Interethnic Marriages and Economic Assimilation of Immigrants

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Abstract

This paper examines the relationship between interethnic marriages and economic assimilation among immigrants in the United States. Two competing hypotheses are evaluated: the productivity hypothesis, according to which immigrants married to native-born spouses assimilate faster than comparable immigrants married to foreign-born spouses because spouses play an integral role in the human capital accumulation of their partners; and the selection hypothesis, according to which the relationship between intermarriages and assimilation is spurious because intermarried immigrants are a selected subsample from the population of all married immigrants. These two hypotheses are analyzed within a model in which earnings of immigrants and their interethnic marital status are jointly determined. The empirical evidence favors the selection hypothesis. Non-intermarried immigrants tend to be negatively selected, and the intermarriage premium obtained by the least squares completelly vanishes once we control for the selection.

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1 Introduction

Interethnic marriage, defined as a marital union between foreign-born and native-born individuals, is considered to have important social implications for both immigrants and their host countries. Indeed, interethnic marriage lies at the heart of the study of intergroup relations. It is viewed to be both a measure of social assimilation and a factor producing it.

Economic studies of interethnic marriages are scarce. Consequently, little is known about the economic implications of this type of marital behavior. This paper attempts to examine one such implication: the relationship between interethnic marriages and the economic assimilation among immigrants. The logic behind this relationship is simple. The working hypothesis is that spouses directly affect the human capital accumulation of their partners[1]. The magnitude of this effect depends on characteristics of spouses, such as their proficiency in the host country's language and their knowledge of local labor markets, which are likely to differ between immigrant and native spouses. As a result, the main testable implication of this hypothesis is that the earnings of intermarried immigrants must be significantly different from the earnings of otherwise identical immigrants who are married to immigrant spouses.

This subject integrates the literature concerned with the economic assimilation of immigrants and the marriage premium literature. First, studies of economic assimilation of immigrant consistently find a positive correlation between earnings of immigrants and years elapsed since their arrival in the host countries[2]. Yet, our understanding of the sources of this correlation is quite modest. While there are many variables that may influence the assimilation process, most empirical studies focused on one single factor – the proficiency in the host country's language[3]. Little is known about the importance of other factors, mainly because available data sets lack measure of human capital variables such as on the job training and job search activities. Interethnic marriage may be yet another important element in the assimilation process. In addition, and in contrast to many other potential

[1] An early example of this hypothesis is Benham (1974) who studied the effect of women's education on the earnings of their husbands. See also Welch (1974).

[2] For a comprehensive survey of this literature see Borjas (1995) and Borjas (1999).

[3] See for example, McManus, Gould and Welch (1983), Grenier (1984), McManus (1985), McManus (1990), Chiswick (1991), and Chiswick and Miller (1992).

determinants of assimilation, interethnic marriage is a variable that can be readily constructed from available data.

Second, while the interest in interethnic marriages is relatively new, the closely related literature on marriage premium is well beyond its infancy. An almost universal finding in this literature is that married men earn higher wages than unmarried men do, even after controlling for observable human capital variables. An important extension of these findings is to ask if and how does the marriage premium vary with the characteristics of spouses, and in particular whether labour market outcomes differ between immigrants married to native-born spouses and immigrants married to foreign-born spouses. In other words, is there an 'interethnic marriage premium'?

This paper is also motivated by Meng and Gregory (2005) who document a positive correlation between interethnic marriage and the economic assimilation among immigrants in Australia. I extend their analysis by using data on the U.S. immigrants. Australia and the U.S. have very different ethnic composition of their immigrant population, and it is of interest to see whether Meng and Gregory (2005) findings extrapolate to the U.S. environment[4].

A major impediment to the causal interpretation of the effect of interethnic marriage on the assimilation rate is that intermarried immigrants may be a selected subsample from the population of all married immigrants. For example, intermarried immigrants may possess characteristics that are valued in both labor and marriage markets, such as physical appearance. In addition, the decision to marry a native spouse rather than an immigrant spouse may be based on the expected gains from each type of marriage. In the marriage premium literature, the selection hypothesis is a real concern. Some researchers document that the effect of marriage on earnings may completely disappear once the selection is controlled for[5].

Disentagling the productivity effects of the interethnic marriage from the selection effects is quite challenging. To accommodate both hypotheses, I formulate and estimate a model in which earnings of immigrants and their interethnic marital status are jointly determined. A separate earnings func-

[4]For example, Chiswick and Miller (1995), who use both Australian and the U.S. Censuses in their study, report that among the foreign-born in Australia in 1981, 37% were born in Britain and Ireland, 43% are from other parts of Europe (mainly Southern Europe), 12 % from Asia and Africa, 4% from New Zealand, and 3 % from the Western Hemisphere. The percentage of immigrants from the Central and South America is very small, compared to the U.S. in which this group forms an important fraction of the immigrant population.

[5]See for example Nakosteen and Zimmer (1987) and Cornwell and Rupert (1997).

tion is specified for intermarried and nonintermarried immigrants, and the probability of interethnic marriage explicitly depends on the net difference in expected gains from each type of marriage. This model is a special case of endogenous switching regime model that have been extensively used in studies in which the treatment variable (interethnic marriage in this paper) may be endogenous[6]. In addition to the standard assumptions in this type of models, I also rely on the variation in the relative marriage market conditions to assist in the identification of the treatment effect of interethnic marriage on the earnings of immigrants. This variation is closely related to the sex ratio variable that has been used in many studies on the marital behavior of individuals[7].

The main conclusion of this paper is that the selection hypothesis is important. According to the least squares estimates, intermarried immigrants (economically) assimilate by about 2.5 percent faster than nonintermarried immigrants do. However, once we control for the selection, this interethnic marriage premium completely vanishes. Nonintermarried immigrants tend to be negatively selected from the population of all married immigrants, while intermarried immigrants tend to be positively selected, although the selection effect is statistically significant only for the latter group.

The paper is organized as follows. In section 2, I present a model of interethnic marriage and earnings to analyze the interaction between labor and marriage markets for immigrants. This section also discusses empirical strategy and tests for assimilation effects. I describe data in section 3, and in section 4, I present the empirical results. Conclusions and suggestions for future research are presented in section 5.

[6]For recent review, see Vella (1998). Maddala (1983) and Maddala (1984) contain a comprehensive survey and a list of applications.

[7]Angrist (2002) contains a recent review of studies that examined the impact of sex ratio on various demographic and economic outcomes. See also Becker (1991) and Grossbard-Shechtman (1993).

2 Empirical Strategy

2.1 Background

The existence of the male marriage premium has been documented across different data sets used[8], across different countries[9], and across different time periods studied[10]. The magnitude of the premium varies across studies and according to age, race and gender, but for white males it is quite large, with typical estimates in the range of 10-30%. Overall, women do not earn a significant marriage premium, and black men typically earn smaller premiums than their white counterparts[11].

The marriage premium literature has offered two main arguments to explain why married individuals receive higher wages than their unmarried counterparts[12]. First, marriage might raise the productivity of married men. Married men tend to accumulate more human capital than unmarried men because marriage makes specialization and division of labour within the household possible (Becker (1973)). Marriage may also alter the costs of investment in human capital (Kenny (1983)). Furthermore, men's productivity may be directly enhanced by their spouses (Benham (1974), Grossbard-Shechtman (1993), Daniel (1995)). A major alternative hypothesis is the selection hypothesis according to which marriage has no independent productivity effect on earnings (Becker (1973), Grossbard-Shechtman (1993)). However, researchers have failed to attribute all higher productivity of married men to selection effect[13]. The empirical evidence suggests that the se-

[8]For a partial summary of the data sets used in the studies of marriage premium, see Loh (1996).

[9]For example, Schoeni (1995) documents that male marital pay differentials are large and statistically significant in each of the twelve industrialized countries that he studies.

[10]Goldin (1990) documents the existence of the marriage premium for males as early as the end of the nineteenth century.

[11]Daniel (1993) develops and tests a model that explains why women typically do not earn marriage premium and why the premium is smaller among blacks. Korenman and Neumark (1992) explore the relationship between marriage and pay fo women.

[12]Other explanations can also be found in the literature. A comprehensive survey is in Weiss (1997). For example, some argue that marriage premium simply reflects employer favoritism. Reed and Harford (1989) suggest that married men receive a compensating wage differential because they work under adverse working conditions. Cornwell and Rupert (1997) argue that marriage induces a shift in the wage-generating process caused by the effect of "settling down".

[13]For reviews, see Korenman and Neumark (1991), Daniel (1993) and Loh (1996).

lection hypothesis may be important, but that even after controlling for the selection in various ways, there still remains a sizeable and significant productivity effect of marriage.

These arguments may be readily extended to explain why labour and marriage markets among immigrants may be significantly related. According to the productivity hypothesis, interethnic marriage may have a causal effect on the labour market productivity of immigrants. There are at least two reasons for this productivity effect. First, the degree of specialization and division of labour within the household may differ between interethnic and noninterethnic marriage. This difference may arise because native and immigrant spouses may have dissimilar preferences for work which determines the extent of potential specialization, and thus the gain from each type of marriage. Second, it is also possible that spouses play an integral role in the formation of human capital of their partners. For example, interethnic marriage can accelerate the linguistic adjustment of intermarried immigrants and enlarge their information network, and this may contribute positively to their labour market productivity.

Interethnic marriage need not always enhance earnings of immigrants. Baker and Benjamin (1997) investigate the family investment hypothesis according to which immigrant couples coordinate their investment activities in the presence of borrowing costs. For example, immigrant wives may take low paying jobs to finance their husbands' investments in education upon the arrival in the host country. Immigrants married to native-born spouses may not face binding borrowing constraints and they may accumulate less human capital than their intermarried counterparts. Consequently, assimilation rate of intermarried immigrants may be smaller than that for nonintermarried immigrants.

On the other hand, the selection hypothesis postulates that the nativity of marriage partners and the work productivity of immigrants may be related even if the nativity of the partner does not affect productivity at all. This spurious relation may arise from omitting an important characteristic, such as physical appearance[14], that is valued in both labour and marriage markets. It is also likely that high earnings may increase the probability of becoming married to a native spouse, i.e. there may be assortative matching in the marriage markets. In all these cases, intermarried immigrants may indeed be

[14]For an example of a study that examines the relation between labour market performance and physical appearance, see Hamermesh and Biddle (1994).

more productive, but interethnic marriage is not a casual factor for enhanced productivity.

2.2 The Model

The alternative hypotheses about the effect of interethnic marriage can be analyzed within a model that is formally similar to that of evaluating the impact of any intervention or treatment[15]. Here, the treatment is the choice of interethnic marriage rather than noninterethnic marriage, and the impact I wish to evaluate is its effect on earnings of immigrants.

The structure of the model is as follows. A single immigrant chooses between a marriage to a native-born spouse ($j = 1$) and a marriage to a foreign-born spouse ($j = 0$) to maximize life-time utility. The utility from each type of marriage depends on its associated earnings and nonpecuniary benefits. Potential earnings in each type of marriage are determined by a standard set of human capital variables, but the returns to these variables is allowed to differ between two types of marriages. Preferences for nonpecuniary benefits vary between individuals, and these preferences are correlated with a set of background personal characteristics. Finally, the cost associated with each type of marriage are assumed to depend on individual characteristics and alternative-specific determinants of costs.

Even this simple structure accommodates both alternative hypotheses about the effect of interethnic marriages on earnings. To account for the productivity hypothesis, the potential earnings are allowed to differ between two types of marriages. To accommodate the selection hypothesis, the utility from each type of marriage explicitly depends on its associated earnings.

More formally, the utility $U_{ij\tau}$ of a single immigrant i from marrying a spouse of nativity j, for $j = 0, 1$, is given by:

$$U_{i\tau j} = \theta y_{i\tau j} + V_{i\tau}\vartheta_j + \eta_{i\tau j} \tag{1}$$

where y represents the (log of) potential earnings; V is a vector of background characteristics related to preferences over nonpecuniary benefits; and η represents other influences on the utility. θ and ϑ are parameters. τ indexes the cross-section in which the individual is observed, and I assume that there

[15] Main references are Maddala (1984), Heckman and Robb (1985), Heckman, LaLonde and Smith (1999), and Vella (1998).

are at least two cross-section surveys. This requirement will be explained later in the context of the separate identification of aging and cohort effects.

The cost for each type of marriage $C_{ij\tau}$ is represented as:

$$C_{i\tau j} = B_{i\tau}\iota_j + \kappa N_j + \zeta_{i\tau j} \tag{2}$$

where B denotes a vector of individual characteristics; N is a measure of search costs for a spouse; and ζ represent other influences on costs. ι and κ are parameters.

A single immigrant's choice of the type of marriage is determined by the sign of the utility difference net of costs, $I^*_{i\tau}$, and is denoted by a categorical variable $I_{i\tau}$:

$$\begin{aligned} I^*_{i\tau} &= (U_{i\tau 1} - U_{i\tau 0}) - (C_{i\tau 1} - C_{i\tau 0}) \\ I_{i\tau} &= 1(I^*_{i\tau} > 0) \end{aligned} \tag{3}$$

where $1(.)$ is the indicator function.

The potential earnings in each type of marriage are specified as[16]:

$$\begin{aligned} y_{i\tau j} &= M_{i\tau}\omega_j + \alpha_j age_{i\tau} + \beta_j ysm_{i\tau} + \lambda_j yom_{i\tau} + \sum\nolimits_{\tau} \mu_{\tau j}\pi_{i\tau} + \epsilon_{i\tau j} \\ &\equiv X_{i\tau}\rho_j + \varepsilon_{i\tau j} \end{aligned} \tag{4}$$

where M gives a vector of human capital variables and other controls; age indicates the age of immigrant; ysm represents years since migration; yom is the year of immigration; and π is a dummy variable indicating if immigrant i was drawn from cross-section τ. The second line is introduced to simplify exposition.

The separate identification of aging and cohort effects requires the availability of longitudinal data where a particular individual is tracked over time, or equivalently, the availability of a number of randomly drawn cross-sections so that specific cohorts can be tracked across survey years[17]. For this reason I assume that there are at least two cross-section survey available for

[16] This specification is relatively standard in the immigration literature. See for example Borjas (1999).

[17] See Borjas (1985) and Borjas (1999).

empirical application. An additional identification problem arises from the identity $ysm_{i\tau} = \sum_\tau \pi_{i\tau}(T_\tau - yom_{i\tau})$, where T_τ is the calendar year in which cross-section τ is obtained. To overcome this problem, I impose the usual identification restriction that the period effects are the same for both intermarried and nonintermarried immigrants:

$$\mu_{\tau 1} = \mu_{\tau 0} \tag{5}$$

Because earnings are observed in only one type of marriage from each individual, (3) is not useful for estimation as specified. However, substitution using (4) yields a reduced form equation for interethnic marriage:

$$\begin{aligned} I^*_{i\tau} &= W_{it}\Gamma + u_{it} \\ I_{i\tau} &= 1(I^*_{i\tau} > 0) \end{aligned} \tag{6}$$

where Z is the set of all exogenous variables in the earnings and interethnic marriage equations; and u_{it} is a composite error term. Equation (6) determines sample selection into interethnic marriage, and can be estimated using any standard discrete choice model such as probit.

To complete the model, I assume that the residuals in the earnings equations and the interethnic marriage equation, $(\varepsilon_1, \varepsilon_0, u)$, are distributed jointly normal with mean zero and covariance matrix $\Sigma = [\sigma^2_1, \sigma_{10}, \sigma_{1u}, \sigma^2_0, \sigma_{0u}, \sigma^2_u]$[18]. The model of interethnic marriage and earnings is thus fully specified by equations (4) and (6), with the assumed structure for disturbances, and subject to the restriction in equation (5).

The difference in the assimilation rate between intermarried and nonintermarried immigrants is defined as:

$$\begin{aligned} \phi^* &= \frac{\partial y_i}{\partial t} \mid_{intermarried} - \frac{\partial y_i}{\partial t} \mid_{nonintermarried} \\ &= (\alpha_1 - \alpha_0) + (\beta_1 - \beta_0) \end{aligned} \tag{7}$$

where t denotes time, and the derivatives account for the fact that both age and years since migration change over time.

[18] Note that σ^2_u is not identified and we employ the usual convention and normalize it to one.

The main purpose of this paper is to test whether there is a casual effect of interethnic marriage on the assimilation rate of immigrants, or equivalently, whether ϕ^* is significantly different from zero. To test this hypothesis, we need consistent estimates of $\alpha_1, \alpha_0, \beta_1$,and β_0. The ordinary least square estimates of equation (4) will in general be inconsistent in the presence of the selection of immigrants into interethnic marriages based on their unobserved characteristics. The selection in the present model is generated explicitly because the disturbance in the interethnic marriage equation (6) contain ε_1 and ε_0 that belong to the earnings equations. However, even weaker condition that the covariances σ_{1u} and σ_{0u} are nonzero will result in inconsistency of the OLS estimates.

Two consistent estimators in the presence of self-selection are the two-step Heckman correction method[19] and the maximum likelihood estimator. Both of these estimators exploit the additional information in the interethnic marriage equation in estimating the parameters of the earnings equations. Note that:

$$E[y_{i\tau} \mid I_{i\tau} = j] = X_{i\tau}\rho_j + E[\varepsilon_{i\tau} \mid I_{i\tau} = j] = X_{i\tau}\rho_j + \frac{\sigma_{ju}}{\sigma_u^2}\lambda_{i\tau j} \qquad (8)$$

for $j = 0, 1$, where $\lambda_{i\tau j} = f(Wi\tau\Gamma)/F(Wi\tau\Gamma)$ for intermarried immigrants ($I_{i\tau} = 1$) and $\lambda_{i\tau j} = -f(Wi\tau\Gamma)/[1 - F(Wi\tau\Gamma)]$. f and F are the density function and the distribution function of a standard normal variable.

The λ terms are known as the inverse Mills ratios, or simply the selectivity terms. Testing for the presence of selection is identical to testing that the coefficients on selectivity terms are significantly different from zero. Equivalently, under the null hypothesis of no selection, σ_{1u} and σ_{0u} should be zero. In the case of positive selection of immigrants into interethnic marriages and the negative selection of immigrants into noninterethnic marriages, we have $\sigma_{1u} < 0$ and $\sigma_{0u} > 0$, but in general σ_{1u} and σ_{0u} can be of either sign.

In the two-step method, one first obtains the consistent estimates of Γ in the interethnic marriage equation. These estimates are used to construct the selectivity terms λ. The OLS of earnings equations, with the selectivity terms included as additional regressors, then yields consistent estimates. An additional adjustment needs to be made to correct the standard errors to account for the two-step nature of the estimation. Note that even after obtaining the selectivity terms, we need to estimate the earnings equations

[19] See Heckman (1979).

for intermarried and nonintermarried immigrants jointly to impose cross-equation restriction (5). These equations were estimated by the generalized least squares (GLS) in the second step to account for the possible correlation between the error terms in two earnings equations.

The two-step estimates are never fully efficient in the sense that they never attain the Cramer-Rao lower bound. The efficient estimator is the full information maximum likelihood which estimates the earnings and interethnic marriage equations jointly. A potential problem, experienced in the empirical part of this study, is that the likelihood function is not concave and the iteration process need not always converge. In few cases when the iteration has not converged, I report the two-step estimates which are consistent. All empirical results are obtained using LIMDEP[20]

2.3 Empirical Specification

The measure of earnings used in this study is the logarithm of hourly wage[21]. I focus on this measure of earnings to isolate the impact of interethnic marriage on the productivity of immigrants. Measures such as annual wage income incorporate various dimensions of labour supply that may be endogenous. In addition, many studies in the marriage premium literature use this measure of earnings as the dependent variable[22]. The choice of covariates in the earnings equations (4) is similarly crucial, because some determinants of earnings may be influenced by interethnic marriage, such as fluency in the host country's language. The set of covariates in (4) is thus minimal, and includes education[23] and indicators for race (four) and regional residence (four). Since educational attainment may be endogenous, I also estimated the model in the sample of immigrants who have completed their education prior to their marriage.

The interethnic marriage is defined as a marital union between any foreign-born and a native-born individual. Two remarks about this definition are

[20] I thank Bill Greene for helpful correspondence.

[21] Hourly wages are constructed by the division of annual wage and salary income by the annual hours of work (a product of the number of weeks worked in the previous year and the number of hours worked in the previous week).

[22] See for example Hill (1979), Korenman and Neumark (1991) and Loh (1996).

[23] The education variable is constructed from a set of educational attainment groups reported in the Census. Since the results are not affected by using a full set of educational dummy variables, the continuos variable representing years of education is reported in all tables.

worth noting. First, the nonintermarried individual is any foreign-born person who is not married to a native-born. This definition does not require that nonintermarried be necessarily married to individuals from the same country of origin[24]. Second, the above definition of intermarriage does not distinguish between first and subsequent generations of immigrants. For example, a foreign-born individual married to someone from his own ethnic group who was born in the U.S. would still be defined as intermarried[25].

The identification of the earnings-interethnic marriage model does not require any exclusion restrictions. However, it is commonly agreed that the exclusion restriction may assist in the identification due to the problems of multicollinearity between the selectivity terms and the exogenous variables in the earnings equations[26]. In this study, I exploit the variation in the relative marriage market conditions between different ethnic groups and states of residence. In particular, I consider the following instrument for the probability of interethnic marriage:

$$Z_{isg} = \frac{m_{sg}/M_g}{n_s/N} \tag{9}$$

where m_{sg} is the number of unmarried (never married, divorced, separated, and widowed) foreign-born individuals who reside in state s and belong to ethnic group g; M_g is the total number of unmarried foreign-born individuals in all states who belong to ethnic group g; n_s is the number of unmarried native-born individuals who reside in state s; and N is the total number of unmarried native-born individuals. All of these variables are defined for individuals of the opposite sex of immigrant i and in the age group 18 to 65 years.

This instrument is closely related to the sex ratio variable that has been extensively used in the studies of marital behavior[27]. Theoretical link between the availability of potential spouses and the marriage decision of indi-

[24] In most cases intermarried immigrants are married to individuals from their own country; the percent of those married to someone from their own country was 77% in 1970 and 83% in 1980.

[25] For a recent study that makes distinction between different generations of immigrants, see Angrist (2002).

[26] See the discussion in Vella (1998). Leung and Yu (1996) conclude from the Monte Carlo investigations that the Heckman two-step estimator is effective provided at least one of the independent variables displays sufficient variation to induce tail behavior in the inverse Mills ratio.

[27] See Angrist (2002), Becker (1991) and Grossbard-Shechtman (1993).

viduals was made explicit at least since Becker (1973). In this study, I expect a negative relationship between the instrument and the propensity of immigrants to intermarry, primarily because of the adverse effect of the relative availability of the potential spouses on the costs associated with each type of marriage. I also include a lagged value of the instrument in all specifications to control for relative marriage market conditions ten years before I observe the immigrant.

In the empirical analysis, I experimented with several other definitions of the instrument. For example, I examined the sensitivity of results in the case where unmarried individuals were defined as those who are never married. This definition may be more appropriate because the primary sample consists of individuals in their first marriage. I also considered the age group 16 to 32 years only, which may be more relevant because men on average tend to marry younger spouses.

3 Data and Descriptive Statistics

The data used in this study comes from the 1970 (Form 1 State) and 1980 (1% Metro B Sample) U.S. Census samples of Integrated Public use Microdata Series (IPUMS-98)[28]. The particular choice of 1970 and 1980 samples was based on two criteria. First, the population of interest consists of all foreign-born individuals who arrived as unmarried to the U.S., since it is this group of immigrants who effectively face the choice of interethnic marriage. In 1970 and 1980 samples, it is possible to identify the age at first marriage. In addition to the information on year of immigration, it is thus possible to identify whether individuals arrived as unmarried or not. Second, at least two samples from different time periods are required for the separate identification of cohort and aging effects, as discussed earlier. The 1970 and 1980 samples are two most recent samples that satisfy both of these criteria[29].

From the larger sample of all foreign-born men, several selection rules were employed to produce the final samples used in the empirical analysis. First, the sample is restricted to all foreign-born males of age 16 to 65, married with spouse present, who do not reside in group quarters, and with nonmissing

[28]The IPUMS was created at the University of Minnesota in 1997, and it consists of twenty five samples which span the U.S. censuses of 1850 to 1990. The data sets and their full documentation is available at http://www.ipums.umn.edu/usa/doc.html.

[29]The information on age at first marriage is not available in the 1990 Census.

information on own and spouse's place of birth, own year of immigration and state of residence. The sample is restricted to males only because the inclusion of females would introduce additional selection problems associated with their labour force participation decision. In addition, if there are any interethnic marriage effects we are more likely to find them in the sample of males because the marriage premium literature usually finds weak evidence for the relation between pay and marriage for females.

Second, only the individuals who are in their first marriage are included in the analysis. The sample is also restricted to individuals who arrived as unmarried. This selection rule results in a substantial loss of observations and I examine the sensitivity of the results to this rule by considering all married immigrants, regardless of whether they arrived as unmarried or not.

Third, I restrict the sample to individuals whose mother tongue is not English[30] and to individuals from ethnic groups that have at least fifty individuals in each Census year. The rationale for this rule is to ensure reliability of the instrument by having sufficient number of observations for each ethnic group-state of residence combination. In addition, we are more likely to find evidence for the interethnic marriage premium in the sample of nonEnglish speaking immigrants if the effect of interethnic marriage works primarily through linguistic and information channels.

Finally, all individuals with missing or zero annual wage, hours worked per week or weeks worked per year are excluded from analysis. In addition, the sample is trimmed by 1% from each tail of the distribution to reduce the impact of extreme observations on the estimation results[31].

The resulting sample includes 9,129 immigrants (3,023 in 1970 and 6,106 in 1980). The average interethnic marriage rate is 37.95 per cent, with 3,464 immigrants married to a native-born spouse, and 5,665 immigrants married to a foreign-born spouse. Table 1 presents the variation in interethnic marriage rate among selected ethnic groups. Several interesting patterns emerge. First, the variation in interethnic marriage rate among ethnic groups is large. For example, in 1970 around 55% of all individuals born in Germany were married to a spouse born in the U.S. The corresponding figure for individuals born in China was only 20%. The average interethnic marriage rate

[30] This rule excludes individuals from Australia, Canada, Ireland, New Zealand, and the United Kingdom.

[31] This rule effectively restrict the hourly wage to lie in ($1, $67) interval, in the real 1990 dollars.

was around 46 % in the same year. Second, while interethnic marriage rate increased or remained constant for few ethnic groups, most groups experienced a substantial decline. As a result, the interethnic marriage rate was about 12% lower in 1980 than it was in 1970[32]. Finally, the interethnic marriage rates among foreign-born individuals in the U.S. are slightly lower than the rates reported by Meng and Gregory (2005) for Australia. For example, among individuals who arrived in Australia at less than 20 years of age, the intermarriage rate was 48, 46, 48 and 47 percent in 1981, 1986, 1991 and 1996, respectively.

Table 2 compares the hourly wage and annual wage and salary income between intermarried and nonintermarried immigrants. The table also includes an estimate of unadjusted interethnic marriage premium obtained from a regression of log hourly wages (log annual wage income) on an indicator of interethnic marital status, with no other covariates in the regression.

Consider the hourly wages first. The earnings of intermarried immigrants were higher in both 1970 and 1980 than earnings of nonintermarried immigrants. The difference amounts to about $ 0.74 in 1970 to $0.56 in 1980, which translates into 4 to 5 percent of real earnings. This premium is significant in both years. Real hourly earnings are lower in 1980 than they were in 1970 for both groups of immigrants.

Similar differences can be observed in the annual wage income between intermarried and nonintermarried immigrants. The premium in the annual income was about 8% in both 1970 and 1980, or an equivalent of $ 1,797 and $ 1,926 per year, respectively. Again, this difference is statistically significant in both years. Compared to the interethnic marriage premium in annual income that Meng and Gregory (2005) report for Australia, the premium in the U.S. is substantially smaller. Over the 1981 to 1996 period, the interethnic premium in Australia was between 9 and 20 percent for immigrant males who arrived in Australia at less than twenty years of age.

Table 3 reports the summary statistics by interethnic marital status. The first two moments of the age distribution are almost identical between intermarried and nonintermarried immigrants. On the other hand, intermarried immigrants spent more years in the U.S. and acquired more education than

[32] An independent investigation of the flow into interethnic marriages using the Vital Statistics Marriage Files revealed that the proportion of foreign-born individuals who were intermarrying every year over the 1970 to 1980 period was relatively constant at about 52%. The reason for lower intermarriage rate that we find in 1980 has probably more to do with outflows from intermarriages such as divorce.

did nonintermarried immigrants. The distribution of intermarried and nonintermarried immigrants across different Census regions is very similar. Most of intermarried and nonintermarried immigrants in both years are white. However, the proportion of nonintermarried immigrants who are Asian was 12% in 1970 and 17% in 1980, which is significantly larger than their proportion in the total sample (7 and 14 percent, respectively). The distribution of intermarried immigrants is clearly skewed toward earlier immigrant cohorts, while the distribution of nonintermarried immigrants is more symmetric.

In sum, this preliminary analysis of the data shows that there is a substantial variation in the interethnic marriage rate among ethnic groups. In addition, intermarried immigrants enjoy a sizeable wage premium, both in hourly wages and in annual wage income. Lastly, intermarried and nonintermarried immigrants differ in characteristics such as education and years since migration which are usually deemed important determinants of earnings.

4 Results

4.1 Probability of Interethnic Marriage

Table 4 presents the maximum likelihood probit estimates of the interethnic marriage equation (6). For purposes of comparison, the estimates from the linear probability model are also shown, and the probit estimates are presented as marginal effects, evaluated at the mean of independent variables. Since the interethnic marriage equation (6) is in the reduced form, the estimates must be interpreted as capturing both the direct effects on interethnic marriage and indirect effects through earnings.

The estimates of the instrument $Z_{ig\tau}$ - the relative availability of the potential spouses from the same ethnic group and in the same state of residence as immigrant i - are negative as expected, and one of the most significant determinants of interethnic marriage. Controlling for the current value of Z, the impact of $Z_{ig\tau-10}$ is positive and significant. Given the current relative marriage market conditions, the past values of Z indicate how well the ethnic group is established in the country. The interehnic marriage rates are expected to be higher among the well-established groups because these groups tend to be more culturally assimilated. In addition, there is a larger number of the second-generation individuals in these ethnic groups who would count as native-born in this study. The chi-square of the joint significance of $Z_{ig\tau}$

and $Z_{ig\tau-10}$ clearly rejects the null hypothesis of no significance[33].

Most of other variables have expected signs. The probability of interethnic marriage is a decreasing and concave function of age. Better educated immigrants are more likely to become intermarried. Interethnic marriage seems to be significantly higher in the West compared to other regions. Black immigrants and immigrants of other races tend to intermarry more than white immigrants do, while Asian immigrants tends to intermarry significantly less often. Immigrants who spent more years in the U.S., as well as earlier immigrant cohorts in general, have higher propensity to intermarry. This may reflect changes in the composition of immigrant cohorts over time, changes in the relative marriage market conditions, or changing tastes for heterogamous marriages as a part of cultural assimilation process. Finally, the interethnic marriage was about six percent lower in the year 1980 compared to 1970.

The estimates obtained from the linear probability model are very similar to the probit estimates. Logit estimates, not presented here, are almost identical to the ordinary least squares and probit estimates.

4.2 Main results

Tables 5 and 6 present the main results of the paper. In table 5, I present the estimates of the parameters of the earnings equations obtained from three alternative estimators: the generalized least squares (GLS), the maximum likelihood, and the two-step Heckman method. Table 6 then shows the difference in the estimated coefficients in the earnings equation between intermarried and nonintermarried immigrants.

Consider the results for intermarried immigrants in table 5a first. The first column presents the GLS estimates. Hourly earnings are an increasing and concave function of age. In particular, each additional year of age brings about eight percent increase in real hourly earnings. Education also positively affects earnings, and each additional years of schooling results in about four percent increase in hourly wage. The earnings of intermarried immigrants are on average lower in the South and West regions. In comparison to white intermarried immigrants, members of other racial groups earn significantly less, although this difference is statistically significant for black race only. There are no significant individual cohort effects on hourly earnings, and

[33]The chi-square statistic is 145.51, and the associated p-value is zero to four decimal places.

these effects are not significant even jointly[34]. Real hourly earnings are about 5 percent lower in 1980 than they were in 1970. Lastly, earnings increase with each year spent in the host country, but at a diminishing rate.

The maximum likelihood estimates are very similar to the GLS estimates. This is not surprising, because the estimated covariance between the error term in the earnings equation and the interethnic marriage equation is very small in magnitude (-0.03) and highly insignificant (t-ratio is -0.24). This result suggests that selection hypothesis is not particularly important in the sample of intermarried immigrants, although the sign of σ_{1u} is indicative of positive selection. The two-step Heckman estimates confirm this finding. The estimated coefficient on the selectivity term is negative, indicating the positive selection, but again this estimate is not statistically significant. As a result, the estimated coefficients of most other independent variables are not very different from the GLS estimates.

Table 5b contains the results for nonintermarried immigrants. As in the sample of intermarried immigrants, the GLS estimates show that hourly earnings are an increasing and concave function of age. More educated immigrants earn more; earnings in the South and West regions are smaller; and white nonintermarried immigrants earn more than immigrants of other races. Individual cohort effects are in general much smaller for nonintermarried immigrants compared to intermarried immigrants, and they fail to attain statistical significance both individually and jointly.

The maximum likelihood estimates and the two-step estimates suggest negative selection. In particular, the estimated σ_{0u} is 0.21 with a t-ratio of 2.00, while the estimated coefficient on the selectivity term λ_0 is -1.74, with a t-ratio of -1.91. In addition, the estimated returns to age are higher than the estimates obtained by GLS. The cohort effects indicate that more recent cohorts may earn more than earlier cohorts, but these effects are not significant either individually or jointly[35]. Finally, the estimates of returns to each year spent in the U.S. are very similar for all three estimation methods.

The difference in the estimated coefficients in the earnings equations between intermarried and nonintermarried immigrants is presented in table 6. Based on the GLS estimates, the only significant difference between intermarried and nonintermarried immigrants is in the returns to age. In particular, intermarried immigrants receive about four percent more than similar non-

[34]The chi-square statistic is 4.52 with associated p-value of 0.2107.

[35]The p-value for the Wald test of joint significance of cohort effects is 0.3999.

intermarried immigrants for each year of age. In contrast, the earnings of intermarried immigrants grew at about 1.5 percent less than the earnings of nonintermarried immigrants with each year spent in the host country. However, this difference is not significant at the conventional levels. The estimate of the assimilation effect is 2.5 percent and the associated p-value is 0.054.

The maximum likelihood estimates also show that the only significant difference between intermarried and nonintermarried immigrants is in the estimated returns to age. However, the estimated difference is only about 3.2 percent, mainly because the MLE estimates of the returns to age for nonintermarried immigrants tend to be higher than the corresponding GLS estimates. The difference in the returns to each year spent in the host country is negative, statistically insignificant and very similar to the GLS estimate. The estimated assimilation effect based on the MLE estimates is about 1.5 percent, almost one percent lower than the GLS estimate. However, this effect is insignificant at the conventional levels (the p-value is 0.18).

The two-step estimates also suggest smaller differences in the returns to age, and insignificant difference in the returns to years since immigration. The estimated assimilation effect is about 2 percent, but again this effect is not statistically significant.

4.3 Specification Checks

Table 7 contains additional specification checks of the model. First, I experimented with several alternative definitions of the instrument. In particular, I examined the sensitivity of results if unmarried individuals are defined as those who were never married and if the age group was restricted to 16 to 32 years of age potential spouses only. The estimated assimilation effect from the two-step method ranges between 1.8 and 2 percent, which is very similar to the estimates obtained using the initial specification of the instrument. In addition, the estimated coefficients on the selectivity terms almost always indicate positive selection into interethnic marriages and negative selection into marriages with other foreign-born individuals. However, only the latter coefficients are statistically significant in all specifications. These results suggest that my results are not particularly sensitive to minor variations in the definition of the instrument for the probability of intermarrying.

Second, I estimated the model in the sample of individuals who have completed their education prior to their first marriage. In this calculation, I have assumed that individuals have been in the school until they completed their

education and have not returned to the school afterwards[36]. In this sample, the GLS estimate of the assimilation effect is slightly larger, 2.8 percent, and significant at 5 percent level. The two-step estimate of the assimilation effect is 1.27 percent, but it is imprecisely estimated. The signs of the coefficients of selectivity terms confirm the presence of positive selection in the sample of intermarried immigrants, and the negative selection in the sample of non-intermarried immigrants. Again, only the coefficient of the selectivity term for nonintermarried immigrants attains statistical significance.

Finally, I considered the sample of English-speaking immigrants only. These are immigrants from Australia, Canada, Ireland, New Zealand, and the UK. If the assimilation effect works primarily through linguistic adjustment, we should observe much smaller effect in this group of foreign-born individuals. This intuition is confirmed by the results. The estimated assimilation effect is much smaller than in the group of nonEnglish-speaking immigrants, and neither the GLS estimates nor the two-step Heckman estimates indicate significant difference in the assimilation rate between intermarried and non-intermarried immigrants. In addition, there is no evidence of selection in the group of English-speaking immigrants.

5 Conclusions

While substantial empirical evidence suggests the presence of economic assimilation among immigrants in many countries, little is known about the underlying factors explaining this phenomenon. In this paper, I have examined the possibility that immigrants who marry spouses born in the host countries accumulate human capital faster than immigrants married to foreign-born spouses. The ordinary least squares estimates confirm this prediction and indicate than intermarried immigrants enjoy growth in their earnings that exceeds that for nonintermarried immigrants by close to 2.5 percent. However, this relationship appears to be spurious. Once an appropriate control is taken of the fact that immigrants may select into different types of marriages, the assimilation effect of intermarriage disappears. The evidence indicates that intermarried immigrants tend to be positively selected among all married immigrants and that intermarried immigrants tend to be negatively selected.

[36]In particular, all individual for whom (age-6-years of education) was greater than the age at first marriage are excluded from the analysis.

These results contrast with Meng and Gregory (2005) who find substantial interethnic marriage premium for nonEnglish speaking immigrants in Australia. While there are many potential reasons for why the results between these two studies differ, an important factor appears to be the difference in the composition of immigrant population in Australia and the U.S. Future research into this issue would be most useful.

Another potential avenue for future research is to examine other labor market outcomes such as geographic and occupational mobility by interethnic marital status. It would also be of interest to examine the assimilation effect of interethnic marriages in the sample of female immigrants, after appropriately controlling for labor force participation of females. The additional sources of selection - such as selection related to immigration and marriage - may also be incorporated in future work. Lastly, it is also important to examine intermarriages and assimilation of immigrants in other countries. We are but at the beginning of understanding the complex link between labor and marriage market outcomes for immigrants, and a lot of work remains ahead.

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Table 1. Interethnic marriage rate, 1970 and 1980 U.S. Census

	Percentage of the group intermarried in:			
Ethnic group	1970 Census	1980 Census	Both Censuses	Group size (both Censuses)
Germany	0.5484	0.6417	0.6015	1,079
Hungary	0.5517	0.4868	0.5215	163
Italy	0.5817	0.4553	0.5166	1,173
Poland	0.4221	0.4167	0.4197	355
Greece	0.4239	0.3910	0.4032	248
Mexico	0.4856	0.3298	0.3654	2,592
West Indies	0.4198	0.2897	0.3245	490
Russia	0.4253	0.1846	0.3224	152
South America	0.2875	0.3252	0.3146	569
Portugal	0.4706	0.2517	0.3093	194
Central America	0.2982	0.2839	0.2867	293
Yugoslavia	0.3789	0.1942	0.2828	198
Cuba	0.3376	0.2366	0.2646	567
Philippines	0.3485	0.1467	0.2000	500
China	0.2000	0.1502	0.1637	556
All ethnic groups	0.4591	0.3400	0.3795	
(standard error)	(0.4984)	(0.4737)	(0.4853)	
Observations	3,023	6,106	9,129	

Notes:

(1) Interethnic marriage rate is defined as the fraction of all married foreign-born persons who are married to native-born spouses.

(2) All estimates are weighted by the Census weights.

(3) Ethnic groups are ranked in the decreasing order of their interethnic marriage rate in both 1970 and 1980 Censuses.

(4) Group size is the number of unweighted observations for each ethnic group in both 1970 and 1980 Censuses.

Table 2. Unadjusted interethnic marriage premium

	1970			
	Hourly Wage		**Annual Wage Income**	
	Mean	St. Deviation	Mean	St. Deviation
Intermarried	15.02	8.67	30,315	17,415
Nonintermarried	14.28	8.19	28,158	16,636
Premium ($)	$ 0.74		$ 1,797	
Premium (%)	4.48 %	[2.16]	7.69 %	[3.36]
	1980			
	Hourly Wage		**Annual Wage Income**	
	Mean	St. Deviation	Mean	St. Deviation
Intermarried	13.85	8.11	28,274	17,834
Nonintermarried	13.29	8.39	26,348	17,065
Premium ($)	$ 0.56		$ 1,926	
Premium (%)	4.78 %	[2.98]	7.64 %	[4.18]

Notes:

(1) The nominal wages are adjusted for inflation using the Consumer Price Index (CPI) included in the Census. The CPI was 3.39 in 1970 and 1.71 in 1980, relative to 1990.

(2) All estimates are weighted by the Census weights.

(3) The interethnic marriage premium (%) is obtained from a regression of log hourly wage (log annual wage income) on an indicator of interethnic marital status, with no other covariates included in the regression.

(4) The sample size is 3,023 in 1970, and 6,106 in 1980.

Table 3. Summary statistics, by interethnic marital status.

	1970		1980	
	Intermarried	Non-intermarried	Intermarried	Non-intermarried
Age	37.65	37.50	34.02	35.24
	(11.03)	(10.24)	(9.10)	(9.15)
Years since migration	18.85	14.74	18.39	14.71
	(6.97)	(7.57)	(7.38)	(7.21)
Education	11.44	10.60	12.24	11.26
	(3.93)	(4.03)	(4.02)	(4.27)
Northeast Region	0.47	0.46	0.32	0.31
Midwest Region	0.17	0.15	0.16	0.11
South Region	0.10	0.09	0.21	0.16
West Region	0.25	0.30	0.31	0.41
White race	0.92	0.84	0.87	0.76
Black race	0.03	0.04	0.05	0.06
Asian race	0.04	0.12	0.05	0.17
Other race	0.01	0.01	0.03	0.02
Immigrated before 1949	0.49	0.27	0.11	0.04
Immigrated 1950-1959	0.37	0.38	0.37	0.21
Immigrated 1960-1969	0.14	0.35	0.32	0.42
Immigrated 1970-1979	0.00	0.00	0.20	0.33
Number of observations	1,388	1,635	2,076	4,030

Notes:

(1) All estimates are weighted by the Census weights. Standard errors are in parentheses.

(2) Asian race includes Chinese, Japanese and other Asian or Pacific.

Table 4. Probability of interethnic marriage.

	Probit		LPM	
	Coefficient	z-ratio	Coefficient	t-ratio
Z	-0.4670	-6.61	-0.4362	-7.02
Z lagged	0.1456	1.97	0.1537	2.37
Age	-0.0411	-10.47	-0.0351	-10.21
100*Age^2	0.0349	7.06	0.0291	6.67
Education	0.0098	6.99	0.0094	7.71
Midwest	-0.0025	-0.14	0.0008	0.05
South	0.0246	1.47	0.0222	1.52
West	0.0538	3.33	0.0507	3.63
Black race	0.0681	2.51	0.0554	2.38
Asian race	-0.2325	-13.28	-0.2181	-13.61
Other race	0.0988	2.48	0.0848	2.47
Immigrated before 1949	0.2595	4.42	0.2362	4.75
Immigrated 1950-1959	0.0976	2.32	0.0859	2.37
Immigrated 1960-1969	-0.0092	-0.38	-0.0098	-0.47
Year 1980 indicator	-0.0612	-2.87	-0.0530	-2.85
Years since immigration	0.0154	3.38	0.0136	3.50
100*Years since immigration^2	0.0032	0.22	0.0035	0.28
constant			0.9471	14.52
Adjusted R^2 (Pseudo R^2 for Probit)	0.1396		0.1711	
Observed P	0.3795			
Predicted P (at mean X)	0.3618			
Log likelihood	-5,214			
Number of observations	9,129			

Notes:

(1) LPM stands for linear probability model.

(2) Probit estimates are evaluated as the marginal change in the probability, evaluated at the mean of independent variables.

(3) Instruments Z and Z lagged are as defined in the text.

Table 5a. Estimates of the earnings equations, intermarried immigrants.

	GLS		MLE		HECKIT	
	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
Constant	0.2878	2.41	0.2840	2.49	0.2921	2.42
Age	0.0788	12.67	0.0798	10.62	0.0808	10.12
Age^2	-0.0009	-11.09	-0.0009	-10.52	-0.0009	-9.94
Education	0.0388	16.57	0.0384	13.96	0.0382	13.45
Midwest	0.0701	2.68	0.0691	2.52	0.0683	2.57
South	-0.1575	-5.85	-0.1594	-5.76	-0.1596	-5.85
West	-0.0514	-2.24	-0.0514	-2.27	-0.0507	-2.20
Black race	-0.1273	-2.79	-0.1284	-2.91	-0.1287	-2.81
Asian race	-0.0186	-0.44	-0.0100	-0.19	-0.0038	-0.07
Other race	-0.0535	-0.83	-0.0566	-0.96	-0.0577	-0.89
Immigrated before 1949	0.1046	1.36	0.1317	1.33	0.0993	1.14
Immigrated 1950-1959	0.0698	1.16	0.0903	1.25	0.0693	1.09
Immigrated 1960-1969	0.0586	1.38	0.0695	1.54	0.0612	1.44
Year 1980 indicator	-0.0485	-1.96	-0.0313	-0.94	-0.0424	-1.69
Years since immigration	0.0157	1.88	0.0148	1.79	0.0147	1.71
Years since $immigration^2$	-0.0004	-1.45	-0.0004	-1.56	-0.0004	-1.47
Sigma (1)			0.5192	113.25	-0.0306	-0.40
Rho (1,u)			-0.0345	-0.24		
Lambda					-0.0306	-0.40

Table 5b. Estimates of the earnings equations, nonintermarried immigrants.

	GLS		MLE		HECKIT	
	Coefficient	t-ratio	Coefficient	t-ratio	Coefficient	t-ratio
Constant	0.9485	7.25	0.7707	6.13	0.7310	4.22
Age	0.0385	5.46	0.0478	7.79	0.0469	5.65
Age^2	-0.0004	-4.54	-0.0005	-7.02	-0.0005	-4.93
Education	0.0392	16.87	0.0379	18.91	0.0363	13.02
Midwest	0.1292	4.32	0.1246	5.09	0.1211	4.01
South	-0.1232	-4.27	-0.1163	-5.38	-0.1269	-4.39
West	-0.0107	-0.48	0.0071	0.39	-0.0026	-0.12
Black race	-0.1419	-3.37	-0.1201	-3.17	-0.1435	-3.41
Asian race	-0.1035	-3.69	-0.0822	-2.95	-0.0532	-1.39
Other race	-0.0806	-1.17	-0.0815	-1.59	-0.0967	-1.40
Immigrated before 1949	0.0370	0.47	-0.0738	-0.88	-0.0498	-0.54
Immigrated 1950-1959	0.0106	0.19	-0.0405	-0.69	-0.0273	-0.45
Immigrated 1960-1969	-0.0112	-0.33	-0.0250	-0.81	-0.0123	-0.37
Year 1980 indicator	-0.0485	-1.96	-0.0313	-0.94	-0.0424	-1.69
Years since immigration	0.0309	4.35	0.0313	5.52	0.0284	3.93
Years since $immigration^2$	-0.0006	-2.52	-0.0006	-3.28	-0.0006	-2.59
Sigma (0)			0.5335	74.00		
Rho (0,u)			0.2110	2.00		
Lambda					-0.1743	-1.91

Table 6. Differences between estimates in earnings equations.

	GLS		MLE		HECKIT	
	Difference	p-value	Difference	p-value	Difference	p-value
Age	0.0403	0.0000	0.0320	0.0010	0.0339	0.0032
Age^2	-0.0005	0.0000	-0.0004	0.0007	-0.0004	0.0004
Education	-0.0004	0.8979	0.0005	0.8879	0.0019	0.6395
Black race	0.0146	0.8144	-0.0083	0.8866	0.0149	0.8109
Asian race	0.0849	0.0935	0.0722	0.2354	0.0494	0.4666
Other races	0.0271	0.7737	0.0249	0.7486	0.0390	0.6812
Immigrated before 1949	0.0676	0.3837	0.2055	0.1139	0.1491	0.1545
Immigrated 1950-1959	0.0592	0.3445	0.1307	0.1592	0.0966	0.1778
Immigrated 1960-1969	0.0698	0.1504	0.0946	0.0839	0.0735	0.1315
Years since migration	-0.0152	0.1613	-0.0165	0.0982	-0.0137	0.2189
Years since $migration^2$	0.0002	0.1551	0.0002	0.4737	0.0002	0.2137
Assimilation effect	**0.0248**	**0.0540**	**0.0153**	**0.1799**	**0.0199**	**0.1396**

Notes:

(1) GLS refers to the generalized least squares (SURE); MLE are the maximum likelihood estimates; HECKIT is the two-step Heckman correction procedure.

(2) Difference indicates the difference between the coefficient estimate between intermarried and nonintermarried earnings equations. P-value is for the test that there is no difference in the coefficient estimates.

(3) The number of observations is 9,192 for MLE estimates, and 6,928 for GLS and HECKIT (3,464 observations for each intermarried and nonintermarried immigrants).

Table 7. Specification checks

Specification	GLS	HECKIT	Lambda1	Lambda0
All unmarried, 16-65	0.0248	0.0200	-0.0306	-0.1743
	(0.0540)	(0.1396)	(-0.40)	(-1.91)
All unmarried, 16-32		0.0242	-0.0357	-0.1816
		(0.1398)	(-0.48)	(-2.05)
Never married, 16-65		0.0188	0.0020	-0.1753
		(0.1653)	(0.27)	(-1.98)
Never married, 16-32		0.0190	-0.0227	-0.1770
		(0.1618)	(-0.31)	(-2.02)
Completed education	0.0280	0.0127	0.0031	-0.1961
	(0.0478)	(0.1485)	(0.042)	(-2.19)
English-speaking immigrants	0.0185	0.0081	0.0325	-0.2196
	(0.5781)	(0.8194)	(0.23)	(-1.10)