time for both the immigrant and the native-born households; and the immigrant-native gap in private transfers diminishes over time.

7.3 Comparative Statics Analysis

In this subsection, we investigate the relationship between private transfers and monetary contributions:

From (10), we know $A^j_{Ft} = A^j_{F0} + \int_0^t e^j_t dt$. By substituting the this equality into (29) we get

$$e^j_t = \frac{(\rho - r)U'_F(A_F{}^j_0 + \int_0^t e^j_t dt)}{U''_F(A_F{}^j_0 + \int_0^t e^j_t dt)} \tag{31}$$

It is clear from (31) that private transfer at any time is pre-determined by parameters ρ, r, and $A_F{}^j_0$, and is thus independent of the price of charitable giving $1 - \tau$, implying that the private transfer is neither a complement nor a substitute to the charitable giving. This implication is consistent with our empirical result in Section 3 that the impact of price of giving on private transfers is insignificant. Moreover, this result, together with results from the dynamic analysis of monetary contributions, suggests that the differences in charitable giving between the immigrant and the native-born is partially caused by the income effect (the immigrant have less initial wealth than the native-born does) instead of the substitution effect between charitable giving and private transfer.

Although there is no substitution effect between charitable giving and private transfers, we should note that charitable giving and private transfer are not independent of each other. In general, both are correlated with the time discount factor ρ, the interest rate r, and the extended family's wealth $A_F{}^j_t$. For example, in (31) private transfers decrease with ρ, and increase with r; on the other hand, it is obvious from (14) that monetary contributions also decrease in ρ, and increase in r. Taken together, private transfers could be positively correlated with monetary contributions through the effects of ρ and r. This result would predict a significant positive correlation between error terms for monetary contributions and private transfers in multivariate probit and tobit models.

How do extended family resources, $A_F{}^j_t$ affect monetary contributions and private transfers? We observe from (14) that monetary(as well as time) contributions decrease with λ^j_t; on the other hand, from (28) it is clear that λ^j_t decreases with $A_F{}^j_t$. Taken together, $A_F{}^j_t$ has a positive impact on monetary(time) contributions. The relationship between extended family's wealth $A_F{}^j_t$ and private transfers e^j_t, however, is more ambiguous, and depends on certain properties of the utility function on extended family's wealth. However, we know from *Propositions 2* and *3* that under the assumption that $R'(A) > 0$ on $A \in R_+$, extended family's wealth has negative effect on private transfers. This is because lower/higher extended family's wealth causes higher/lower private transfers, both initially and over time.

References

Andreoni, James, Brown, Eleanor and Rischall, Isaac. (2003). "Charitable Giving by Married Couples: Who Decides and Why Does It Matter?" *Journal of Human Resources*, Vol. 38, No. 1 (winter, 2003), pp. 111-133.

Andreoni, James, William G. Gale, and John Karl Scholtz. (1996). "Charitable Contributions of Time and Money," mimeo, University of Wisconsin-Madison.

Auten, Gerald, Holder Sieg, and Charles Clotfelter. (2002). "Charitable Giving, Income and Taxes: An Analysis of Panel Data," *American Economic Review*, 92(1): 371-382.

Becker, Gary and N. Tomes (1979). "An Equilibrium Theory of the Distribution of Income and Intergenerational Mobility," *Journal of Political Economy*, 87:1153-89.

Bergstrom, T.C., L. Blume, and H.R. Varian. (1986). "One the Private Provision of Public Goods". *Journal of Public Economics* 29:25-49.

Borjas, George J. (1994). "The Economics of Immigration," *Journal of Economic Literature*, 32(4): 1667-1717.

Borjas, George J. (1985). "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants," *Journal of Labor Economics*, 3(4): 463-489.

Borjas, George J. and Hilton, Lynette. (1996). "Immigration and the Welfare State: Immigrant Participation in Means-Tested Entitlement Programs," *Quarterly Journal of Economics*, Vol. 111, No. 2, pp. 575-604.

Borjas, George J. and Friedberg, Rachel M. (2006). "The Immigrant Earnings Turnaround of the 1990s," Brown University mimeo, 2004.

Chiswick, Barry R. (1978). "The Effect of Americanization on the Earnings of Foreign-born Men," *Journal of Political Economy*, 86(5): 897-921.

Chiteji, Ngina and Darrick Hamilton (2000). "Family Matters: Kin Networks and Asset Accumulation," Washington University Center for Social Development Working Paper 00-6.
http://gwbweb.wustl.edu/csd/Publications/2000/wp00-6.pdf

Clotfelter, Charles T. (1985). *Federal Tax Policy and Charitable Giving.* Chicago, IL and London: The University of Chicago Press.

Council on Foundations and Association of Black Foundation Executives. (1993). *Donors of Color: A New Promising Frontier for Community Foundations.* Washington D.C.

Feenberg, Daniel and Elisabeth Coutts. (1993). "An Introduction to the TAXSIM Model," *Journal of Policy Analysis and Management*, 12(1): 189-94.

Fix, M. and J. Passel (2002), "The Scope and Impact of Welfare Reform's Immigrant Provisions," Washington, DC: Urban Institute. <http://www.urban.org>.

Hungerman, D. (2005). "Are Church and State Substitutes? Evidence from the 1996 Welfare Reform," *Journal of Public Economics*, 89, 2245-2267.

Ku, Leighton, and Alyse Freilich. (2001). "Caring for Immigrants: Health Care Safety Nets in Los Angeles, New York, Miami, and Houston," Kaiser Commission on Medicaid and the Uninsured. Washington, DC: Henry J. Kaiser Family Foundation.

O'Neill, Michael and William L. Roberts. (2000). Giving and Volunteering in California. San Francisco: Institute for Nonprofit Organization Management, College of Professional Studies, University of San Francisco.

Powell, J.S. (1984). "Least Absolute Deviation Estimation for the Censored Regression Model," *Journal of Econometrics*, 25, 303-325.

Ribar, C. David & Wilhelm, Mark, (2002). "Altruistic and Joy-of-Giving Motivations in Charitable Behavior," *Journal of Political Economy*, University of Chicago Press, vol. 110(2), pages 425-457.

Robert, Russell D., "A Positive Model of Private Charity and Public Transfers," *Journal of Political Economy*, February 1984, 92, 136-48.

Samuelson, Paul A "The Pure Theory of Public Expenditure," *the review of economics and statistics*, VOL 36, NO 4, P 387-389.

Steinberg, Richard. (1991). "Does Government Spending Crowd Out Donations? Interpreting the Evidence," *Annals of Public and Cooperative Economics*, 62(4): 591-617.

Wilhelm, Mark, (2003). "The Distribution of Giving in Six Surveys," Department of Economics, Indiana University-Purdue University at Indianapolis. mimeo.

World Bank. (2005). Global Development Finance. Washington D.C.: World Bank.