Accounting for the Native-Immigrant Earnings Differentials and Ethnicity Assimilation in Taiwan

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Abstract

After World War II, many Chinese immigrants moved to Taiwan for political reasons where they and their immediate descendants performed better by posting average earnings of about 30 percent higher than that of Taiwanese. This paper studies the factors underlying the earnings gap between immigrants and natives in Taiwan, with attention paid to differences in the endowment of human capital and occupations. Three main findings are as follows. First, the earnings disparity is mostly rooted in differences in the endowment, with only a negligible fraction attributable to the unexplained part. Second, for differences in the endowment that account for the earnings differential, human capital variables play the most important role, and occupational differences only have a minor role. Finally, an individual's secondary and higher education was most important in explaining the earnings gap, followed by a father's education externalities, an individual's occupation as a professional and/or paraprofessional, a mother's ethnicities and Mandarin proficiency. An individual's middle and primary education tended to moderate the earnings gap.

Keywords: Immigrants, educational attainments, ethnicity, earnings differentials, language proficiency.

JEL Classification: J01, J15, J21, J31, O15

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1. Introduction

Existing literature has voluminous analyses concerning immigrants. The issues under study here are centered on how immigrants perform in the host country, what impact immigrants have on the employment opportunities of natives and which immigration policy most benefits the host country.[1] Existing research has focused on North America, Australia and Europe and most studies investigate economically motivated immigrants. In particular, these analyses have reached the conclusion that immigrants and their immediate descendants have disadvantages in the host country's labor market. However, a striking feature is that immigrants outperformed natives in Taiwan. Available data indicates that immigrants and their immediate descendants obtained much higher earnings than natives during ages 24 and 64 (see Figure 1). Notably, these immigrants received an income on average of about 30% higher than that of natives.

[Insert Figure 1 about here]

After 1949, a wave of émigrés came to Taiwan as asylum seekers and/or refugees escaping communist rule. They accounted for as much as an eighth of the island population by 1950. They and early settlers/natives have the same ethnic origins and similar cultural backgrounds. These two features make immigrants' employment opportunity and performance in Taiwan different from elsewhere. While Hong Kong and Israel have similar features, immigrants there have earnings lower than natives.[2] Why did immigrants make so much more in earnings than natives in Taiwan? What are the driving forces which underlie the earnings differential between immigrants and natives in Taiwan? The purpose of this paper is to offer explanations for these questions. This study is valuable as existing analysis does not answer why immigrants would perform better than natives in earnings. In analyzing these issues, attention is paid to differences in human capital and occupations between immigrants and natives.

Human capital includes educational attainment, language proficiency and parental human capital externalities. It has been argued by Chiswick (1988), Borjas (1992), Gang and Zimmermann (2000) that educational attainment plays a central role in explaining earning differentials across racial and ethnic groups in the U.S. and other countries. Moreover, according to studies by Chiswick and Miller (1995) and Hoyt and Chin (2004), language fluency is an important part of the human capital that helps increase immigrants' earnings. Furthermore, as

[1] See early surveys by Borjas (1994) and Zimmermann (1995) and a more recent book edited by Borjas (2000).

[2] On account of immigrants and their earnings differentials from natives, see Lam and Liu (2002) and Liu et al (2002) for Hong Kong and Chiswick and Miller (1995) and Berman et al (2003) for Israel.

contended by Borjas (1992, 1995), the human capital of today's generation depends upon their parents' human capital and thus, parental human capital externalities are important. In Taiwan, a large fraction of first-generation immigrants after World War II were civilian officers and teachers whose education levels were higher than that of natives. Immigrants spoke Mandarin, the official language, while most natives could not.[3] As a result of parental human capital externalities, immigrants' immediate descendants were better educated and also spoke the official language more fluently. Indeed, in a paper Tsay (2006) documented that second-generation immigrants in Taiwan had higher educational attainments than natives. Thus, there seems to be differences in human capital between immigrants and natives.

Different occupations are paid differently. Occupation differences were an important factor in explaining the earnings differential between Jewish natives and Jewish immigrants in Israel (Berman, et al., 2003), and the earnings gap between natives and immigrants in Sweden (Behtoui, 2004). Notably, in a paper, Liu et al. (2004) found that occupational segregation was an important cause in the explanation of why natives made more in earnings than immigrants in Hong Kong. As most of the first-generation immigrants in Taiwan were civilian officers, teachers and military personnel that were affiliated in the public sector, occupational differences might be a source of the earnings gap. We differentiate a job in a public sector from a job in a private sector. As Taiwan developed into more a manufacturing-based and skill-oriented industrial structure, occupations with different skill requirements were created and were paid differently. To better measure the effects of occupations, we also distinguish different types of occupations based on their skills.

Our analysis is carried out in two steps. In the first step, we employ the maximum likelihood estimation method to estimate the Heckit two-stage model. This estimation method allows us to simultaneously estimate the labor force participation equation and the selectivity-corrected earnings equation. The estimation is accomplished using data in a full sample and in sub-samples of immigrants and natives, respectively. In the second step, based on the estimated earnings equations, we use a decomposition model to compute the sources underlying the earnings differential between immigrants and natives. Differences in the earnings gap are accounted for in two parts: (1) the difference in the endowment of human capital, occupations and socio-economic factors and (2) the difference in returns to the endowment and the selection-bias correction. While part (1) is usually dubbed as the explained part, part (2) is called the unexplained part in existing literature.

[3] Right after World Ward II, natives in Taiwan spoke either Hokkien or Hakka, and if they were educated, they also spoke Japanese, the official language during Japan's rule from 1895-1945.

The primary findings are outlined as follows. First, the majority of the earnings gap is rooted in the difference in the endowment with only a negligible fraction attributable to the unexplained part. Next, the difference in the endowment of human capital is the major driving force that accounts for the earnings gap and the difference in occupations plays only a minor role. Finally, an individual's secondary and higher education is the most critical factor in explaining the earnings gap, followed by a father's education externalities, an individual's occupation as a professional and/or paraprofessional, a mother's ethnicities, and Mandarin proficiency. An individual's middle and/or primary education tends to moderate the earnings gap.

As developed below, Section 2 offers background about immigrants to Taiwan. Section 3 sets up the econometric model for estimation. Section 4 presents the data and Section 5 analyzes empirical results. Finally, concluding remarks are made.

2. Background of Immigration to Taiwan

More than four centuries ago, the island of Taiwan was home to mainly Malayo-Polynesians. Beginning in the early 17th century, lowland tribes were relentlessly driven into the island's mountainous interior, overwhelmed by alien conquerors from both Europe and Asia, and especially by Han-Chinese immigrants fleeing from poverty in China. Over the centuries, many indigenes have been assimilated into immigrant communities.[4]

The Netherlands, via the Dutch East Indies (today's Indonesia), and Spain, via colonial holdings in the Philippines, also established their bases on the island as early as 1622. In 1642, Spanish consortiums were driven away by the Dutch. Under the Dutch control, Taiwan became an important entreport for maritime trade and transshipment of goods between Japan, China, Southeast Asia, Persia, and Europe. Although settlements of Chinese immigrants have existed as early as the 16th century, they were scarce and small until the Dutch East India Company imported laborers from China to work its sugarcane and rice plantations in the southwest. This marked the beginning of large-scale, intensive cultivation in Taiwan.

European Colonization ended in 1662 when army commanded by General Cheng Cheng-Kung laid siege to headquarters of the Dutch East India Company and established a base from which to fight against the Qing Dynasty (of the Manchu imperial court). Under the 22-year Cheng rule and the following 200-year Qing Dynasty rule, Chinese immigrants steadily migrated to Taiwan. These immigrants came mostly from the areas of Quanzhou and Zhangzhou in the south of Fujian province, followed by the areas in the east of Guangdong province. They spoke either Hokkien

[4] For more information about immigrants to Taiwan, see Taiwan Government Information Office (2008) and the background papers cited therein.

(i.e., the Min-Nan language) or Hakka.[5] The bulk of these immigrants were farmers, typically engaged in rice, sugarcane, tea and camphor cultivation with output partly shipped to China and Japan and partly to Australia.

In 1895, the Qing Dynasty ceded Taiwan to the Japanese Empire who ruled Taiwan for the following 50 years. During Japanese rule, compulsory primary education in Japanese was enacted and programs for cultural assimilation were carried out. At the same time, economic development accelerated, partly with a view to building the island into a secure forward base for a southward projection of power.

Japan announced its surrender to the Allied Powers in August 1945, and the Chinese Nationalist government under Chiang Kai-shek ruled Taiwan. Only four years later, the Nationalist government was defeated in the Chinese Civil War that had been going on since the late 1920s. The Chiang government evacuated China and was moved to Taiwan in 1949, along with the influx of more than one million soldiers and civilian refugees in the period until the end of Korea War in 1953.[6] Most new immigrants were male, with females accounting for less than 3%. In particular, there were about 600,000 mostly male military personnel.

During Japanese rule, although formal education was conducted in Japanese, the literacy rate was low. Most Taiwanese spoke either Hokkien or Hakka. When the Chiang Kai-shek government ruled Taiwan at the end of war, especially when the central government was moved to Taipei in 1949, Mandarin, the official language in China, became the official language in Taiwan. In particular, Hokkien and Hakka languages have no written forms. It was natural for Mandarin to take over of the status of Japanese at least in terms of a written form. Even though compulsory primary education was enforced by the Chiang government, the majority of local adults could neither read nor write Mandarin. The majority of new immigrants could not speak local languages in Taiwan, but most of the new immigrants knew Mandarin. Notably, most new immigrants were either better-educated civilian officers and teachers or military personnel. Most of them worked in the public sectors. This sector paid better than jobs in the private sector such as farming, fishing and mining that the majority of natives worked then. Through parental investment and parents' human capital externalities, immigrants' immediate descendants tended to have higher human capital and better opportunities in access to the public sector and, moreover, in more skill-intensive occupations in the private sector when the economy was developed o more manufacturing-based and skill-oriented industrial structure. These considerations motivate why

[5] More than a half of the population of the Hakka also speaks the language of Hokkien now.

[6] There were about 7 million natives in Taiwan in 1950 indicating that about one in eight was new immigrants.

attention is paid to human capital and occupations as potential sources of the earnings differential between natives and immigrants in Taiwan.

3. Econometric Methodology

Our econometric model includes two steps. In the first step, the Heckit two-stage estimation model (Heckman, 1979) is used to simultaneously estimate the labor force participation regression and the selection-corrected earnings regression. In the second step, based on the estimation obtained in the first step, we carry out the decomposition analysis and disentangle vital characteristics in accounting for the earnings differential between immigrants and natives.

3.1 The Heckit Two-stage Procedure

Now, we set up the econometric model. Let *LFP** be a variable that stands for the labor force participation of an individual. *LFP**, however, is a latent variable and is not observable. We use a variable *LFP* to measure *LFP** in the way as follows.

$$\begin{cases} \boldsymbol{LEP} = 1, \text{ if } \boldsymbol{LEP}^* > 0, \\ \boldsymbol{LEP} = 0, \text{ otherwise.} \end{cases}$$

Thus, *LFP* is a discrete variable in that its value is equal to 1 if an individual participates in the labor force and zero if otherwise.

Under the normality assumption about errors to be specified below, *LFP* and *LFP** are linked by the probit model. The probit model of labor force participations and earnings is as follows.

$$\mathrm{P}(\boldsymbol{LFP}_j = 1) = \mathrm{P}(\boldsymbol{LFP}_j^* > 0 \,|\, \mathrm{X}) = \beta_{1j}' \boldsymbol{X} + \nu_j, \quad j = N, M, \tag{1}$$

$$ln\, W_j = \alpha_j' X_1 + \varepsilon_j, \quad j = N, M, \tag{2}$$

where the subscript *j* indicates the two ethnic groups, natives (*N*) and immigrants (*M*).

The vector *X* includes variables that affect the probability of an individual's participation in the labor force, while the vector X_1 consists of variables that affect an individual's earnings, W_j. The individual earnings function (2) is observed only when LFP_j=1. The vectors β and α both are coefficient vectors to be estimated. For identification purposes, explanatory variables in vector X_1 used in the earnings regression (2) cannot include all variables in vector *X* employed in the labor force participation regression (1).

The term ν_j represents unobservable determinants of the labor force participation and the term ε_j represents unobservable determinants of earnings. We assume that ν_j is normally distributed with a zero mean and a unit constant variance and ε_j is also normally distributed with a zero mean and a variance of σ_ε^2. Moreover, we assume that ε_j and ν_i are independent of explanatory variables

in their relevant equations and have a covariance of $\sigma_{\varepsilon v}$.

The procedure for conducting the Heckit two-stage estimation is briefly sketched as follows. In the first stage, we conduct the probit estimate of the labor force participation equation (1). We will obtain the inverse Mills ratio $(\hat{\lambda})$, where a cap ^ associated with a variable is used to denote a fitted value of the variable. The inverse Mills ratio will be included in the earnings regression in order to correct for the selectivity bias.

In the second stage, we run regressions of earnings on X_1 and the inverse Mills ratio. Thus, instead of using (2), the earnings function under estimation is as follows.

$$ln\, W_j = \alpha_j' X_1 + \gamma_j' \hat{\lambda}_j + \eta_j, \quad j=N, M. \tag{3}$$

Although the estimation of (3) yields consistent estimators, the distribution of error term η_j may not be homogeneous. To correct for the potential heteroskedasticity problem, we use the maximum likelihood estimation (MLE) method in order to obtain robust standard errors. The MLE method simultaneously estimates the labor force participation equation (1) and the earnings equation (3). This procedure takes care of both the heteroskedasticity and the correlation between the error term in the labor force participation equation and the error term in the earnings equation. This Heckit two-stage estimation is conducted using a full sample of immigrants and natives, a sub-sample of immigrants only and finally, a sub-sample of natives only.

3.2 Decomposition Analysis

In the second step, the estimated earnings equations obtained in the first step are now used to unravel factors that account for the earnings differential between immigrants and natives. We employ the decomposition method proposed by Oaxaca (1973) and Blinder (1973).[7]

As immigrants make higher earnings than natives, our decomposition model takes the difference of the earnings regression estimated for immigrants from the earnings regression estimated for natives. Different references about referenced estimated coefficients may lead to different results in the decomposition model. To avoid results driven by the use of different references, we employ two types of specification using immigrants' estimated coefficients and natives' estimated coefficients, respectively, as a reference. If we denote $\beta_M = [\alpha_M', \gamma_M']$, $\beta_N = [\alpha_N', \gamma_N']$, $X_M = [X_1, \hat{\lambda}_M]$ and $X_N = [X_1, \hat{\lambda}_N]$, the decomposition model is as follows.

First, we use immigrants' estimated coefficients as a reference. The decomposition model

[7] An alternative method is to add a dummy variable in the full sample that assigns a value of one if the individual is an immigrant and zero if otherwise. The coefficient of the dummy in this method only summarizes the earnings gap as it does in Figure 1. The Oaxaca-Blinder decomposition method has a better property in that this method identifies the underlying factors that account for the earnings gap.

takes the difference of the estimated earnings regression for immigrants from the estimated earnings regression for natives. The result is unchanged if in the difference, we add in and subtract the term $\hat{\beta}_M \bar{X}_N$, where a bar above a variable denotes the mean of the variable. Then, if we rearrange terms, we obtain the following decomposition model.

$$\overline{\ln W_M} - \overline{\ln W_N} = \hat{\beta}_M (\bar{X}_M - \bar{X}_N) + (\beta_M - \hat{\beta}_N)\bar{X}_N. \quad (4)$$

Alternatively, we use natives' estimated coefficients as a reference. In the difference of the estimated earnings regressions, if we add in and subtract the term $\hat{\beta}_N \bar{X}_M$, the consequence is the same. By rearranging terms, we obtain the following decomposition model.

$$\overline{\ln W_M} - \overline{\ln W_N} = \hat{\beta}_N (\bar{X}_M - \bar{X}_N) + (\beta_M - \hat{\beta}_N)\bar{X}_M. \quad (5)$$

The decomposition models in (4) and (5) both include two terms. The components summarized in the first term are comprised of the factors that are explained by differences in average characteristics (differences in average endowments) between these two ethnic groups with a weight. Differences in average characteristics involve differences in average human capital, average occupations and average socio-economic factors. The earnings differential that is accounted for by the first term is called the *explained part* of the earnings gap between immigrants and natives. In the explained part in (4), it is evaluated at the estimated coefficients of characteristics associated with immigrants, and thereby immigrants' estimated coefficients are used as a reference in this model. Similarly, in the model in (5), the estimated coefficients of characteristics associated with natives are used as a reference.

The components summarized in the second term in (4) and (5) are those elements accounted for by the difference in the estimated coefficients or returns associated with the characteristics of immigrants and natives, weighted by natives' average characteristics in (4) and immigrants' average characteristics in (5). This term accounts for the earning in terms of reasons other than differences in the average characteristics. The term is usually referred to as the *unexplained part*, or the *"discrimination" part*, of the earnings gap.

4. Data and Comparisons

There are four major ethnic groups in Taiwan: the Hokkien, the Hakka, aboriginals and (Chinese) immigrants. The Hokkien is the largest ethnic group, accounting for more than 73% of total population in Taiwan in 2004. Immigrants are the second largest with about 13% of the population, followed by the Hakka with about 12% of the population. Aboriginal inhabitants account for less than 2% of the population. This study uses the Hokkien as native representatives.

This choice is justified as follows. The Hokkien accounts for over 83% of the population in the whole three native groups. Inclusion of the other two native groups comes at costs of a complicated analysis about cross comparisons without gaining new insights about the earnings gap between immigrants and natives. The use of the Hokkien as the representative of natives streamlines the comparison between the representative native group and the group of immigrants. For the sake of convenience, the Hokkien are referred to as natives. We call an individual an immigrant if s/he emigrated from China after 1950 (the so-called mainlander) or was second generation born in Taiwan by a father who emigrated from China after 1950.[8]

Our data is based on the *Taiwan Social Change Survey* (TSCS), a nation-wide survey designed to trace trends of social changes in Taiwan. This is a cross-sectional survey and has been conducted every year since its inception in 1985. The TSCS has been an active member in the *International Social Survey Programme* (ISSP) and accordingly, some survey questionnaires resemble those in the ISSP. As the data before 1992 contains no information regarding uses of language, we use available data in 1992-2006 except for 1994 and 1999.[9]

We select natives and immigrants aged 20 to 64. In the data, there are a total of 29,032 samples, in which about 88% is natives and the remaining immigrants. Male and female ratios are about 1; about 70% are married in both ethnic groups. Immigrants on average make earnings 32% higher than natives. See Appendix Table 1 for definitions of variables, Appendix Table 2 for summary statistics, and Appendix Tables 3-5 for variance-covariance matrix.

In analyzing the characteristics that account for the earnings gap between immigrants and natives, attention is paid to two sets of characteristics. The first set is human capital and the second set is occupation. In the set of human capital, we include educational attainments, Mandarin fluency and parental human capital externalities. In the set of occupations, we include an occupation in the public sector or not and occupations of different skills.

According to human capital theory, individual educational attainments are the most important factor in explaining earnings. Educational attainments play a central role in explaining earning differentials across racial and ethnic groups as found by Chiswick (1988), Borjas (1992) and others. Language fluency is an important part of human capital, according to Chiswick and Miller (1995) and Hoyt and Chin (2004). Moreover, as asserted by Borjas (1992, 1995), there are

[8] While our definition of an immigrant rules out a second generation whose mother is an immigrant but father is a native, available data indicate that there were less than 3% of first-generation female immigrants in the period during 1950 and 1953 and most were married to male immigrants. As a result, the number of female immigrants married to natives was negligible. Our definition of an immigrant is consistent with what people in Taiwan acknowledges their ethnic identities and also consistent with the official classification.

[9] The data of either earnings or working in a public or a private sector are not available in 1994 and 1999.

intergenerational human capital externalities and thus, parental human capital externalities may be also important.

There is indeed a large difference in educational attainments between immigrants and natives: immigrants with education from high schools and above and middle schools are 88.4% and 85.7%, respectively, and the corresponding numbers for natives are only 56.4% and 18.4%, respectively. However, the fraction of natives with primary education (18.9%) is much higher than immigrants (8.6%). With no education as a reference, we use three dummy variables to sum up individual educational attainments. Of the three dummies, *Primary school* equals one if an individual attains primary education and zero if otherwise. The dummy variable *Middle school* is assigned a value of one if an individual attains middle education and zero if otherwise. Finally, the dummy variable *High school and above* is one if an individual attains secondary and/or post-secondary education and zero if otherwise.

The change of government from that of Japan to the Chiang Kai-Sheik government in 1945 led to the change of the official language from Japanese to Mandarin. As a result, Mandarin played a role just like English in Hong Kong and Hebrew in Israel. The ability in speaking and writing Mandarin leads to an advantage in the labor market. The only information about the proficiency of Mandarin available in the TSCS is the language that respondents used during the survey interview. We utilize this information to measure Mandarin proficiency. We construct a language dummy, *Mandarin*, whose value is one if Mandarin is chosen as one of the languages used during interviews and zero if otherwise. Thus, a dummy of one indicates that a respondent can speak Mandarin with proficiency.[10] Data show that more than 88% of immigrants speak Mandarin proficiently, as compared to 54% of natives.

For the two variables concerning parents' human capital externalities, one variable is a father's educational attainment. Data indicate that 49.9% of immigrants have fathers with secondary and/or higher education and that is higher than natives' 13.2%. Natives have higher fathers' middle and primary education than immigrants. The fraction of natives with non-educated fathers is 28.7% and is twice more than that of immigrants (12.2%). Using individuals with non-educated fathers as a reference, we employ three dummies, *F_Primary school*, *F_Middle school* and *F_High school and above*, to stand for different fathers' attainments of primary education, middle education, or higher education, respectively.

[10] Our dummy variable implicitly assumes that an individual who can speak both Mandarin and Hokkien and an individual who speaks only Mandarin have the same language ability in earnings. This assumption is innocuous as, if an individual chooses to answer questions in Mandarin rather than in Hokkien, this indicates that she/he uses Mandarin more often than Hokkien and her/his Mandarin is possibly better than Hokkien.

Another variable in relation to the effects of parents' human capital externalities is a mother's ethnicities. If a second-generation immigrant has a native mother, this may help the immigrant to assimilate into the local market. Studies in Europe and North America have confirmed that immigrants' immediate descendants with one native-born parent perform better than those with two foreign-born parents.[11] We use a dummy, *Native mother*, to represent a mother's ethnicities, assigning a value equal one if a mother is native and zero if otherwise. Data suggest that 55.5% of immigrants have a native mother and 94.9% of natives have a native mother.

The second set of characteristics in determining the earnings gap is occupational differences. According to Liu et al. (2004), occupational segregation is important in explaining why natives made more earnings than immigrants in Hong Kong wherein immigrants and natives both are ethnic Chinese. Similar evidence was found in Israel (Berman, et al., 2003) and in Sweden (Behtoui, 2004). A large fraction of immigrants to Taiwan after the war were civilian officers and teachers. In particular, the majority of these immigrants were military personnel who retreated to Taiwan after the loss of war with Chinese communists and remained employed in the military or veteran sectors.[12] We separate an occupation in the public sector from the private sector. A dummy, *Public*, is constructed which equals one if an individual works in the public sector and zero if otherwise. Our data show that 19.3% of immigrants and their immediate descendants worked in the public sector with 9.4% of natives working in the public sector.

As Taiwan develops into a more manufacturing-based and skill-oriented industrial structure, jobs of different skills are created. Younger generations may be employed in occupations of differing skills. Different types of occupations with different skills are paid differently. We thus distinguish occupations in terms of the type of skills. We organize the occupation of different skills into seven types according to the three-digit standard occupation classification codes in Taiwan. Using workers in the agriculture, animal husbandry, forestry and fishing industries as a reference, we utilize six dummies to capture the effects of differences in types of occupations. These dummies are (1) *Legislators, senior officials and managers*, (2) *Professionals and para-professionals*, (3) *Technicians and related workers*, (4) *Clerical workers, service workers and salespersons*, (5) *Mechanical operators and assemblers*, and (6) *Unskilled workers and laborers*.

Our data indicates that immigrants have large fractions working as clerical workers, service workers and salespersons (23.1%), professionals and paraprofessionals (21.7%), and mechanical operators and assemblers (12.0%). Natives have large fractions working as mechanical operators

[11] See, for example, evidence for Germany in Gang and Zimmerman (2000), for Sweden in Rooth and Ekberg (2003) and for the Netherland in van Ours and Veenman (2003).

[12] This may be related to institutional regulations in favor of immigrants, as opposed to institutional regulations in favor to natives argued in Angrist and Kugler (2003).

and assemblers (19.1%), clerical workers, service workers and salespersons (19.1%) and professionals and paraprofessionals (12.4%). It is worth noting that, the fraction of immigrants working as professionals and paraprofessionals is almost twice higher than natives.

While we underline human capital variables and occupational variables, we also control for socio-economic variables that potentially exert effects on the earnings gap between immigrants and natives. These socio-economic variables include age (*Age*), gender (*Male*), marital status (*Married*), potential working experiences (*Potential work experience*) and the cohort effect (*Born after 1950*). In addition, we control for whether the spouse is in the labor market. When an individual's spouse participates in the labor market, the individual may need to reduce effort in the labor market in order to share some household work. As a result, the individual's earnings are expected to be lower. We construct a dummy variable, *Spouse in LF*, and assign a value of one if an individual's spouse participates in the labor force and zero if otherwise. Our data indicates that immigrants and natives have about the same fraction of spouses in the labor market. Finally, we also control for whether an individual grows up in the Taipei metropolitan area.[13] Taipei City is the capital of Taiwan and is better facilitated in public goods and especially in educational organizations. The Taipei metro area has the same high school district with the best high schools in Taiwan. In addition, the Taipei metro area also has best universities in Taiwan. While best universities usually attract students across the country, the best high schools receive students mainly from nearby cities and counties. If an individual grows up in the Taipei metro area, it is easier to gain access to the best high schools, thereby a higher chance to enter the best universities. As a result of a better access to public goods and a good school district, we expect that growing up in the Taipei metro area has a positive effect on earnings. We construct a dummy variable, *Reside in Taipei<age15*, that controls for whether or not an individual lives in the Taipei metro area in her/his childhood before age 15. Our data indicates that more than 20% of the immigrants grow up in the Taipei metro area, as compared to 7.9% of natives.

5. Empirical Results

This section reports empirical results in terms of a series of tables. We analyze the results of the Heckit two-stage estimation conducted in the first step. In the second step, we conduct the decomposition analysis accounting for factors underlying the earnings differential between immigrants and natives.

[13] The Taipei metropolitan area includes Taipei City, Keelung City and the County of Taipei that surrounds Taipei City. The Taipei metro area is the largest metro area and accounted for more than 30% of total population in Taiwan in 2007.

5.1 The Heckit Two-stage Estimation

The Heckit two-stage estimation includes the estimation of the labor force participation regression at the first stage and the estimation of the selectivity-corrected earnings regression at the second stage. We simultaneously estimate both regressions at these two stages by the MLE method. The MLE method corrects for the potential heteroskedasticity problem and yields robust standard errors for the estimation of the earning equations.

5.1.1 Estimation Results in Full Sample

In the full sample, there are a total of 29,032 observations in the estimation of the labor force participation regression and a total of 18,046 observations in the estimation of the earnings regression. Table 1-1 reports the results of labor force participation regressions and Table 1-2 the results of earnings regressions.

[Insert Tables 1-1 and 1-2 about here]

We use four kinds of specification in the estimation of labor force participation regressions in Table 1-1 in order to be consistent with different kinds of specification in earnings regressions in Table 1-2. According to Table 1-1, all explanatory variables are statistically significant except for *Mandarin*. Concerning the effect in signs, ages have signs as anticipated. Individuals with middle and higher education have a higher probability in joining the labor force than individuals without education. The household size has a positive effect and non-labor income has a negative effect on individual's labor force participation. Intuitively, a larger household size increases an individual's incentives to participate in the labor force in order to make more money to raise more household members. A higher non-labor income, however, reduces incentives to make money and as a result, the incentive to participate in the labor force is lower. The proficiency in speaking Mandarin does not significantly increase the statistical probability of labor force participation but, as will be seen, once an individual participates in the labor market, Mandarin proficiency helps increase earnings.

For the results of earnings regressions in Table 1-2, Model (1) includes only individuals' socio-economic variables. This is the baseline model and will be extended to include the set of human capital variables, the set of occupation variables, and finally, both sets of variables in Models (2), (3) and (4), respectively. The estimation results in Model (1) indicate that individuals who are male, growing up in the Taipei metro area and born after 1950 have higher earnings, while those with spouses joining in the labor force have lower earnings. The negative effect of the spouse in the labor force emerges possibly because of the share of household works and the pay security due to spouses in the labor market. While marriages and potential work experiences each increase earnings, their interactions reduce earnings and lead to a net negative effect.

In Model (2), human capital variables are included. The effects of socio-economic variables are unchanged. All human capital variables increase earnings statistically significantly except for having a native mother. Specifically, returns to primary education and to middle education are 25.4% and 50.8% higher than those to non-education, respectively. Returns to higher education are 85.2% higher than those to non-education, indicating more than 30% of a premium over middle and lower education. Mandarin proficiency increases individuals' earnings. This result is consistent with the finding in existing studies on immigrants (e.g., Chiswick, 2001). Language skills are the result of investment in human capital which enhances individuals' productivity and thus earnings capabilities. The estimated coefficient suggests that, with other things being equal, a person speaking Mandarin fluently would earn 16.5% higher than those without Mandarin proficiency.

Intergenerational human capital externalities have a mixed effect. A father's education has a statistically significant positive effect on an immediate descendant's earnings. In particular, when an individual has a father with a secondary and/or higher education, his/her earnings are 16.6% higher than those with a non-educated father. However, an individual with a native mother has statistically, significantly lower earnings. This result is in contrast to those of existing studies in Europe and North America (e.g., Gang and Zimmermann, 2000; Rooth and Ekberg, 2003). According to these existing studies, if a second-generation immigrant has a native parent, he/she can assimilate into the economy more easily and increase earnings. Our different result arises possibly because a native mother in Taiwan generally cannot speak the official language, while an immigrant mother usually speaks Mandarin fluently. As a result, a native mother has a lower intergenerational human capital externality on her immediate descendants than an immigrant mother.

We now turn to Model (3) where occupation variables are added into the baseline model. The effects of the baseline variables remain unchanged. The estimated coefficients of occupation variables suggest that an individual working in the public sector has 25.6% higher returns than those employed in the private sector. In the six occupation dummies, using workers in the agriculture, animal husbandry, forestry and fishing industries as a reference, the estimated coefficients indicate that all occupations except for unskilled workers and laborers are paid statistically and significantly higher than the reference occupation. In particular, an individual as a legislator, a senior official and/or a manager has the highest return that is 89.7% higher than workers in the reference occupation. The second highest return to occupation goes to professionals and para-professionals and is 60% higher than a worker in the reference occupation.

Finally, Model (4) is the most complete model in which all variables in the sets of human

capital and occupation are included. Most of the estimated coefficients of human capital variables and occupation variables are lower than those in Models (2) and (3), but their statistical significance levels are about the same.

5.1.2 Estimation Results in Sub-samples

We now illustrate the estimation results using sub-samples. In labor force participation, there are 3,442 observations of immigrants and 25,590 observations of natives. In earnings equations, there are 2,258 observations of immigrants and 15,788 observations of natives. Tables 2-1 and 2-2 are the results of the labor force participation and the earnings equation for immigrants, while Tables 3-1 and 3-2 are the corresponding results for natives.

[Insert Tables 2-1, 2-2, 3-1 and 3-2 about here]

The estimated signs and statistical significance levels of the labor force participation equations in Tables 2-1 and 3-1 are the same as those in a full sample in Table 1-1. Exceptions are immigrants with middle school and higher education who do not have a higher probability in labor force participation than non-educated immigrants. However, natives with middle school and higher education have a probability in labor force participation 36% and 58%, respectively, higher than non-educated natives. Notably, Mandarin proficiency helps an immigrant to join the labor force statistically significantly, but for natives, it is not statistically significant when the human capital variables are under control in earnings equations. The reason may be that natives could work in some types of occupations wherein the use of Mandarin is not required. As a result, Mandarin proficiency does not increase natives' labor force participation.

We next illustrate the results of earnings equations in Tables 2-2 and 3-2. The results in the baseline model are the same as those using a full sample in Table 1-2. Exceptions are *Spouse in LF* and *Born after 1950* in the sub-sample of immigrants (Table 2-2) which are statistically insignificant from zero. As in Table 1-2, human capital variables are then added in Model (2), occupational variables are included in Model (3), and all human capital variables and occupational variables are enclosed in Model (4). To save space, we report the results in the most complete Model (4) as follows.

We begin with the set of human capital variables. Individuals with education have statistically significantly higher returns than the non-educated. In particular, returns to education are higher for immigrants than for natives.

Relative to non-Mandarin speaking immigrants, Mandarin proficiency does not increase earnings for immigrants, even though it increases the probability of labor force participation. In contrast, Mandarin proficiency increases natives' earnings although it does not increase natives' probabilities in the labor force participation. The reasons are as follows. Most immigrants can

speak Mandarin fluently. As a result, even though Mandarin proficiency enhances immigrants' probabilities in joining the labor force, it does not enhance their earnings abilities. However, only 54% of natives can speak Mandarin fluently, but natives can also speak Hokkien when employed as a blue-collar worker. Consequently, the probability of natives' participations in the labor force is not increased by Mandarin proficiency when other human capital variables are controlled. However, if a working native can reap speak Mandarin fluently, he/she has an additional advantage and can reap higher earnings than other natives who cannot speak Mandarin fluently.

No matter whether they are immigrants or natives, an individual whose father has a secondary and/or higher education earns more than those having non-educated fathers. A father's primary education, however, increases only natives' earnings without increasing immigrants' earnings. Although this result seems surprising, it may be reasoned as follows. Many natives are blue-collar workers and Hokkien is generally used. However, Mandarin is necessary at least in a written form. A native father with primary school education and with the skill of Mandarin thus has a better chance in promotion to a position in supervision that is better paid. Such a higher pay enables a native father to invest more resources in a child's education. Thus, a native father's primary education externally enhances a child's earnings. An immigrant father with primary education usually cannot speak Hokkien and thus his immediate descendants do not have advantages in blue-collar occupations over non-educated immigrants. Finally, a native mother externally lowers a native child's earnings, relative to a native with a non-native mother. However, an immigrant with a native mother does not have lower earnings than immigrants without native mothers. The reason is possibly because an immigrant has a father who can teach her/him Mandarin. As a result, having a native mother or an immigrant mother does not matter and an immigrant makes the same earnings.

We now turn to the set of occupation variables. Most results are similar to those in a full sample and thus we just make two remarks. First, immigrants working as unskilled workers and laborers have lower earnings than workers in the reference occupation. Second, relative to their reference occupation, in all occupations, natives have higher estimated returns than immigrants.

5.2 Decomposition of the Earnings Differentials

We are now ready to identify the sources of income differentials. Based on the estimated results of the determinants of earnings found in Tables 2-2 and 3-2, we use the Oaxaca-Blinder decomposition method and compute the corresponding predicted earnings differences between immigrants and natives.

5.2.1 Differences in Characteristics and Returns to Characteristics

Tables 4 and 5 are the results of the Oaxaca-Blinder decomposition method using the estimated coefficients for immigrants and the estimated coefficients for natives, respectively, as a reference. We report the decomposition results in Tables 4 and 5 in correspondence to Models (1)-(4) in Tables 2-2 and 3-2. As Model (4) is the most complete model, to save space we will only analyze the results in this model.

[Insert Tables 4 and 5 about here]

We begin with Table 4. First, differences in endowments between immigrants and natives are at an order of 27.5. Among them, the largest difference goes to human capital variables (at an order of 20.6), followed by occupation variables (at an order of 6.3). Thus, the difference in human capital variables accounts for 74.9% of total differences in endowments. The difference in occupations gives an explanation of another 22.9%, with the remaining 2.2% accounted for by other socio-economic variables.

Among individual factors, the difference in an individual's secondary and higher education is the most important which accounts for more than 100% of earnings differentials. The second most important factor is the difference in a father's secondary and higher education which accounts for 20% of earnings. The third most important variable goes to an individual's occupation as a professional and/or a paraprofessional that accounts for 11.3% of earnings differentials. Differences in having a native mother also contribute to 7.3% of income differentials. Although Mandarin proficiency only explains a mild 3.2% of the earnings gap, explanatory powers go up dramatically when natives' estimated coefficients are used as a reference (see Table 5).

However, there are factors that reduce earnings differences. The most important elements are differences in an individual's middle education and primary education, each moderating income differentials by 30.5% and 24%, respectively. An individual's occupation as a mechanical operator and/or an assembler helps shrink earnings differentials by 3.27% and a father's primary school education reduces earnings gaps by 2.9%. Potential work experiences and marriages reduce the earnings gap by 10.18% and 2.91%, respectively, but their interactions enlarge the income gap by 8%. Together, these two factors have a net effect that reduces the earnings differential by 5.09%.

Next, for the estimated returns to endowments between immigrants and natives, the difference is at an order of 14.0 (Table 4). It is clear that returns for human capital enlarge earnings differentials. Returns to individuals' education increase income differentials. In particular, returns for an individual's secondary and higher education accounts for about 69.9% of total returns to human capital. Alternatively, returns for occupations and baseline factors both narrow earnings gaps. Returns for the cohort effect narrow 85.7% of earnings gaps, indicating a large reduction in

the earnings gap for younger cohorts. Returns for marriages, to potential work experiences and to their interaction together shrink 45.7% of the income differentials. Finally, returns for Mandarin proficiency trim down 37.1% of income gaps, suggesting that natives have advantages over immigrants in the labor market once they have proficiency in Mandarin.

Table 5 is the results when natives' estimated coefficients are used as a reference. The results in Table 5 are similar to those in Table 4, except that some variables gain explanatory powers while others lose. In particular, *Mandarin* explains 13.3% of the earnings gap. *Professionals and paraprofessionals* and *Native mother* both increase explanatory powers. However, a father's secondary and higher education reduces explanatory powers.

To summarize the effects, among variables that tend to increase the earning gap, an individual's secondary and post-secondary education is the most important, followed by a father's education externalities, an individual's occupation as a professional and/or a paraprofessional, a mother's ethnicities, and Mandarin proficiency. However, an individual's middle and/or primary education tends to moderate the earning gap.

5.2.2 Contribution of Explained and Unexplained Parts

Predicted earnings differences between immigrants and natives can be accounted for in two parts: the explained part and the unexplained part. The explained part is the difference in the endowment or characteristics between immigrants and natives. The unexplained part is the part that cannot be explained by differences in the characteristics. The unexplained part intrinsically comes from differences in estimated returns to endowment and also includes differences in the estimated intercept and differences in the estimated coefficient of the inverse Mills ratio. The results in Tables 4 and 5 allow us to compute relative contribution between the explained part and the unexplained part in accounting for the earnings gap between natives and immigrants. The results are in Table 6.

[Insert Table 6 about here]

In Table 6, the top panel is computed based on the results in Table 4 with immigrants' estimated coefficients as a reference, and the bottom panel is computed based on the results in Table 5 with natives' estimated coefficients as a reference. Results are as follows.

First, based on the results in the most complete Model 4, it is clear that the unexplained part is negligible, no matter whether immigrants' estimated coefficients or natives' estimated coefficients are used as a reference group. This result indicates that, at best, only a tiny fraction of the earnings gap is due to "discrimination."

Second, the contribution of the explained part increases from 58% to around 100% if the specification is changed from Model 3 to Model 4. These two models are otherwise identical

except that the set of human capital variables is included in Model (4). Similarly, the contribution of the explained part increases from below 30% to around 100% if the specification is changed from Model (1) to Model (2), two otherwise identical models except for the set of human capital variables in Model (2). These results suggest that differences in the endowment of human capital are major driving forces that account for the earnings gap between immigrants and natives.

Finally, the contribution of the explained part increases modestly if the specification is changed from Model (1) to Model (3). These two models are otherwise identical except that Model (3) includes the set of occupational variables. However, the contribution of the explained part deceases slightly, if the specification is changed from Model (2) to Model (4), two otherwise identical models except for the set of occupational variables in Model (4). These results imply that differences in the endowment of occupations are minor driving forces of the earnings gap between immigrants and natives. The result is different from Hong Kong wherein occupational differences are a major factor accounting for the earnings gap between natives and immigrants.

6. **Concluding Remarks**

Post World War II witnessed a wave of new immigrants who fled from China to Taiwan. These immigrants and early settlers (or natives) shared that same ethnic origins and cultural backgrounds. Immigrants and their immediate descendants performed better during ages 24-64 with average earnings of about 30% higher than natives. This study offers an explanation concerning why immigrants and their immediate descendants made higher earnings than natives in Taiwan.

Our paper analyzes a nation-wide survey in Taiwan available in 1992-2006. There are three main findings. First, the majority of the earnings gap is caused by differences in the endowment, with only a negligible fraction attributable to the unexplained or “discriminatory” part. Second, differences in the endowment of human capital are major driving forces that account for the earnings gap between immigrants and natives and differences in occupations play only a minor role. Finally, an individual’s secondary and higher education is the most important factor in explaining the earnings differential, followed by a father’s education externalities, an individual’s occupation as a professional and/or a paraprofessional, a mother’s ethnicities and Mandarin proficiency. An individual’s middle and primary education tends to reduce the earning gap.

A limitation of our study is that comparisons are not made between natives and political refugees in Taiwan. This is because our data is available only after 1992. In our data, these political refugees are almost all over 60 years old and most of them are retired. It is not possible to analyze only political refugees in our data. This limitation points to a potential avenue for a

further extension of research if a set of data is available in earlier years. Existing literature on political refugees found little or inconclusive impact on the affected localities. For example, when studying 900,000 persons, about 2% of the French labor force, returning to France within one year after the 1962 independence of Algeria, Hunt (1992) found little impact on the affected localities. Carrington and Lima (1994) also reported inconclusive results when they analyzed the impact of the 600,000 refugees, almost 7% of the population, who entered Portugal after the country lost the African colonies of Mozambique and Angola in the mid-1970s. Natives and political refugees in France and Portugal shared their own languages, but natives and political refugees in Taiwan did not. In particular, political refugees are better educated than natives in Taiwan. It is reasonable to expect that political refugees may have impacts on the localities if a set of data is available in much earlier years.

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Table 1-1 Heckit Two-Stage Estimation on Earnings: Full Sample

First-stage: Labor Force Participation

Variable	Model (1) Baseline	Model (2) Human Capital	Model (3) Occupation	Model (4) Human Capital and Occupation
Age	0.1860*** (0.0099)	0.1806*** (0.0109)	0.1798*** (0.0101)	0.1731*** (0.0101)
Age squared	-0.2004*** (0.0116)	-0.2114*** (0.0124)	-0.2039*** (0.0118)	-0.2039*** (0.0131)
Primary school	0.2010* (0.0785)	0.1290 (0.0774)	0.1739* (0.0773)	0.1331 (0.0769)
Middle school	0.5265*** (0.0844)	0.3223*** (0.0844)	0.4593*** (0.0844)	0.3261*** (0.0842)
High school and above	0.9713*** (0.0827)	0.5347*** (0.0830)	0.7603*** (0.0826)	0.5442*** (0.0832)
Married	-0.0540 (0.0390)	-0.0249 (0.0397)	-0.0410 (0.0392)	-0.0132 (0.0400)
Household size	0.0455*** (0.0037)	0.0529*** (0.0035)	0.0478*** (0.0035)	0.0533*** (0.0035)
Log Nonlabor income	-0.0262*** (0.0030)	-0.0201*** (0.0032)	-0.0227*** (0.0031)	-0.0191*** (0.0032)
Mandarin	0.1680*** (0.0348)	0.0380 (0.0374)	0.0945** (0.0360)	0.0378 (0.0375)
Year	-0.0274*** (0.0039)	-0.0287*** (0.0039)	-0.0313*** (0.0039)	-0.0313*** (0.0038)
Intercept	51.4679*** (7.8539)	54.7443*** (7.8053)	59.5873*** (7.7822)	60.1071*** (7.6636)
Log likelihood	-21307.7279	-20089.8024	-20005.0121	-19456.6892
Sample size	29032			

Table 1-2 Heckit Two-Stage Estimation on Earnings: Full Sample

Second-stage: Log Earnings Regression

Variable	Model (1) Baseline	Model (2) Human Capital	Model (3) Occupation	Model (4) Human Capital and Occupation
Male	0.3932*** (0.0111)	0.3628*** (0.0104)	0.4059*** (0.0106)	0.3698*** (0.0104)
Married	0.4722*** (0.0264)	0.4300*** (0.0250)	0.4262*** (0.0251)	0.4033*** (0.0245)
Potential work experience	0.0008 (0.0010)	0.0159*** (0.0010)	0.0033*** (0.0010)	0.0130*** (0.0010)
Married Potential work experience*	-1.1710*** (0.1157)	-0.9831*** (0.1079)	-0.9944*** (0.1108)	-0.9021*** (0.1065)
Spouse in LF	-0.0296* (0.0143)	-0.0624*** (0.0132)	-0.1051*** (0.0134)	-0.1059*** (0.0129)
Reside in Taipei<age15	0.2678*** (0.0160)	0.1469*** (0.0155)	0.1938*** (0.0152)	0.1341*** (0.0150)
Born after 1950	0.1852*** (0.0218)	0.2055*** (0.0200)	0.1991*** (0.0198)	0.1967*** (0.0191)
Primary school	--	0.2535*** (0.0394)	--	0.1885*** (0.0383)
Middle school	--	0.5080*** (0.0406)	--	0.3975*** (0.0395)
High school and above	--	0.8520*** (0.0410)	--	0.6303*** (0.0404)
Mandarin	--	0.1646*** (0.0118)	--	0.1116*** (0.0115)
F_Primary school	--	0.0570*** (0.0143)	--	0.0394** (0.0138)
F_Middle school	--	0.0540** (0.0166)	--	0.0254 (0.0161)
F_High school and above	--	0.1663*** (0.0173)	--	0.0966*** (0.0168)
Native mother	--	-0.0589*** (0.0142)	--	-0.0512*** (0.0135)
Public	--	--	0.2557*** (0.0130)	0.1612*** (0.0126)
Legislators, senior officials, Managers	--	--	0.8972*** (0.0266)	0.7056*** (0.0260)
Professionals and para-professionals	--	--	0.6021*** (0.0179)	0.4490*** (0.0175)
Technicians and related Workers	--	--	0.4623*** (0.0223)	0.3252*** (0.0214)
Clerical workers, service workers, and salespersons	--	--	0.3559*** (0.0176)	0.2574*** (0.0171)
Mechanical operators and assemblers	--	--	0.2218*** (0.0168)	0.2274*** (0.0164)
Unskilled workers and laborers	--	--	-0.0072 (0.0226)	0.0300 (0.0223)
Intercept	5.1845*** (0.0300)	4.0322*** (0.0520)	4.7890*** (0.0310)	4.0771*** (0.0514)
$\hat{\lambda}$	-0.5254 *** (0.1409)	-0.2917*** (0.0373)	-0.3756*** (0.0204)	-0.2170*** (0.0377)
LR_Chi_square	2437.5802	5329.0065	5790.5048	7231.8626
Sample size	18046			

Table 2-1 Heckit Two-Stage Estimation on Earnings: Sub-sample of Immigrants

First-stage: Labor Force Participation

Variable	Model (1) Baseline	Model (2) Human Capital	Model (3) Occupation	Model (4) Human Capital and Occupation
Age	0.2747*** (0.0301)	0.2782*** (0.0321)	0.2714*** (0.0312)	0.2738*** (0.0321)
Age squared	-0.3185*** (0.0352)	-0.3334*** (0.0370)	-0.3212*** (0.0362)	-0.3303*** (0.0372)
Primary school	0.6593* (0.3245)	0.3186 (0.3988)	0.6268 (0.3285)	0.2767 (0.3993)
Middle school	0.8890** (0.2970)	0.3339 (0.3574)	0.8265** (0.3023)	0.2822 (0.3596)
High school and above	1.4044*** (0.2777)	0.4774 (0.3366)	1.2111*** (0.2864)	0.4429 (0.3411)
Married	-0.0290 (0.1108)	0.0221 (0.1139)	-0.0062 (0.1110)	0.0316 (0.1126)
Household size	0.0594*** (0.0141)	0.0692*** (0.0145)	0.0653*** (0.0140)	0.0704*** (0.0146)
Log Nonlabor Income	-0.0356*** (0.0092)	-0.0343*** (0.0092)	-0.0388*** (0.0094)	-0.0373*** (0.0094)
Mandarin	0.3992** (0.1322)	0.3079* (0.1464)	0.3494** (0.1340)	0.3081* (0.1448)
Year	-0.0204 (0.0122)	-0.0252 (0.0131)	-0.0255* (0.0121)	-0.0273* (0.0126)
Intercept	35.1979 (24.1208)	45.6577 (26.0184)	45.6408 (24.0890)	50.0821* (24.9856)
Log Likelihood	-2390.9746	-2263.7458	-2250.6840	-2174.5825
Sample size	3442			

Table 2-2 Heckit Two-Stage Estimation on Earnings: Sub-sample of Immigrants

Second-stage: Log Earnings Regression

Variable	Model (1) Baseline	Model (2) Human Capital	Model (3) Occupation	Model (4) Human Capital and Occupation
Male	0.3604*** (0.0280)	0.3573*** (0.0264)	0.3813*** (0.0273)	0.3652*** (0.0263)
Married	0.3554*** (0.0726)	0.3714*** (0.0676)	0.3323*** (0.0695)	0.3452*** (0.0659)
Potential work experience	0.0048 (0.0029)	0.0119*** (0.0027)	0.0058* (0.0029)	0.0112*** (0.0026)
Married Potential work experience*	-0.7715* (0.3334)	-0.7943** (0.2939)	-0.7410* (0.3235)	-0.7712** (0.2893)
Spouse in LF	0.0446 (0.0385)	0.0078 (0.0352)	-0.0227 (0.0358)	-0.0362 (0.0340)
Reside in Taipei<age15	0.1544*** (0.0320)	0.1100*** (0.0307)	0.1303*** (0.0297)	0.1044*** (0.0292)
Born after 1950	0.0617 (0.0569)	0.0621 (0.0540)	0.0811 (0.0529)	0.0641 (0.0518)
Primary school	--	0.4632** (0.1700)	--	0.5053** (0.1722)
Middle school	--	0.7679*** (0.1629)	--	0.7774*** (0.1646)
High school and above	--	1.1558*** (0.1576)	--	1.0523*** (0.1607)
Mandarin	--	0.0587 (0.0398)	--	0.0292 (0.0389)
F_Primary	--	0.0402 (0.0453)	--	0.0332 (0.0427)
F_Middle School	--	0.0728 (0.0437)	--	0.0548 (0.0417)
F_High school and above	--	0.1995*** (0.0394)	--	0.1415*** (0.0374)
Native mother	--	-0.0494 (0.0265)	--	-0.0400 (0.0256)
Public	--	--	0.1963*** (0.0278)	0.1354*** (0.0273)
Legislators, senior officials, Managers	--	--	0.6714*** (0.0631)	0.5959*** (0.0611)
Professionals and para-professionals	--	--	0.4087*** (0.0443)	0.3294*** (0.0426)
Technicians and related Workers	--	--	0.2452*** (0.0514)	0.1782*** (0.0492)
Clerical workers, service workers, and salespersons	--	--	0.1793*** (0.0451)	0.1400*** (0.0425)
Mechanical operators, Assemblers	--	--	0.0614 (0.0493)	0.0981* (0.0475)
Unskilled workers and Laborers	--	--	-0.2211*** (0.0629)	-0.1318* (0.0627)
Intercept	5.3793*** (0.0843)	3.9862*** (0.1851)	5.1081*** (0.0887)	3.9620*** (0.1897)
$\hat{\lambda}$	-0.4765*** (0.0343)	-0.3415*** (0.0617)	-0.4090*** (0.0346)	-0.3308*** (0.0523)
LR_chi_square	272.8737	561.0332	624.3866	817.7402
Sample size	2258			

Table 3-1 Heckit Two-Stage Estimation on Earnings: Sub-sample of Natives

First-stage: Labor Force Participation

Variable	Model (1) Baseline	Model (2) Human Capital	Model (3) Occupation	Model (4) Human Capital and Occupation
Age	0.1759*** (0.0106)	0.1692*** (0.0117)	0.1689*** (0.0108)	0.1610*** (0.0123)
Age squared	-0.1869*** (0.0125)	-0.1965*** (0.0133)	-0.1896*** (0.0126)	-0.1881*** (0.0141)
Primary school	0.2032* (0.0798)	0.1414 (0.0786)	0.1752* (0.0784)	0.1469 (0.0779)
Middle school	0.5474*** (0.0864)	0.3567*** (0.0864)	0.4803*** (0.0865)	0.3632*** (0.0861)
High school and above	0.9804*** (0.0851)	0.5683*** (0.0853)	0.7719*** (0.0851)	0.5796*** (0.0853)
Married	-0.0625 (0.0417)	-0.0350 (0.0425)	-0.0509 (0.0420)	-0.0228 (0.0429)
Household size	0.0436*** (0.0038)	0.0507*** (0.0036)	0.0457*** (0.0036)	0.0512*** (0.0036)
Log Nonlabor Income	-0.0250*** (0.0032)	-0.0182*** (0.0035)	-0.0207*** (0.0033)	-0.0169*** (0.0034)
Mandarin	0.1699*** (0.0364)	0.0346 (0.0391)	0.0937* (0.0378)	0.0351 (0.0393)
Year	-0.0300*** (0.0042)	-0.0308*** (0.0041)	-0.0335*** (0.0042)	-0.0330*** (0.0041)
Intercept	56.6879*** (8.4338)	59.0843*** (8.2687)	64.2641*** (8.3705)	63.7547*** (8.1388)
Log Likelihood	-18786.0240	-17777.2144	-17669.2146	-17227.1953
Sample size	25590			

Table 3-2 Heckit Two-Stage Estimation on Earnings: Sub-sample of Natives

Second-stage: Log Earnings Regression

Variable	Model (1) Baseline	Model (2) Human Capital	Model (3) Occupation	Model (4) Human Capital and Occupation
Male	0.3960*** (0.0120)	0.3640*** (0.0113)	0.4061*** (0.0114)	0.3707*** (0.0113)
Married	0.4713*** (0.0282)	0.4354*** (0.0268)	0.4278*** (0.0268)	0.4080*** (0.0261)
Potential work experience	0.0003 (0.0010)	0.0165*** (0.0010)	0.0029** (0.0010)	0.0132*** (0.0010)
Married Potential work experience*	-1.1462*** (0.1223)	-1.0117*** (0.1152)	-0.9716*** (0.1169)	-0.9125*** (0.1134)
Spouse in LF	-0.0408** (0.0152)	-0.0707*** (0.0142)	-0.1151*** (0.0143)	-0.1146*** (0.0139)
Reside in Taipei<age15	0.2696*** (0.0187)	0.1609*** (0.0180)	0.1949*** (0.0179)	0.1437*** (0.0175)
Born after 1950	0.2001*** (0.0233)	0.2201*** (0.0215)	0.2104*** (0.0212)	0.2088*** (0.0205)
Primary school	--	0.2426*** (0.0404)	--	0.1705*** (0.0391)
Middle school	--	0.4953*** (0.0420)	--	0.3760*** (0.0407)
High school and above	--	0.8355*** (0.0426)	--	0.6034*** (0.0418)
Mandarin	--	0.1759*** (0.0124)	--	0.1188*** (0.0121)
F_Primary school	--	0.0559*** (0.0151)	--	0.0374* (0.0146)
F_Middle School	--	0.0526** (0.0179)	--	0.0219 (0.0172)
F_High school and above	--	0.1622*** (0.0197)	--	0.0865*** (0.0192)
Native mother	--	-0.0965*** (0.0212)	--	-0.0735*** (0.0200)
Public	--	--	0.2490*** (0.0148)	0.1632*** (0.0142)
Legislators, senior officials, Managers	--	--	0.9174*** (0.0292)	0.7179*** (0.0287)
Professionals and para-professionals	--	--	0.6158*** (0.0195)	0.4630*** (0.0192)
Technicians and related Workers	--	--	0.4835*** (0.0245)	0.3459*** (0.0237)
Clerical workers, service workers, and salespersons	--	--	0.3678*** (0.0189)	0.2714*** (0.0185)
Mechanical operators, Assemblers	--	--	0.2381*** (0.0178)	0.2394*** (0.0174)
Unskilled workers and laborers	--	--	0.0133 (0.0239)	0.0441 (0.0237)
Intercept	5.1605*** (0.0319)	4.0568*** (0.0568)	4.7635*** (0.0329)	4.0972*** (0.0558)
$\hat{\lambda}$	-0.5253*** (0.0154)	-0.2891*** (0.418)	-0.3692*** (0.2228)	-0.2056*** (0.0405)
LR_chi_square	4358.6879	4358.7211	4388.2519	4868.3295
Sample size	15788			

Table 4 Earnings Decomposition by Factor – Immigrants s as a reference group (%)

	Model (1) Baseline		Model (2) Human Capital		Model (3) Occupation		Model (4) Human Capital and Occupation	
Variable	Diff in endow	Diff in coeff	Diff in endow	Diff in coeff	Diff in endow	Diff in coeff	Diff in endow	Diff in coeff
Subtotal contribution by baseline factors	2.9	0.10	0.2	-20.8	2.3	-2.9	**0.6**	**-14.5**
Male	0.30	-2.00	0.30	-0.40	0.30	-1.40	0.30	-0.30
Married	-0.80	-8.30	-0.90	-4.60	-0.80	-6.90	-0.80	-4.50
Potential work experience	-1.20	10.60	-3.00	-11.00	-1.50	6.80	-2.80	-4.70
*Married*Potential work experience*	2.20	7.30	2.30	4.20	2.20	4.50	2.20	2.80
Spouse in LF	0.00	4.90	0.00	4.50	0.00	5.30	0.00	4.50
Reside in Taipei<age15	2.10	-0.90	1.50	-0.40	1.70	-0.50	1.40	-0.30
Born after 1950	0.30	-11.50	0.30	-13.10	0.40	-10.70	0.30	-12.00
Subtotal contribution by Human capital	--	--	**27.60**	**26.10**	--	--	**20.60**	**39.6**
Primary school	--	--	-6.00	3.50	--	--	-6.60	5.40
Middle school	--	--	-8.30	5.00	--	--	-8.40	7.40
High school and above	--	--	30.80	19.80	--	--	28.00	27.70
Mandarin	--	--	1.90	-6.70	--	--	0.90	-5.20
F_Primary school	--	--	-1.00	-0.70	--	--	-0.80	-0.20
F_Middle school	--	--	0.00	0.30	--	--	0.00	0.60
F_high school and above	--	--	7.80	0.50	--	--	5.50	0.70
Native mother	--	--	2.40	4.40	--	--	2.00	3.20
Subtotal contribution by Occupations	--	--	--	--	**8.70**	**-16.10**	**6.30**	**-11.10**
Public	--	--	--	--	2.10	-0.60	1.40	-0.30
Legislators, senior Officials, managers	--	--	--	--	1.50	-1.10	1.30	-0.50
Professionals and para-professionals	--	--	--	--	3.80	-3.20	3.10	-2.10
Technicians and related workers	--	--	--	--	0.50	-1.20	0.40	-0.80
Clerical workers, service workers, and salespersons	--	--	--	--	0.70	-4.50	0.60	-3.10
Mechanical operators, and assemblers	--	--	--	--	-0.60	-3.90	-0.90	-3.10
Unskilled workers and laborers	--	--	--	--	0.70	-1.60	0.40	-1.20
Total	**2.90**	**0.10**	27.80	5.30	**11.00**	**-19.00**	**27.50**	**14.00**

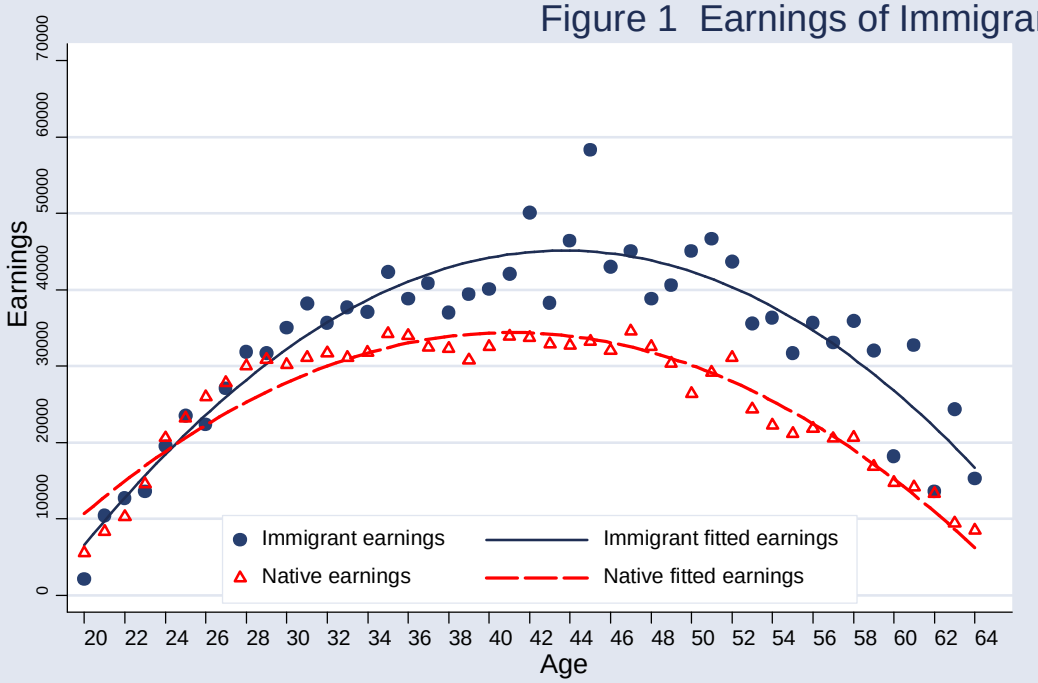
Table 5 Earnings Decomposition by Factor -- Natives as a reference group (%)

	Model (1) Baseline		Model (2) Human Capital		Model (3) Occupation		Model (4) Human Capital and Occupation	
Variable	Diff in endow	Diff in coeff	Diff in endow	Diff in coeff	Diff in endow	Diff in coeff	Diff in endow	Diff in coeff
Subtotal contribution by baseline factors	7.1	-4.20	1.20	-21.50	5.10	-5.60	1.70	-15.60
Male	0.40	-2.00	0.30	-0.40	0.40	-1.40	0.30	-0.30
Married	-1.10	-8.10	-1.00	-4.40	-1.00	-6.60	-0.90	-4.40
Potential work experience	-0.10	9.50	-4.20	-9.80	-0.70	6.10	-3.30	-4.20
*Married*Potential work experience*	3.30	6.20	2.90	3.60	2.80	3.80	2.70	2.30
Spouse in LF	0.00	4.90	0.00	4.50	0.00	5.30	0.00	4.50
Reside in Taipei<age15	3.60	-2.50	2.10	-1.10	2.60	-1.40	1.90	-0.80
Born after 1950	1.00	-12.20	1.10	-13.90	1.00	-11.40	1.00	-12.70
Subtotal contribution by Human capital	--	--	28.80	24.60	--	--	**19.7**	**40.60**
Primary school	--	--	-3.20	0.70	--	--	-2.20	1.00
Middle school	--	--	-5.40	2.10	--	--	-4.10	3.00
High school and above	--	--	22.20	28.30	--	--	16.10	39.70
Mandarin	--	--	5.60	-10.50	--	--	3.80	-8.00
F_Primary school	--	--	-1.40	-0.30	--	--	-0.90	-0.10
F_Middle school	--	--	0.00	0.30	--	--	0.00	0.60
F_high school and above	--	--	6.30	1.90	--	--	3.40	2.90
NativeMother	--	--	4.70	2.10	--	--	3.60	1.50
Subtotal contribution by Occupations	--	--	--	--	10.6	-17.9	**7.10**	**-12.00**
Public	--	--	--	--	2.60	-1.20	1.70	-0.60
Legislators, senior Officials, managers	--	--	--	--	2.00	-1.60	1.60	-0.80
Professionals and para-professionals	--	--	--	--	5.70	-5.10	4.30	-3.30
Technicians and related workers	--	--	--	--	1.00	-1.60	0.70	-1.20
Clerical workers, service workers, and salespersons	--	--	--	--	1.50	-5.30	1.10	-3.70
Mechanical operators, and assemblers	--	--	--	--	-2.20	-2.30	-2.20	-1.80
Unskilled workers and laborers	--	--	--	--	0.00	-0.80	-0.10	-0.60
Total	**7.10**	**-4.20**	30.00	3.10	**15.60**	**-23.50**	**28.50**	**13.0**

Table 6 Earnings Differentials Decomposition Results

	Model (1) Baseline	Model (2) Human Capital	Model (3) Occupation	Model (4) Human Capital and Occupation
Immigrants as a reference group				
(41) Due to explained portion difference in observed characteristics, (endowment differences):	**2.90**	27.80	11.10	27.50
(B) Due to unexplained portion (discrimination): (B1)+(B2)	**22.00**	-1.80	15.50	0.50
(B1) difference in coefficient	0.10	5.30	-19.00	14.00
(B2) difference in constant	21.90	-7.10	34.50	-13.50
© Total differentials, (A)+(B):	**24.80**	26.00	26.50	28.00
(D) Explained part as % of total differentials: (A/C)	11.69	**106.92**	**41.70**	**98.21**
(E) Discrimination part as % of total differentials: (B/C)	88.31	**-6.92**	**58.30**	**1.79**
Natives as a reference group				
(41) Due to explained portion difference in observed characteristics, (endowment differences):	**7.10**	30.00	15.60	28.50
(B) Due to unexplained portion (discrimination): (B1)+(B2)	**17.70**	-4.00	10.90	-0.50
(B1) difference in coefficient	-4.20	3.10	-23.50	13.0
(B2) difference in constant	21.90	-7.10	34.50	-13.50
©Total differentials, (A)+(B):	**24.80**	26.00	26.50	28.00
(D) Explained part as % of total differentials: (A/C)	28.63	**115.38**	**58.90**	**101.79**
(E) Discrimination part as % of total differentials: (B/C)	71.37	**-15.38**	**41.10**	**-1.79**

Figure 1 Earnings of Immigran



Source: Taiwan Social Change Sruvey 1992-2006.

Appendix Tables (for referees; not intended for publication.)

Appendix Table 1 Definition of variables

Variables	
Natives	A dummy, equals 1 if s/he is Hokkien, 0 otherwise
Immigrants	A dummy, equals 1 if an individual was emigrated from Mainland China or was born in Taiwan after 1950 by a father emigrated from Mainland China.
Labor force participation	A dummy, equals 1 if s/he is employed, 0 otherwise
$\ln W$	Log monthly earnings from main employment in terms of New Taiwan Dollars.
Age	Number of years since birth
*Potential work experience**	Defined as age minors years of education and minors 6
Male	A dummy, equals 1 if male, 0 otherwise
Married	A dummy, equals 1 if married or cohabited, 0 otherwise
Household size	Total number of people within a household
Born after 1950	A dummy, equals 1 if a respondent was born after 1950
Year	A year dummy
Own education	
Not educated	A reference group.
Primary school	A dummy, equals 1 if having primary school degree, 0 otherwise
Middle school	A dummy, equals 1 if having middle school degree, 0 otherwise
High school and above	A dummy, equals 1 if having a degree for high school and above, 0 otherwise
Father education	
F_Not educated	A reference group.
F_Primary school	A dummy, equals 1 if father has primary school degree, 0 otherwise
F_Middle school	A dummy, equals 1 if father has middle school degree, 0 otherwise
F_High school and above	A dummy, equals 1 if father has a degree for high school and above, 0 otherwise
Native Mothers	A dummy, equals 1 if mother's ethnicity is Hokkien, 0 otherwise
Mandarin	A dummy, equals 1 if a respondent chooses to speak Mandarin during the interview of survey, 0 if otherwise
Public	A dummy, equal 1s if respondent works in public sector
Reside in Taipei<age 15	A dummy, equal 1 if a respondent lived in the Taipei metro area before age 15, 0 otherwise
Spouse in LF	A dummy, equals 1 if a respondent's spouse works in the labor force, 0 otherwise
Log Nonlabor income (NT dollars)	Log monthly family earnings deducted by a respondent's log monthly earnings

* Years of education are computed as follows. 0 year if there is no education, 6 years if there is a primary school degree, 9 years if there is a middle school degree, 12 years if there is a high school degree, 16 years if there is a 4-year college degree, 18 years if there is a master degree, and 22 years if there is a Ph.D degree.

Appendix Table 2 Variable Statistics

	Total sample		Natives (Hokkien)		Immigrants	
Variable [1]	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Natives (Hokkien)	0.8814	0.3233	--	--	--	--
Mainlander	0.1186	0.3233	--	--	--	--
Male	0.4943	0.5000	0.4915	0.4999	0.5148	0.4999
Female	0.5057	0.5000	0.5085	0.4999	0.4852	0.4999
Married	0.7211	0.4484	0.7258	0.4461	0.6868	0.4639
Labor force participation rate	0.7453	0.4357	0.7402	0.4385	0.7830	0.4123
Earnings (NT dollars)	28284.3100	32912.8500	27236.6200	32281.1600	36073.5000	36345.1500
Own education						
Not educated	0.0526	0.2232	0.0581	0.2339	0.0119	0.1085
Primary	0.1755	0.3804	0.1931	0.3948	0.0447	0.2068
Middle school	0.1722	0.3776	0.1838	0.3873	0.0857	0.2800
High school and above	0.5991	0.4901	0.5644	0.4958	0.8568	0.3504
Mandarin	0.5847	0.4928	0.5445	0.4980	0.8841	0.3202
Father Education						
F_Not educated	0.2674	0.4426	0.2870	0.4524	0.1217	0.3270
F_Primary	0.3797	0.4853	0.4063	0.4911	0.1822	0.3860
F_Middle school	0.1517	0.3588	0.1504	0.3575	0.1615	0.3681
F_High school and above	0.1759	0.3807	0.1324	0.3389	0.4994	0.5001
Native Mothers						
Immigrants	0.0528	0.2236	--	--	0.4451	0.4970
Natives	0.8363	0.3700	0.9488	0.2204	--	--
Public	0.1061	0.3080	0.0944	0.2924	0.1929	0.3946
Occupation distribution						
Legislators, senior officials and managers	0.0373	0.1894	0.0349	0.1834	0.0552	0.2284
Professionals and para-professionals	0.1352	0.3419	0.1242	0.3298	0.2170	0.4123
Technicians and related Workers	0.0456	0.2086	0.0426	0.2020	0.0677	0.2513
Clerical workers, service workers, and salespersons	0.1959	0.3969	0.1911	0.3932	0.2310	0.4215
Mechanical operators and Assemblers	0.1828	0.3865	0.1912	0.3933	0.1203	0.3253
Unskilled workers and laborers	0.0533	0.2246	0.0561	0.2301	0.0322	0.1767
Agriculture, animal husbandry, forestry and fishing Workers	0.0450	0.2074	0.0504	0.2189	0.0046	0.0680
Reside in Taipei<age 15	0.0931	0.2906	0.0790	0.2698	0.2002	0.4002
Spouse in LF	0.5729	0.4947	0.5744	0.4944	0.5613	0.4963
Non labor income (NT dollars)	25645.7000	47214.2500	25564.2400	47710.3900	26244.5500	43395.3600
Sample size (number)	29032		25590		3442	

Note: 1. All units are expressed in percentages unless otherwise noted in parentheses.

Appendix Table 3. Correlation of Independent Variables — Full Sample

	lnin.	Male	Mar.	Mar*p exp.	F_pri.	F_mid sch..	F_hi & ab.	Prim.	Mid. Sch.	Above_ hs.	Pub.	Mand ar.	Spo. in LF	Born 50	Na. mo.	Pot. Exp.	Legi, seni.	Prof . &	Tech.	Cleri., ser.	Mech oper.	Unsk. wk &
Lnin.	1.000																					
Male	0.311	1.000																				
Mar.	0.000	-0.047	1.000																			
Mar*p exp.	-0.132	-0.020	0.773	1.000																		
F_pri.	0.070	-0.008	0.029	-0.077	1.000																	
F_mid sch.	0.042	0.007	-0.070	-0.124	-0.331	1.000																
F_hi & ab.	0.057	0.017	-0.189	-0.231	-0.362	-0.195	1.000															
Prim.	-0.170	-0.059	0.153	0.356	-0.062	-0.156	-0.193	1.000														
Mid. Sch.	-0.041	0.035	0.106	0.067	0.041	0.007	-0.164	-0.210	1.000													
Above_hs.	0.244	0.080	-0.227	-0.464	0.078	0.157	0.324	-0.564	-0.558	1.000												
Pub.	0.213	0.067	0.039	-0.006	-0.005	0.023	0.111	-0.117	-0.111	0.207	1.000											
Mandar.	0.155	-0.024	-0.188	-0.368	0.061	0.101	0.259	-0.347	-0.163	0.507	0.143	1.000										
Spo. in LF	-0.040	-0.241	0.639	0.416	0.055	-0.049	-0.098	0.073	0.029	-0.092	0.025	-0.057	1.000									
Born 50	0.192	-0.011	-0.174	-0.546	0.141	0.090	0.136	-0.302	0.019	0.376	-0.007	0.301	-0.018	1.000								
Na. mo.	-0.044	-0.014	-0.030	-0.007	0.066	0.008	-0.184	0.077	0.057	-0.127	-0.087	-0.151	-0.017	-0.009	1.000							
Pot exp.	-0.157	-0.029	0.418	0.796	-0.113	-0.143	-0.269	0.439	0.059	-0.578	-0.028	-0.447	0.189	-0.693	0.006	1.000						
Legi, seni.	0.117	0.080	0.066	0.036	0.012	0.008	0.053	-0.072	-0.047	0.111	0.018	0.076	0.045	0.011	-0.032	0.019	1.000					
Prof &	0.224	0.021	-0.032	-0.107	-0.007	0.034	0.171	-0.158	-0.138	0.270	0.170	0.199	0.014	0.085	-0.066	-0.124	-0.078	1.000				
Tech..	0.114	0.041	-0.011	-0.048	0.021	0.014	0.055	-0.077	-0.070	0.135	0.081	0.090	0.007	0.048	-0.017	-0.061	-0.043	-0.086	1.000			
Cleric., ser.	0.189	-0.081	-0.007	-0.047	0.037	0.043	0.017	-0.072	-0.038	0.113	0.054	0.087	0.037	0.054	-0.024	-0.051	-0.097	-0.195	-0.108	1.000		
Mech oper.,	0.147	0.188	0.046	0.027	0.035	-0.014	-0.136	0.079	0.155	-0.163	-0.105	-0.126	-0.029	0.044	0.039	0.027	-0.093	-0.187	-0.103	-0.233	1.000	
Unsk. wk &	0.045	-0.001	0.016	0.051	-0.008	-0.025	-0.064	0.090	0.061	-0.135	0.007	-0.110	0.002	-0.033	0.014	0.088	-0.047	-0.094	-0.052	-0.117	-0.112	1.000

Appendix Table 4. Correlation of Independent Variables — Immigrants

	Ilnin.	Male	Mar.	Mar*p exp.	F_pri.	F_mid sch..	F_hi & ab.	Prim.	Mid. Sch.	Above_ hs.	Pub.	Mand ar.	Spo. in LF	Born 50	Na. mo.	Pot. Exp.	Legi, seni.	Prof . &	Tech..	Cleri., ser.	Mech oper.	Unsk. wk &
Lnin.	1.000																					
Male	0.275	1.000																				
Mar.	0.066	-0.026	1.000																			
Mar*p exp.	-0.023	0.010	0.791	1.000																		
F_pri.	-0.023	-0.018	0.017	0.005	1.000																	
F_mid sch.	0.003	-0.034	0.014	-0.008	-0.207	1.000																
F_hi & ab.	0.092	0.022	-0.092	-0.132	-0.471	-0.438	1.000															
Prim.	-0.135	-0.046	0.049	0.214	0.073	-0.045	-0.188	1.000														
Mid. Sch.	-0.110	-0.006	0.034	0.082	0.044	0.012	-0.192	-0.066	1.000													
Above_hs.	0.201	0.038	-0.062	-0.236	-0.078	0.029	0.297	-0.529	-0.749	1.000												
Pub.	0.220	0.053	0.119	0.119	-0.059	-0.025	0.117	-0.067	-0.105	0.135	1.000											
Mandar.	0.084	0.004	-0.063	-0.104	-0.043	-0.001	0.153	-0.176	-0.162	0.259	0.092	1.000										
Spo. in LF	0.024	-0.184	0.711	0.487	0.020	0.019	-0.040	0.004	-0.014	0.013	0.084	-0.011	1.000									
Born 50	0.106	-0.032	-0.120	-0.447	0.010	0.042	0.100	-0.267	-0.087	0.291	-0.093	0.046	0.017	1.000								
Na. mo.	0.014	0.004	-0.106	-0.232	0.021	0.033	-0.017	-0.061	0.016	0.046	-0.122	-0.138	-0.055	0.288	1.000							
Pot exp.	-0.066	0.014	0.357	0.735	0.012	-0.019	-0.174	0.319	0.143	-0.381	0.096	-0.125	0.174	-0.631	-0.277	1.000						
Legi, seni.	0.093	0.072	0.078	0.069	-0.002	-0.009	0.041	-0.034	-0.038	0.059	-0.022	0.036	0.078	0.007	-0.014	0.053	1.000					
Prof &	0.219	-0.019	0.044	-0.020	-0.073	-0.026	0.162	-0.107	-0.141	0.191	0.107	0.107	0.065	0.024	-0.038	-0.051	-0.127	1.000				
Tech..	0.111	0.070	0.002	-0.004	-0.019	0.029	0.027	-0.058	-0.066	0.097	0.038	0.029	0.003	0.026	0.022	0.000	-0.065	-0.142	1.000			
Cleric., ser.	0.160	-0.107	0.013	0.019	0.040	0.009	-0.004	-0.032	-0.047	0.055	0.027	0.022	0.034	0.021	0.034	0.022	-0.133	-0.289	-0.148	1.000		
Mech oper.,	0.089	0.153	0.005	0.002	0.038	0.022	-0.144	0.050	0.174	-0.162	-0.115	-0.151	-0.049	0.040	0.057	0.001	-0.089	-0.195	-0.100	-0.203	1.000	
Unsk. wk &	0.027	0.023	0.017	0.040	0.025	-0.004	-0.071	0.104	0.115	-0.160	0.028	-0.052	0.012	-0.068	-0.021	0.070	-0.044	-0.096	-0.049	-0.100	-0.068	1.000

Appendix Table 5. Correlation of Independent Variables — Natives

	Ilnin.	Male	Mar.	Mar*p exp.	F_pri.	F_mid sch..	F_hi & ab.	Prim.	Mid. Sch.	Above_ hs.	Pub.	Mand ar.	Spo. in LF	Born 50	Na. mo.	Pot. Exp.	Legi, seni.	Prof . &	Tech.	Cleri., ser.	Mech oper.	Unsk. wk &
Lnin.	1.000																					
Male	0.315	1.000																				
Mar.	-0.007	-0.050	1.000																			
Mar*p exp.	-0.139	-0.022	0.773	1.000																		
F_pri.	0.091	-0.005	0.027	-0.099	1.000																	
F_mid sch.	0.046	0.013	-0.081	-0.137	-0.348	1.000																
F_hi & ab.	0.029	0.011	-0.212	-0.237	-0.323	-0.164	1.000															
Prim.	-0.167	-0.059	0.161	0.360	-0.092	-0.167	-0.169	1.000														
Mid. Sch.	-0.029	0.040	0.112	0.059	0.028	0.008	-0.144	-0.232	1.000													
Above_hs.	0.240	0.083	-0.244	-0.477	0.124	0.171	0.291	-0.557	-0.540	1.000												
Pub.	0.207	0.068	0.028	-0.016	0.021	0.031	0.074	-0.114	-0.105	0.204	1.000											
Mandar.	0.150	-0.031	-0.199	-0.380	0.108	0.111	0.220	-0.338	-0.147	0.500	0.131	1.000										
Spo. in LF	-0.048	-0.248	0.629	0.409	0.058	-0.058	-0.114	0.079	0.032	-0.103	0.015	-0.061	1.000									
Born 50	0.198	-0.010	-0.179	-0.554	0.165	0.095	0.131	-0.301	0.033	0.380	-0.001	0.315	-0.021	1.000								
Na. mo.	-0.020	-0.010	-0.039	-0.017	-0.023	0.012	-0.033	0.028	0.018	-0.052	-0.006	-0.030	-0.018	-0.041	1.000							
Pot exp.	-0.163	-0.033	0.425	0.800	-0.139	-0.157	-0.277	0.443	0.045	-0.591	-0.038	-0.466	0.191	-0.697	0.014	1.000						
Legi, seni.	0.119	0.081	0.065	0.035	0.020	0.010	0.046	-0.073	-0.046	0.114	0.022	0.075	0.040	0.010	-0.018	0.018	1.000					
Prof &	0.221	0.026	-0.043	-0.113	0.017	0.043	0.150	-0.157	-0.132	0.271	0.175	0.197	0.007	0.090	-0.021	-0.129	-0.072	1.000				
Tech..	0.112	0.036	-0.013	-0.052	0.033	0.011	0.049	-0.076	-0.068	0.137	0.087	0.091	0.008	0.049	-0.003	-0.067	-0.040	-0.080	1.000			
Cleric., ser.	0.191	-0.078	-0.009	-0.053	0.043	0.047	0.010	-0.072	-0.034	0.116	0.056	0.088	0.038	0.057	-0.022	-0.057	-0.092	-0.183	-0.103	1.000		
Mech oper.,	0.158	0.193	0.049	0.024	0.025	-0.017	-0.124	0.074	0.150	-0.154	-0.099	-0.114	-0.028	0.048	-0.002	0.024	-0.092	-0.183	-0.103	-0.236	1.000	
Unsk. wk &	0.049	-0.003	0.014	0.049	-0.016	-0.027	-0.055	0.086	0.054	-0.129	0.009	-0.109	0.000	-0.028	-0.001	0.087	-0.046	-0.092	-0.052	-0.119	-0.119	1.000