The Fertility of Second-Generation Political Immigrants in Taiwan

Wen-Jen Tsay *

This draft: April 2007

Abstract

In contrast to the results in Mayer and Riphahn (2000) where no distinction is made between the causes of economic as well as political immigrants, this paper shows that compared to native Taiwanese, the parental refugee experience results in a lower completed fertility of the children's family partly through inducing a higher female labor force participation (FLFP) of the second-generation immigrant family. In addition, the likelihood of a wife participating in the market sector increases with the number of political immigrant parents and in-laws, supporting the psychological conjecture generated from Borjas (1982) and Brenner and Kiefer (1981) in which completed fertility falls with the refugee experience shared with a couple's parents and in-laws. A positive policy toward admitting more refugees is also considered.

Key words: Second-generation political immigrants, fertility, refugee

*Tsay: Institute of Economics, Academia Sinica. 128 Academia Road, Sec. 2, Taipei, TAIWAN. Correspondence: wtsay@econ.sinica.edu.tw.

1 Introduction

The past three decades in the European Union have witnessed a 20-fold increase in asylum seekers/refugees as documented in Hatton (2004). Based on the 2006 report of United Nations High Commissioner for Refugees (UNHCR), by the end of 2005 the global number of refugees reached an estimated 8.4 million persons. The enormous number of asylum seekers/refugees threatens the use of a liberal universalist approach to refugee policy and stimulates discussions about the responsibility of liberal democratic states to these individuals.[1] The normative prescription, humanitarianism, considered in Gibney (1999) is important in being the principle to which we look first, but setting up a satisfactory refugee policy for all people surely is not easy, if not impossible. An event history study about the completed fertility of political immigrants' families provides solid and direct evidence for liberal democratic states to reckon with what is an appropriate policy toward admitting refugees, because the demographic decisions of refugees are of great importance to the long-run perspectives of refugee policy and should be considered more carefully.

Borjas (1982) and Brenner and Kiefer (1981) argue that a refugee psychologically is likely to invest more in general human capital or formal education than someone without a similar experience. This conjecture is supported by Borjas (1982) who demonstrates that the economic success of Cuban (*political*) immigrants over that of other Hispanic (*economic*) counterparts is partly due to the fact that the Cuban immigrants have invested more in U.S. schooling than other Hispanic groups.

Borjas (1982) is right not to consider the differences between Cuban immigrants and Americans since first-generation Cuban immigrants and Americans may have very different cultural backgrounds and social networking, making a fair comparison between these two groups difficult. To design a homogenous space-time atmosphere shared with the respondents under investigation, Tsay (2006) investigates the impact of the parental refugee experience on the well-being of second-generation mainland Chinese immigrants in Taiwan. The reults in Tsay (2006) point to two conclusions. First, an immigrant father can help his children achieve a higher educational qualification than a native Taiwanese after controlling the relevant determinants of educational achievement, and can be partly explained

[1]Please see Boswell (2000), Gibney (1999), and Zimmermann (1995) about the issues surrounding the treatment of asylum seekers/refugees.

with the preceding psychological conjecture. Second, the intergenerational transmission of the refugee experience does not last forever in that, in terms of educatonal attainment, the children of political immigrants gradually assimilate into the society where they live. These findings support the idea that asylum seekers/refugees resulting from armed conflicts can be admitted on humanitarian grounds as argued in Gibney (1999).

Apart from the immigrants' educational attainment, Mayer and Riphahn (2000) point out that immigrant fertility has a *direct* impact on the labor market involvement of first-generation immigrants and an *indirect* effect on the human capital of second-generation immigrants. The traditional immigrant fertility literature mainly concentrates on whether the fertility adjustment should be explained in a framework of fertility assimilation or in a model of fertility disruption ever since the contribution of Ben-Porath (1973). However, both immigrant fertility models do not distinguish between the cause of immigration and only focus on first-generation immigrants.

The above considerations lead us to investigate the mechanism behind the completed fertility of second-generation political immigrants in Taiwan. The first advantage thus derived is that the issue of controlling a woman's reproductive phase in the receiving country raised in Mayer and Riphahn (2000) is no more relevant in this set-up. The second advantage is that the problems generated from different countries of origin considered in Blau (1992), Jasso and Rosenweig (1990), Kahn (1988), and Mayer and Riphahn (2000) can be mostly avoided with our data, because of the similar cultural background faced by mainland Chinese immigrants and native Taiwanese. The third distinguishing feature of Taiwanese data is that the five-decade history of mainland Chinese immigrants in Taiwan may be the minimum requirement to assess the mechanism behind the completed fertility of political immigrants' children provided that we follow the tradition of the literature to concentrate on the fertility behaviors of women aged 40 or above. The three-decade history of asylum seekers/refugees in the European Union is simply too short to analyze the impact of parental refugee experience on the completed fertility of their children.

We employ the count data frameworks in Winkelmann (1995) and Mayer and Riphahn (2000) to empirically test the extent to which the parental refugee experience affects the fertility decisions of offspring.[2] The well-known under-dispersion phenomenon of completed

[2]Please see the excellent survey of the count data model in Winkelmann and Zimmermann (1995).

fertility data is explicitly accommodated by using the generalized Poisson regression (GPR) model of Famoye (1993). After controlling the relevant determinants of completed fertility, including the female labor force particiation (FLFP) decision right after marriage, and a wife's and a husband's demographic and social background, we find that the parental refugee experience is not significantly related to children's completed fertility, but rather significantly increases the FLFP of the second-generation family. Moreover, the likelihood that a wife will participate in the market sector right after marriage increases with the number of political immigrant parents and in-laws, indicating that her completed fertility falls with the strength of the refugee experience that is shared with her parents and in-laws. These findings hold robustly after we control the potential endogeneity of FLFP on completed fertility, supporting that the psychological conjecture made by Borjas (1982) and Brenner and Kiefer (1981) is in line with the observed fertility decisions of Taiwanese.

The remainder of this paper is arranged as follows. Section 2 presents a conceptual model for characterizing the channels through which the parental refugee experience can reduce the relative completed fertility of the offspring to that of the native Taiwanese counterparts. The data and the summary statistics of second-generation immigrants and those of native Taiwanese are illustrated in Section 3. Section 4 considers the count data models and corresponding estimation methods. In Section 5 we discuss the empirical results concerning the demographic decisions of second-generation political immigrants in Taiwan. Section 6 provides a summary and a policy recommendation.

2 Conceptual Model

Before discussing the following conceptual model, let us briefly review the historical background behind the assimilation process of mainland Chinese immigrants in Taiwan. Mass emigration of mainland Chinese to Taiwan occurred when Chiang Kai-Sheik's forces were defeated by the People's Liberation Army on mainland China in 1949. Roughly 12.71% of Taiwanese had come from mainland China by the end of 1949.[3] Following Smith (2003), Tsay (2006) defines second-generation political immigrants as those who were born in Taiwan after 1949 from at least one parent who came as a mainland Chinese immigrant. The

[3]Please see footnote 5 of Tsay (2006) for the decomposition of Taiwan's population at that time.

rationale of this definition is based on the observation that, no matter whether the mainland Chinese immigrants came to Taiwan for economic or political causes, they could not freely go back to their homeland after 1949. The situation confronting them was almost identical to Cuban immigrants in the U.S. after Castro controlled Cuba in the 1960s. Since the essential concern of the current paper is about the completed fertility of a couple, we define the second-generation immigrant family as those married couples who were both born in Taiwan after 1949 and at least one of their parents was a mainland Chinese immigrant.

Based on the same statistical sources in footnote 3 of this paper, female first-generation immigrants only consisted of 2.07% of Taiwanese residents at the end of 1949, implying that most male first-generation immigrants had to marry native Taiwanese if they wanted to and if they could. In other words, most second-generation immigrants are from a family with an immigrant father and a native mother. Since the father is known to be the major decision-maker of a traditional Chinese family, the refugee experience of the father certainly has a profound impact on his children, no matter if he married an immigrant or a native wife. Indeed, Tsay (2006) finds that a woman born around 1949 significantly benefits by her father's immigrantion status, because an immigrant father represents an extra advantage to an immigrant family and the probability for a woman in traditional Chinese society to pursue education is strongly related to her family resources.[4]

There are at least four channels through which the parental refugee experience can reduce the relative completed fertility of their offspring as compared to that of native Taiwanese counterparts. The first one is more directly linked to the better-educated position of female second-generation immigrants mentioned above and is called the *female-education channel*. Combining the well-known observation that a wife with a higher educational achievement tends to have fewer births, this channel predicts that the parental refugees' experience will decrease the completed fertility of their daughters. According to the arguments in Tsay (2006), the psychological effect and the language assimilation problems of Taiwanese are the

[4]Two reasons are used in Tsay (2006) to explain the extra advantage generated from a father's immigration status. The first one is based on psychological arguments, while the second one refers to the sudden and exogenous change of the language system when Japan returned control of Taiwan to the R.O.C., because language assimilation became a serious problem to most native Taiwanese at that time. He also finds that the influence of these two factors on educational attainment should disappear as time goes by. This partly explains why the intergenerational transmission of the refugee experience does not last forever.

main driving forces behind this circumstance.

For the second channel, the parental refugee experience may induce the second-generation family members to actively participate in the labor market in order to obtain further specific human capital or avoid a fast depreciation of their acquired general human capital. We call this the *female-market-participation* channel. Since the uneasy memory of a refugee will be heard and echoed by others with a similar experience, its impact on the FLFP decisions of the family of a political immigrant's children will hence be enhanced if the refugee experience shared within this family is stronger. For example, a girl from a political immigrant family married to a son of another similar family may be more likely to participate in the labor market as compared to the scenario when she instead married a comparable native Taiwanese. By the stylized fact that a higher FLFP in the market sector has a negative impact on completed fertility,[5] the female-market-participation channel also predicts a lower completed fertility of second-generation political immigrant families than that of native Taiwanese.

As with the third channel, after a couple has married, the first-generation immigrants, no matter whether they are the parents of the husband or those of the wife, may persuade the married couple to have fewer births so as to invest more resources in each child born due to the preceding psychological arguments. The working of this channel is similar to that of the quality-quantity tradeoff hypothesis of Becker and Lewis (1973). Thus, we call it the *child-quality* channel, which acts as the third channel to reduce the completed fertility of a second-generation immigrant family.

Unlike the female-education channel, the second and third channels may involve both the parents of the wife and those of the husband, and thus they activate only after a marriage is formed. Another feature shared with these two channels is that they are driven with the parental refugee experience, and not by the language assimilation problems of Taiwanese. Moreover, the refugee experience shared with the parents of the wife or those of the husband may interact and accumulate to decrease the completed fertility of their children, while in the female-education channel the effects of the parental refugee experience on a daughter's education are only through her father's immigration status. Chronologically, the female-education channel operates first, then followed by the second and third ones as most people marry after they finish their education.

[5]Please also see Stokes and Hsieh (1983) about female employment and reproductive behavior in Taiwan.

In addition to the preceding three channels, there is a fourth channel which can also reduce completed fertility - that is, female second-generation immigrants tend to participate more in the market sector as compared to their native Taiwanese counterpart, because they possess a relative higher educational attainment generated from their father's immigration status. This implies that, other things being equal, a female second-generation immigrant will have less completed fertility than that of a native Taiwanese counterpart by following the arguments behind the female-market-participation channel. Put differently, this channel is a mixture of the female-education and the female-market-participation channels, and we name it as the *education-participation mixture* channel. As a result, although the effects of the language assimilation problems of Taiwanese on the educational attainment of second-generation immigrants may depreciate quickly as found in Tsay (2006), the language assimilation problems of Taiwanese still generate a long-lasting effect on the latter completed fertility of the second-generation immigrants through the education-participation-mixture channel. Figure 1 displays the detailed interactions between these four channels and the three generations of immigrants involved.

Before we move on to the next section, let us point out that the conceptual model proposed is limited in scope. Similar to the standing point adopted in Oppenheimer (1988), we do not seek to develop exhaustive lists of all the channels affecting the completed fertility of second-generation immigrants. We particularly do not consider the marriage-formation behaviors of the respondents. Marriage selection and timing, as well as adaptive socialization during courtship or after marriage are important for achieving a good match, but there are simply too many random elements involved in searching for a mate as clearly argued in Oppenheimer (1988, p.566). We only include the number of immigrant parents and in-laws to represent the outcome of marriage selection for second-generation immigrant families. This variable also captures the strength of the refugee experience shared with a couple's parents and in-laws and serves as the major driving force behind the child-quality and the female-market-participation channels. Based on the psychological conjecture generated from Borjas (1982) and Brenner and Kiefer (1981), the completed fertility of a wife is expected to be lower when she has more immigrant parents and in-laws. This is indeed what we observe in the following empirical investigation.

3 Data and Summary Statistics

We use the R-I 1999, R-I 2000, and R-I 2003 of a recent survey entitled Panel Study of Family Dynamics (PSFD)[6], because they allow us to trace the birth place and birth year of respondents' parents and in-laws. The number of observations for the R-I 1999, R-I 2000, and R-I 2003 is 994, 1959, and 1152, respectively. For ease of comparison, we follow the classification employed in Mayer and Riphahn (2000) to select the observations of currently married women aged 40 or above at the time of the survey and code the number of their past births as the dependent variable. After a sequence of selection procedure, there are 531 observations remaining for the latter econometric analysis, of which 71 are second-generation immigrant families.[7]

Table 1 presents the distribution of a wife's average number of births across different birth cohorts and family backgrounds. It clearly reveals that the completed fertility of second-generation immigrant families is lower than that of the native Taiwanese. Among the 71 second-generation families, we also find that the average number of births seems to decrease with the number of immigrant parents and in-laws, showing that the refugee experience shared with a couple's parents and in-laws may strongly affect the fertility choice of their children.[8] It is quite interesting to investigate the results in Table 1 and the following empirical studies further by dividing the family background into 16 different categories depending on whether the first-generation immigrant is a father or a mother or an in-law. However, this task is not possible with the 71 observations of second-generation political families. As

[6]Please see footnote 6 of Tsay (2006).

[7]The procedure for selecting the observations is mainly based on an exogenous historic event to distinguish who are first-generation immigrants, i.e., we only include currently married couples who were both born in Taiwan after 1949, and they are not the third generation of mainland Chinese immigrants. In so doing, the number of observations decreases from 4,105 to 1,762. Because the focus of this paper is on the completed fertility of married women, we only include woman aged 40 or above at the time of the survey. Thus, the number of observations decreases further from 1,762 to 704. Since all the data are asked retrospectively, we do not include the data of respondents when the record about the exogenous or endogenous variables for later econometric analysis is missing or incomplete as van Ours and Veenman (2003, p.744) and Tsay (2006) do. As a result, the number of observations further reduces from 704 to 531.

[8]If we pool the observations with 3 and 4 immigrant parents and in-laws together, then the average number of births from the total sample monotonically decreases with the number of immigrant parents and in-laws.

a consequence the results generated from this paper are tentative and should be viewed as a first attempt to tackle the issues concerning the completed fertility of second-generation political immigrants.

To uncover the mechanism behind the pattern found in Table 1, we also illustrate the labor market participation rate of a wife right after marriage across different birth cohorts and family backgrounds in Table 2, because this variable is the important determinant of completed fertility.[9] Interestingly, the FLFP is mostly positively correlated with the number of first-generation immigrant parents and in-laws, confirming the arguments behind the conceptual model in Figure 1 and the summary statistics displayed in Table 1. Since there are many factors behind a couple's fertility decisions, a statistical analysis is needed to shed more light on the effects of the parental refugee experience on children's demographic decisions. The next section presents the details of the econometric model.

4 Econometric Models and Variable Definition

The objective of the econometric analysis is to find out to what extent the four channels displayed in Figure 1 and discussed in Section 2 can reduce the relative completed fertility of the second-generation immigrant family as compared to that of a native Taiwanese one. The nature of the dependent variable requires us to adopt the framework of Winkelmann (1995) and Mayer and Riphahn (2000) to estimate the completed fertility with the count data model, i.e., we assume that the count dependent variable ($y = 0, 1, 2, \ldots$) denotes the number of children born by a woman and assume that y possesses a probability density function $f(y)$. Observed heterogeneity can be introduced by setting x as the time-invariant $(k \times 1)$ exogenous explanatory variables and we assume the associated conditional probability density function is $f(y|x)$. For example, under the standard Poisson distribution assumption, we have:

$$f(y|x) = \frac{\exp(-\lambda)\lambda^y}{y!}, \qquad \lambda = \exp(x'\beta). \tag{1}$$

[9] We do not count the unpaid home worker as participating in the labor market, because it is well-known in the demographic literature that the status of FLFP is no more significant in affecting the completed fertility of Taiwanese women if the data include unpaid home workers. Please see Stokes and Hsieh (1983) for details.

The drawback of applying the standard Poisson model in (1) is that the equal-dispersion assumption inherent in the standard Poisson model is frequently violated for empirical applications. In particular, the number of children in a household often exhibits under-dispersion and the mode is two as clearly documented in Winkelmann and Zimmermann (1994).[10] We thus apply the generalized Poisson regression (GPR) model of Famoye (1993) as follows:

$$f(y|x) = \left(\frac{\lambda}{1+a\lambda}\right)^{y} \frac{(1+ay)^{y-1}}{y!} \exp\left(\frac{-\lambda(1+ay)}{1+a\lambda}\right), \quad \lambda = \exp(x'\beta). \tag{2}$$

The key feature of the GPR model is that it can characterize a wide range of data phenomena with the dispersion parameter a which is estimated simultaneously with the other coefficients in the GPR model. For example, the GPR model reduces to the standard Poisson model when $a = 0$. For $a > 0$, the GPR model represents count data with over-dispersion as $\mathrm{Var}(y|x) > \mathrm{E}(y|x)$, while $a < 0$ corresponds to the case where data show under-dispersion. However, as $a < 0$ (under-dispersion case), the value of a in (2) is required to satisfy the following conditions:

$$a > \min\left(\frac{-1}{\max(\lambda_i)}, \frac{-1}{\max(y_i)}\right), \qquad \lambda_i = \exp(x_i'\beta), \tag{3}$$

where y_i and x_i denote the observation of y and that of x for individual i, respectively.

There are two ways to generalize the GPR model in (2). First, we can allow the presence of heterogeneity across individuals by assuming λ in (2) as:

$$\lambda = \exp(x'\beta + \epsilon). \tag{4}$$

Second, given the modification in (4), we can further allow some dummy variable to be correlated with the random variable ϵ in (4) in order to capture the potential endogeneity of FLFP in the completed fertility analysis.[11] To formalize this idea, the explanatory variable can be divided as $x' = (x_d', d)$, and the dummy variable d (the FLFP status of the current paper) is generated as:

$$d = \begin{cases} 1, & \text{iff} \quad z\alpha + u > 0, \\ 0, & \text{otherwise}, \end{cases} \tag{5}$$

[10] It follows that the negative binomial model which accommodates over-dispersion is not appropriate to model the completed fertility data, either.

[11] We discuss in Section 2 that the FLFP status is important to determine the completed fertility.

where z is a $(k_d \times 1)$ vector of exogenous variables for determining the values of d, and u is correlated with the heterogeneity term ϵ in (4).

To solve the occurrence of heterogeneity and endogeneity considered in (4) and (5), we adopt the full information maximum likelihood (FIML) estimator of Terza (1998). Assume that, conditional on all the exogenous variables in x and z, i.e., w, the joint distribution of ϵ and u is normal with mean zero and a covariance matrix:

$$\Sigma = \begin{bmatrix} \sigma^2 & \sigma\rho \\ \sigma\rho & 1 \end{bmatrix}. \tag{6}$$

Under these assumptions the joint conditional probability density function of y_i and d_i given w_i is:

$$f(y_i, d_i|w_i) = \int_{-\infty}^{\infty} f(y_i|w_i, d_i, \epsilon_i) \left[d_i\Phi^*(\epsilon_i) + (1-d_i)(1-\Phi^*(\epsilon_i)\right] f(\epsilon_i|w_i)d\epsilon_i, \tag{7}$$

where

$$\Phi^*(\epsilon_i) = \Phi^*\left[\frac{z_i\alpha + (\rho/\sigma)\epsilon_i}{\sqrt{1-\rho^2}}\right]. \tag{8}$$

Here, $\Phi^*(.)$ is the cumulative distribution function of a standard normal distribution, and $f(\epsilon_i|w_i)$ is normal with zero mean and variance σ^2. Moreover, $f(y_i|w_i, d_i, \epsilon_i)$ is specified as a GPR distribution function in (2), i.e.:

$$f(y_i|w_i, d_i, \epsilon_i) = \left(\frac{\lambda_i}{1+a\lambda_i}\right)^{y_i} \frac{(1+ay_i)^{y_i-1}}{y_i!} \exp\left(\frac{-\lambda_i(1+ay_i)}{1+a\lambda_i}\right), \tag{9}$$

but using the specificaton of λ_i in (4), or $\lambda_i = \exp(x_i'\beta + \epsilon_i)$. Using the change of variable $\epsilon_i = \sqrt{2}\sigma\xi$, the value of $f(y_i, d_i|w_i)$ in (7) becomes:

$$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(y_i|w_i, d_i, \sqrt{2}\sigma\xi) \left[d_i\Phi^*(\sqrt{2}\sigma\xi) + (1-d_i)(1-\Phi^*\left(\sqrt{2}\sigma\xi\right)\right] \exp(-\xi^2)d\xi, \tag{10}$$

which can be used to evaluate the associated log-likelihood function for a sample of size N:

$$L(y, d|w) = \sum_{i=1}^{N} \ln f(y_i, d_i|w_i). \tag{11}$$

Applying the Hermite quadrature,[12] we can approximate the log-likelihood function in (11) and estimate the parameters of interest.

To facilitate a comparison, the explanatory variables selected for the completed fertility analysis in Table 3 are chosen mainly based on those used in Winkelmann (1995) and Wang

[12]Please see Butler and Moffitt (1982) for details.

and Famoye (1997). The educational attainment of a wife is included in the model as it is directly related to her opportunity cost of time and inversely related to the completed fertility decision, while the educational attainment of the husband is used as the proxy for the ambiguous family income effect or permanent income effect used in Behrman and Taubman (1985). Indeed, other things being equal, the significance of a wife's educational attainment presents whether the female-education channel considered in Section 2 is in effect or not. Following Winkelmann (1995) and Wang and Famoye (1997), a wife's age at the time of marriage is employed to control her biological characteristic. In addition, a husband's age at the time of marriage is used to capture the above-mentioned family income effect, because wage or the money-making ability of the husband is likely to increase with age by the well known age-earning profile considered in the labor literature.

Borjas (1995) also suggests the importance to control the regional fixed effect on the transmission of human capital. We thus add a variable BornCitySize to the model representing the 2003 population within 366 different zip codes where the wife was born. This variable acts similar to the variable Rural in Winkelmann (1995, p.471) and the variable City in Wang and Famoye (1997, p.280). Based on the arguments in Borjas (1995, p.365), we expect a negative relationship between the variable BornCitySize and the wife's completed fertility, because a larger value of BornCitySize fosters more social contacts and economic opportunities that affect people throughout their lives.[13]

Becker (1960) states that children can be viewed as durable goods, and household fertility decisions are determined by female wage and family income. Thus, households with working wives are expected to have fewer children than those with non-working wives, and the FLFP status of a wife right after marriage should be included in the model as in Wang and Famoye (1997). Finally, a variable, Number of immigrant parents, is used to represent the strength of shared parental refugee experience. The significance of this variable in the completed fertility analysis reveals whether the child-quality channel is at work or not. Other control factors being equal, a negative relationship between this variable and completed fertility is expected if the influence of the child-quality channel on completed fertility is strong.

The preceding control variables are also used for the FLFP choice, however, they may

[13]Wang and Famoye (1997) alternatively argue that urban families have less children than rural families since it is much cheaper to raise children on a farm.

convey different meanings under different settings. In particular, a higher educational attainment by the wife implies a higher propensity for her to participate in the labor market, but it represents the opportunity cost of raising a child in the completed fertility context. In addition, while a husband's higher education may signify the egalitarian perception of the husband in the context of the FLFP choice, on the contrary, it changes into a proxy of family permanent income in the completed fertility context. Most importantly, when the female-market-participation channel is burned out, we expect a positive relationship between the variable Number of immigrant parents and the FLFP choice. If the education-participation-mixture channel is influential in affecting the completed fertility, then we should also observe a positive correlation between a wife's educational level and her probability to be in the market sector.

Table 4 presents the descriptive statistics for the variables in Table 3, clearly demonstrating that the husband and wife of the second-generation family achieve a higher educational level than their native Taiwaness counterparts, respectively. A reason for this finding is that the second-generation immigrants on average achieve a higher level of education than the native Taiwanese as discussed in Tsay (2006), and these second-generation immigrants tend to marry a spouse of comparable educational level through assortative mating in education.[14] As a consequence, it is not surprising to observe a higher average marriage age of the husband and that of the wife of a second-generation family in Table 4, because the children of political immigrants spend more time in schooling.

The average value of the variable BornCitySize is larger for second-generation immigrant families than that of native Taiwanese. This can be explained with the following observations. First, second-generation immigrants tend to grow up in urban centers as found in Tsay (2006). Second, they tend to marry a spouse with a similar background through the residential propinquity on marriage selection first proposed in Bossard (1932) and later replicated in Marches and Turbeville (1953).

We also find in Table 4 that the FLFP of married native Taiwanese women is comparable to those of married women in the U.S., Canada, Great Britain, and Germany during the 1970s and 1980s as illustrated in Table 2.5 to Table 2.8 of Killingsworth and Heckman

[14]Please see footnote 2 in Oppenheimer (1988, p.564) and Mare (1991) for the sociological literature on assortative mating.

(1986). By contrast, the FLFP rate of second-generation immigrant families is much higher than that of native Taiwanese. One reason is that wives of the second-generation immigrant families on average achieve a higher educational attainment as explicitly displayed in the same table. Another possible explanation is that the psychological arguments may work strongly via the female-market-participation channel. Whether the gap in FLFP between the immigrant families and the native Taiwanese ones remains significant after controlling the relevant determinant of FLFP status is important for policy implication and will be discussed later.

5 Estimation Results

Table 5 presents the results when the FLFP decision is seperately estimated with the probit model, and the choice of completed fertility is estimated with the GPR model in (2) without considering the heterogeneity across respondents or endogeneity of FLFP.[15] The robustness of the findings in Table 5 is checked by estimating a modified GPR model explicitly accommodating the presence of heterogeneity across individuals and the potential endogeneity of FLFP with the method discussed in Section 4.[16] Please note that the choice of FLFP and its impact on the completed fertility are jointly estimated with our proposed method, with Table 6 representing the estimation results. Before we discuss the findings generated from these two tables, let us point out here that the estimated σ and ρ in Table 6 are insignificantly different from zero. Since the modified GPR model reduces to the original GPR model in (2) when both σ and ρ are zero, this explains why the results in Table 6 are qualitatively identical to those found in Table 5.[17] Moreover, under-dispersion is clearly exhibited in the

[15]We first include a squared value of the variable, Number of immigrant parents, in the model, but its impacts on completed fertility and FLFP decisions are not statistically significant. We thus exclude this variable from the latter analysis.

[16]Given the Gaussian distribution assumption used for the FIML estimator, we do not need to employ an exclusion assumption based on the Proposition in Heckman (1978, p.936). That also explains why we use identical variables for the completed fertility and FLFP models.

[17]This also implies that the FLFP can be viewed as an exogenous variable in the completed fertility analysis. Following the arguments in endnote 8 of Mayer and Riphahn (2000, p.260), we note that the completed fertility outcome is observable only after age 40, while the FLFP decisions at the time of marriage are taken on average prior to age 26 as shown in Table 4. Thus, the potential endogeneity of FLFP status

completed fertility data since the parameter a is significantly negative, supporting the rationale of using the GPR model in this paper. The sensitivity of the preceding findings is also verified with the different division of a wife's age cohort, and the results remain robust.

Now let us consider the findings about the four channels illustrated in Figure 1. For the female-education channel, other things being equal, we find that the higher the educational attainment is for a wife, the less the number of births a wife will have as shown in the coefficients of the variables representing a wife's educational level in the completed fertility choice. Combining the findings in Tsay (2006) where an immigrant father can help his daughter achieve a higher educational level, the preceding result is consistent with the prediction made by the female-education channel.

A woman of the highest educational level is more likely to participate in the market sector as shown in the estimation results for the choice of FLFP. Table 3 illustrates that the percentage of women attaining the highest level of education is much higher for second-generation immigrant families. Given the preceding two observations and the finding that the coefficient of the variable FLFP in the completed fertility choice is significant at the 5% level in a one-tailed t ratio test, the education-participation-mixture channel is clearly supported with the estimation results.

As with the child-quality channel, we find that this channel is not important in affecting the completed fertility of the second-generation families, because the number of immigrant parents and in-laws has no significant impact on the completed fertility of their offspring family after controlling the educational attainment and labor market participation of a wife and other factors. On the contrary, we find that, other things being equal, the number of immigrant parents and in-laws significantly increases the FLFP of the second-generation families. Together with the previous observation that the FLFP status decreases subsequent completed fertility, we can see that the female-market-participation channel is influential in reducing the completed fertility of second-generation families.

In summary, except for the child-quality channel, the remaining three channels separately decrease the completed fertility of the children's family significantly. Thus, through the female-education and the education-participation-mixture channels, the effects of insecure feelings upon immigrants and those from the language assimilation problems of Taiwanese

on completed fertility is much limited.

are far-reaching and can partly explain why the completed fertility of the second-generation family is lower than that of the native Taiwanese counterparts. However, through the female-market-participation channel, the parental refugee experience alone is powerful enough to stimulate the wife of the second-generation families to pursue an economic career. Overall, the children of refugees are strongly motivated to participate in the market sector in order to sustain themselves based on the Taiwanese data. This finding is also consistent with the result found in Borjas (1982) about first-generation Cuban immigrants in the U.S. and confirms that the intergenerational transition of the refugee experience remains strong in affecting the offspring's motive to pursue economic success.

An inspection of the results concerning the remaining variables for the completed fertility analysis reveals that, ceteris paribus, the educational attainment of the husband or his age at the time of marriage has no significant impact on completed fertility, revealing that the permanent income or family income is not strong enough to affect the completed fertility of Taiwanese. Moreover, a wife's birth place and her birth cohort are not significantly correlated with her completed fertility once we control the other determinants of completed fertility. The reason for the first observation is that a woman's birth place is important in determining her educational attainment if we adapt the finding in Tsay (2006) in which a woman raised in a larger society indicates that her family may have better economic opportunities. Nevertheless, as she grows up, she may move or even migrate around the country. Thus, a woman's birth place may not be an important determinant of completed fertility any more. For the second observation about a woman's birth cohort, our explanation is that the norm beneath the society will not change quickly in such a short period of time.[18]

We also find that the completed fertility of a wife is negatively related to her age at the time of marriage and is what we expect, but is opposite to that found in Wang and Famoye (1997). The reason is that we are concerned with the completed fertility of a married women, while Wang and Famoye (1997) consider a group of married women aged between 18 and 40.

For the other control variables for the FLFP choice, a husband's education is not significant to help his wife participate in the labor market, indicating the egalitarian perception of the husband is not strong for the cohort of persons considered in our sample. This observation is reasonable, because the husbands under consideration were born under a traditional

[18]We only cover 14 years of the birth cohort of married women.

Chinese society. By contrast, a husband's age at the time of marriage is negatively related to the chance of his wife participating in the labor market. This implies that the permanent income effect represented by a husband's age is influential in reducing his wife to participate in the labor market. Furthermore, a wife's age at the time of marriage increases her chance to participate in the labor market due to the higher human capital she possesses. Controlling a wife's education and other relevant factors, the variable BornCitySize and a wife's birth cohort do not significantly change the FLFP status as we find in the completed fertility analysis.

6 Summary and Discussion

This paper fills the gap in the immigrant fertility literature by considering the issues concerning the completed fertility of second-generation *political* immigrant families in Taiwan. The historical background faced by Taiwanese allows us to evaluate the impact of the parental refugee experience on the demographic decisions of their children's families, because a homogenous space-time atmosphere shared with the respondents can be created under the second-generation immigrant context. The results generated from this paper and the assimilation experience of Cubans in the U.S. considered in Borjas (1982) jointly reveal that the refugees and their children have a much stronger incentive to pursue an active economic career. As a consequence, the refugees may not be the liability, but they just can be assets to the host countries in that we believe the refugees and their children can contribute to the new homeland as much as the natives hosting them, provided that they are properly educated and equally treated.

Combining the normative prescription, humanitarianism, of Gibney (1999) and the positive event history study conducted in this paper, we are inclined to suggest that liberal democratic states do think about the possibility of substituting more asylum seekers/refugees for economic immigrants who do not face an immediate threat to their lives. The reason is that the use of a liberal universalist approach to a refugee policy seems to be not powerful enough for dealing with the enormous problems associated with the millions of refugees all over the world.

References

Becker GS (1960) An Economic Analysis of Fertility. In: *Demographic and Economic Changes in Developed Countries.* Universities-National Bureau Conference Series, no.11. Princeton University Press, Princeton, New Jersey, pp 209-231.

Becker GS, Lewis HG (1973) On the interaction between the quantity and quality of children. *Journal of Political Economy* 81(2):S279-288.

Behrman J, Taubman P (1985) Intergenerational Earning Mobility in the United States: Some Estimates and a Test of Becker's Intergenerational Endowment Model. *Review of Economics and Statistics* 67(1):144-151.

Ben-Porath Y (1973) Economic Analysis of Fertility in Israel: Point and Counterpoint. *Journal of Political Economy* 81(2):202-233.

Blau FD (1992) The Fertility of Immigrant Women: Evidence from High-Fertility Source Countries. In: George JB, Freeman RB (eds) *Immigration and the Work Force: Economic Consequences for the United States and Source Areas.* The University of Chicago Press, Chicago and London, pp 93-133.

Borjas GJ (1982) The Earnings of Male Hispanic Immigrants in the United States. *Industrial and Labor Relations Review* 35(3):343-353.

Borjas GJ (1995) Ethnicity, Neighborhoods, and Human-Capital Externalities. *American Economic Review*, 85(3):365-390.

Bossard JH (1932) Residential Propinquity as a Factor in Marriage Selection. *American Journal of Sociology* 38(2):219-224.

Boswell C (2000) European Values and the Asylum Crisis. *International Affairs* 76(3):537-557.

Brenner R, Kiefer NM (1981) The Economics of Diaspora: Discrimination and Occupational Structure. *Economic Development and Cultural Change* 29(3): 517-534.

Butler JS, Moffitt R (1982) A Computationally Efficient Quadrature Procedure for the One-Factor Multinomial Probit Model. *Econometrica* 50(3):761-764.

Famoye F (1993) Restricted generalized Poisson regression model. *Communications in Statistics — Theory and Methods* 22(5):1335-1354.

Gibney MJ (1999) Liberal Democratic States and Responsibilities to Refugees. *American Political Science Review* 93(1):169-181.

Hatton TJ (2004) Seeking Asylum in Europe. *Economic Policy* 19(38):5-62.

Heckman J (1978) Dummy Endogenous Variables in a Simultaneous Equation System. *Econometrica* 46(4):931-959.

Jasso G, Rosenweig MR (1990) The Immigrant's Legacy: Investing in the Next Generation. In: Jasso G, Rosenweig MR (eds) *The New Chosen People: Immigrants in the United States.* Russell Sage Foundation, New York, pp 382-410.

Kahn JR (1988) Immigrant Selectivity and Fertility Adaption in the United States. *Social Forces* 67(1):108-128.

Killingsworth MR, Heckman JJ (1986) Female Labor Supply. In: Ashenfelter O, Layard R (eds) *Handbook of Labor Economics*, Vol. 1. North-Holland: Amsterdam, pp 103-204.

Marches J, Turbeville G (1953) The Effect of Residential Propinquity on Marriage Selection. *American Journal of Sociology* 58(6):592-595.

Mare, RD (1991) Five Decades of Educational Assortative Mating. *American Sociological Review* 56(1):15-32.

Mayer J, Riphahn RT (2000) Fertility Assimilation of Immigrants: Evidence from Count Data Models. *Journal of Population Economics* 13(4):241-261.

Oppenheimer VK (1988) A Theory of Marriage Timing. *American Journal of Sociology* 94(3):563-591.

Smith JP (2003) Assimilation across the Latino Generations. *American Economic Review* 93(2):315-319.

Stokes CS, Hsieh Y-S (1983) Female Employment and Reproductive Behavior in Taiwan, 1980. *Demography* 20(3):313-331.

Terza JV (1998) Estimating Count Data Models with Endogenous Switching: Sample Selection and Endogenous Treatment Effect. *Journal of Econometrics* 84(1):129-154.

Tsay WJ (2006) The Educational Attainment of Second-Generation Mainland Chinese Immigrants in Taiwan. *Journal of Population Economics* 19(4):749-767.

van Ours JC, Veenman J (2003) The Educational Attainment of Second Generation Immigrants in the Netherlands. *Journal of Population Economics* 16(4):739-753.

Wang W, Famoye F (1997) Modeling household fertility decisions with generalized Poisson regression. *Journal of Population Economics* 10(3):273-283.

Winkelmann R (1995) Duration Dependence and Dispersion in Count-Data Models. *Journal of Business & Economic Statistics* 13(4):467-474.

Zimmermann, KF (1995) Tackling the European Migration Problem. *Journal of Economic Perspectives* 9(2):45-62.

Winkelmann R, Zimmermann KF (1994) Count Data Models for Demographic Data. *Mathematical Population Studies* 4(3):205-221.

Winkelmann R, Zimmermann KF (1995) Recent Developments in Count Data Moldelling: Theory and Application. *Journal of Economic Survey* 9(1):1-24.

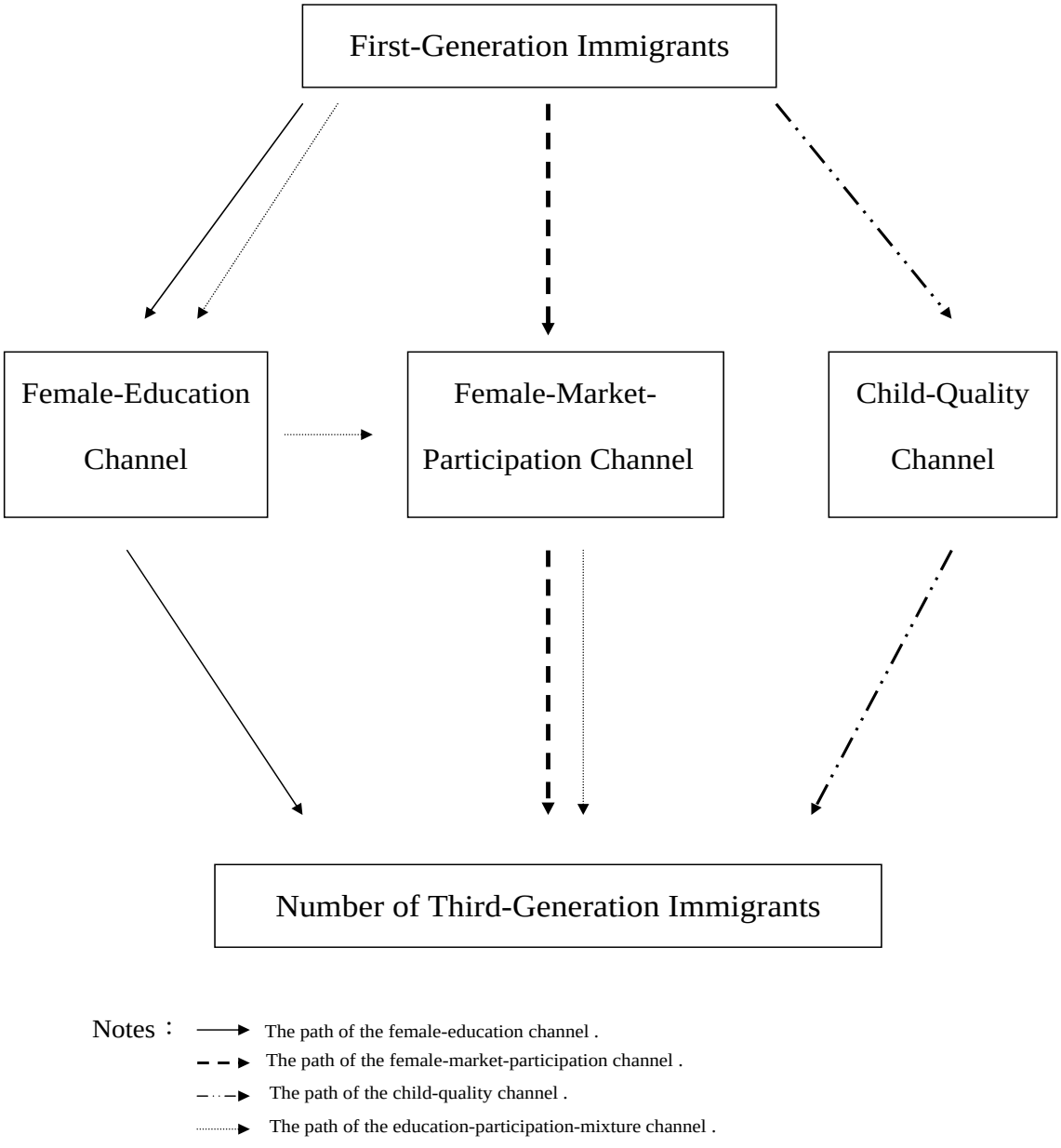

Figure 1: The four channels within the conceptual model.

Table 1. Average Number of Births of Wife by Their Cohorts and Their Parents' Backgrounds

# of parents and in-laws who are mainland immigrants	0	1	2	3	4
Birth year of wife					
1950-54	2.75 (168)	2.33 (3)	2.14 (14)	2.00 (1)	2.25 (4)
1955-63	2.65 (292)	2.18 (22)	2.07 (15)	2.50 (2)	1.80 (10)
Total	2.69 (460)	2.20 (25)	2.10 (29)	2.33 (3)	1.93 (14)

Notes: Numbers in parentheses are the number of observations belonging to the corresponding category.

Table 2. Labor Market Participation Rate of Wife by Their Cohorts and Their Parents' Backgrounds

# of parents and in-laws who are mainland immigrants	0	1	2	3	4
Birth year of wife					
1950-54	43.45 (168)	66.67 (3)	71.43 (14)	0.00 (1)	100.00 (4)
1955-63	46.58 (292)	63.64 (22)	86.67 (15)	100.00 (2)	90.00 (10)
Total	45.44 (460)	64.00 (25)	79.31 (29)	66.67 (3)	92.86 (14)

Notes: Numbers in parentheses are the number of observations belonging to the corresponding category.

Table 3. Variable Definitions

Variable	*Description*
Numbirth	Number of births
Wife's Education	
Level 1	= 1 if her years of education are ≤ 9
Level 2	= 1 if her years of education are 10 to 12
Level 3	= 1 if her years of education are ≥ 13
Husband's Education	
Level 1	= 1 if his years of education are ≤ 9
Level 2	= 1 if his years of education are 10 to 12
Level 3	= 1 if his years of education are ≥ 13
Wife's age at marriage divided by 10	Wife's age at the time of marriage divided by 10
Husband's age at marriage divided by 10	Husband's age at the time of marriage divided by 10
FLFP	= 1 if a woman participated in the labor market right after marriage (unpaid family work is excluded)
Number of immigrant parents	Number of parents and in-laws who are mainland Chinese immigrants
BornCitySize	The (population/10,000) of the zip code where the wife was born
CohAB-CD	= 1 if the wife was born between 19AB and 19CD = 0 otherwise

Table 4. Characteristics of the Variables for Econometric Analysis

# of observations	Natives 460 (%)	2nd-generation families 71 (%)
Numbirth	2.685	2.113
Wife's education		
Level 1	274 (59.57)	11 (15.49)
Level 2	127 (27.61)	29 (40.85)
Level 3	59 (12.83)	31 (43.66)
Husband's education		
Level 1	204 (44.35)	8 (11.27)
Level 2	147 (31.96)	24 (33.80)
Level 3	109 (23.70)	39 (54.93)
Wife's age at marriage divided by 10	2.360	2.537
Husband's age at marriage divided by 10	2.584	2.725
FLFP	209 (45.44)	54 (76.06)
BornCitySize	0.898	1.375
Coh50-54	168 (36.52)	22 (30.99)

Notes: Numbers in parentheses are percentages.

Table 5. Completed Fertility and FLFP Models Estimated Separately

Variables	Completed Fertility	FLFP
Wife's education		
Level 2	-0.1085 (2.351)**	0.0589 (0.372)
Level 3	-0.1553 (2.092)**	0.6316 (2.639)***
Husband's education		
Level 2	-0.0332 (0.843)	0.0791 (0.540)
Level 3	-0.0087 (0.146)	0.2634 (1.313)
Wife's age at marriage divided by 10	-0.2168 (2.699)***	1.1398 (3.816)***
Husband's age at marriage divided by 10	-0.0041 (0.051)	-0.6777 (2.300)**
BornCitySize	-0.0191 (1.127)	0.0018 (0.031)
Number of immigrant parents	-0.0396 (1.425)	0.2402 (2.620)***
Coh50-54	0.0423 (1.191)	-0.2062 (1.585)
FLFP	-0.0628 (1.851)*	-
a	-0.1542 (45.173)***	-
Constant	1.5908 (11.966)***	-1.1594 (2.341)**
Log-likelihood	-656.1355	-327.2250
Observations	531	531

Notes: Numbers in parentheses are the absolute value of t ratios. ***, **, and * denote significance at the 1%, 5%, and 10% levels in a two-tailed test, respectively.

Table 6. Completed Fertility and FLFP Models Estimated Jointly

Variables	Completed Fertility	FLFP
Wife's education		
Level 2	-0.1085 (2.349)**	0.0590 (0.370)
Level 3	-0.1553 (2.088)**	0.6322 (2.351)**
Husband's education		
Level 2	-0.0332 (0.842)	0.0792 (0.539)
Level 3	-0.0087 (0.146)	0.2637 (1.280)
Wife's age at marriage divided by 10	-0.2168 (2.661)***	1.1409 (3.080)***
Husband's age at marriage divided by 10	-0.0041 (0.050)	-0.6783 (2.093)**
BornCitySize	-0.0191 (1.127)	0.0018 (0.031)
Number of immigrant parents	-0.0396 (1.424)	0.2404 (2.376)**
Coh50-54	0.0423 (1.184)	-0.2064 (1.514)
FLFP	-0.0628 (1.831)*	-
a	-0.1542 (45.171)***	-
Constant	1.5908 (11.886)***	-1.1603 (2.147)**

Notes: Data observations are 531 and the value of the log-likelihood is -998.8694. The respective estimates of ρ and σ are -0.0835 and 0.0001. Their corresponding t ratios are -0.009 and 0.004, respectively. Numbers in parentheses are the absolute value of t ratios. ***, **, and * denote significance at the 1%, 5%, and 10% levels in a two-tailed test, respectively.