

Labor Supply, Unemployment and Education Investments in Immigrant Families: Evidence for Australia

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ABSTRACT

Credit constraints and a need to invest in host country-specific human capital may lead immigrant couples to adopt a family investment strategy. Researchers attempting to evaluate this family investment hypothesis, however, face severe data limitations, because standard data sources often identify the foreign born, but typically provide no information about the migrating unit or the immigration process itself. Principal applicants are usually indistinguishable from accompanying family members and while family units at the time of data collection are identified, family units at the time of migration are completely unknown.

This paper re-examines the family investment hypothesis by utilizing new panel data for a recent cohort of immigrant households. The Longitudinal Survey of Immigrants to Australia provides a unique opportunity to simultaneously consider the labor-supply and human capital investment decisions of men and women in the same migrating household. In particular we are interested in how selection criteria are related to the settlement process and whether these patterns support the family investment hypothesis.

The determinants of participation, unemployment, hours, and human capital investment decisions of couples entering Australia under different visa categories are assessed. Information about principle applicant/accompanying spouse status is used to sort out whether the observed relationships are driven by comparative labor market advantage or by gender roles. While some decisions appear consistent with comparative advantage and the family investment hypothesis (e.g., participation), others appear to stem from traditional gender roles (e.g., investment in education).

1 Motivation

Immigration has played a major role in shaping the identity of several industrialized countries. The tremendous growth of the United States and Canada in the 19th Century was fueled to a large degree by migrants, while Australia began to actively recruit immigrants after WWII to ensure an adequate supply of labor for a growing economy. Given this, it is not surprising that studies of how immigrants adapt to and influence labor market opportunities in the receiving country have become increasingly common among labor economists.

The majority of early studies concentrated exclusively on the behavior of male immigrants with researchers only recently turning to focus explicitly on the experiences of female immigrants. Even more recently, studies have begun to recognize that migration is not usually a solitary undertaking but that "migrating units" often include a husband, wife, and children. Furthermore, the family itself may have an important role in the process of immigrant settlement. In particular, researchers have hypothesized that due to an inability to borrow against future earnings to finance current consumption, immigrant households adopt a family investment strategy (Long, 1980; Beach and Worswick, 1993; Duleep and Sanders 1993; Worswick, 1996; and Baker and Benjamin, 1997). Specifically, immigrant wives undertake labor market activities that facilitate their husbands' investments in receiving country-specific human capital.

Researchers attempting to evaluate the family investment hypothesis have struggled with important data limitations. In particular, labor force surveys and censuses may identify the foreign born, but typically provide no information about the migrating unit or the immigration

process itself. Principal applicants are usually indistinguishable from accompanying family members and while family units at the time of data collection are identified, family units at the time of migration are completely unknown. Still, many researchers have concluded that the family investment hypothesis is consistent with the observed labor market behavior of immigrant men and women in ways that other explanations are not.¹

Our goal is to re-examine the family investment hypothesis taking advantage of a new data source that provides panel data for a recent cohort of immigrant households. The Longitudinal Survey of Immigrants to Australia (LSIA) provides a unique opportunity to simultaneously consider the labor-supply behavior of men and women in the same migrating household. In particular we are interested in addressing the following questions: first, how does the settlement process vary across households entering Australia under different selection criteria and second, do these patterns appear to support the family investment hypothesis? The answers to these questions have important policy implications because immigration policy is, after all, typically results in the selection of households rather than individuals.² Given this, it is vital for immigration research to move beyond a simple analysis of individuals to consider the entire immigrant household. We also hope to add to the growing body of literature that focuses on the contribution of immigrant wives to the economic status of their families as well as the role of the family in labor market behavior of immigrant women.

In the following section of the paper, the existing literature on the family investment

¹In particular, Baker and Benjamin (1997) explicitly consider alternative explanations for the observed relationships in immigrant men and women's hours and wages over time. See also Beach and Worswick, 1993.

²Once an individual principal applicant applies for and is granted a visa, dependent family members are automatically granted visas as well.

hypothesis and the labor market experience of immigrant women is reviewed. An overview of the LSIA data is presented in Section III. A discussion of the estimation procedure and empirical results follow. The final section of the paper discusses some general conclusions and provides suggestions for future research.

2 The Family Investment Hypothesis

Numerous studies have detailed the labor-market experiences of immigrants in the United States, in Canada, and in Australia.³ The majority of early studies, however, concentrated exclusively on male immigrants and focused on the relationship between relative immigrant-native earnings on the one hand and the effects of year of arrival (cohort effects) and the number of years since migration (typically called assimilation) on the other.⁴ Male immigrants were estimated to have lower earnings immediately after arrival, but have relatively high earnings growth over time.⁵ These patterns were thought to be explained by the difficulties in completely transferring human capital across countries and the resulting need to accumulate host country-specific human capital (Chiswick, 1978).

Recognizing that immigrant women often make substantial contributions to family earnings, researchers then turned an assessment of the labor market behavior of immigrant women—particularly married immigrant women—over time (Chiswick, 1980; Long, 1980; MacPherson and Stewart, 1989; Beach and Worswick, 1993; Duleep and Sanders 1993; Worswick, 1996;

³See Wooden, et al (1994) for a recent review of the Australian literature.

⁴A more limited number of studies have focused on participation or unemployment (cites???)

⁵See Boras (1985) and LaLonde and Topel (1992) for a discussion of the methodological issues involved in estimating the magnitude of the assimilation effect.

and Schoeni 1998).⁶ Long (1980) was the first to demonstrate that although immigrant women often have higher earnings than native-born women immediately after migration, as the number of years since migration increased relative immigrant-native earnings declined. These patterns—which were directly opposed to those observed for immigrant men—lead Long to speculate that immigrant wives were working to finance their husbands’ investment in U.S.-specific human capital.

This family investment hypothesis (as it has come to be called) postulates that due to credit constraints, immigrant families who need to make investments in host country-specific human capital must finance that investment themselves. As a result, immigrant wives (generally secondary workers) undertake those labor market activities that facilitate their husbands’ investments in receiving country-specific human capital. The family investment hypothesis predicts that immigrant wives are more likely to work, work longer hours, and forego their own investment in human capital by taking better paying but dead-end jobs.

Empirical tests of the family investment hypothesis have produced somewhat mixed results. Duleep and Sanders (1993) find that—as predicted—labor force participation rates are higher for immigrant women whose husbands have difficulty adapting to the new labor market and need to make investments in host-country skills. Baker and Benjamin (1997) find that women married to foreign-born men work more upon arrival, have flatter wage profiles, and have a lower

⁶In addition to the standard factors typically influencing the labor force participation decisions of native-born women, country of origin is also thought to affect the labor-supply decisions of married immigrant women through differences in skill transferability (Chiswick, 1980; Duleep and Sanders, 1993) or cultural attitudes (Reimers, 1985). The presence of other adult relatives in the home is positively related to the propensity that immigrant women work (MacPherson and Stewart, 1989; Duleep and Sanders, 1993), while women married before migration have lower participation rates than women married after migration (MacPherson and Stewart 1989). Finally, a limited number of recent studies have assessed the extent to which the employment behavior of immigrant women changes through the assimilation process (Funkhauser and Trejo, 1997; Schoeni, 1998).

propensity to invest in schooling relative to immigrant women married to native-born men. After ruling out conventional price explanations, they conclude these patterns lend support for the idea of a family investment strategy.

At the same time, MacPherson and Stewart (1989), find only weak support the notion that immigrant women to the United States increase their labor force participation when their husbands attend school.⁷ Consistent with the family investment model, Worswick (1996) finds that relative to native-born women, immigrant women in Canada have higher wages, lower returns to education, and are less sensitive to the effect of young children. On the other hand, he finds that the relative wage growth of immigrant women exceeds the relative wage growth of immigrant men suggesting that it is immigrant women rather than immigrant men who are investing in human capital.⁸

Additionally, the empirical literature produces two puzzles concerning the family investment hypothesis that are as yet unresolved. First, if the labor supply and human capital investment behavior of immigrant families is driven by credit constraints, we should observe very recent immigrant families acting consistently with the family investment hypothesis. Credit constraints are almost certainly more binding immediately after migration (Worswick, 1999). Yet there is evidence that while the family investment hypothesis holds for more established immigrants, it does not describe the behavior of very recent immigrants (Worswick, 1996; Baker and Benjamin, 1997).⁹ Second, household decisions about which partner undertakes

⁷Significant effects were found only for immigrant women from Canada and the West Indies.

⁸Beach and Worswick (1993) using a single cross-section of data assess the relative earnings of immigrant women in Canada and conclude that although immigrant women have higher earnings than native-born women they also have a flat earnings profile.

⁹Note Baker and Benjamin (1997) find that the sum of the estimated cohort effects for immigrant husbands and wives are negative for the most recent cohort of immigrants (See Table 2). Similarly, Worswick finds that

the human capital investment and which partner undertakes the borrowing function theoretically depend upon each partner's comparative advantage. Yet, even after identifying mixed immigrant/native-born families in which the comparative advantage is presumably clearer, Baker and Benjamin (1997) provide evidence that the family investment hypothesis does not appear to hold symmetrically for immigrant men and women.¹⁰

3 Model

The model of family labor supply used in the analysis of this paper is based in part on the standard dynamic labor supply model (see for example Heckman and MaCurdy, 1980, MaCurdy, 1981, MaCurdy, 1983, Browning, Deaton and Irish, 1985). Much of the previous literature assumes perfect capital markets. Following Ball (1990) and Worswick (1999), the assumption of no credit constraints in the dynamic labor supply model is relaxed in the same way as in the dynamic consumption literature (see Zeldes, 1989, and Runkle, 1991). The model also allows for multiple time uses. In particular, each person in the household can devote time to: 1) leisure (including home production), 2) wage labor, 3) investment activities (which could include formal education or job search).

The household is assumed to choose household consumption, hours in paid work, hours in investment activities of both the head and spouse in the household. The household's utility is

immigrant women do not supply more hours than native-born women in the first few years after migration.

¹⁰In particular, immigrant men married to native-born women appear to have the same wage-age profiles as native-born men married to native-born women suggesting that they bypass the traditional investment process of other immigrant families.

expressed in the following general form:

$$U(t) + \frac{1}{1 + \rho} E_t \left\{ \sum_{\tau=t+1}^{T^*} \frac{U(\tau)}{(1 + \rho)^{\tau-t-1}} \right\} \quad (1)$$

The within period utility function has the following general form: $U(\tau) = U(C(\tau), l_1(\tau), l_2(\tau))$ where $C(\tau)$ is family consumption, $l_a(\tau) \equiv T - h_{aw}(\tau) - h_{ae}(\tau)$ is the hours of leisure of adult $a = 1, 2$, T is the total number of hours in the period, $h_{aw}(\tau)$ is the hours of paid work of person a in period τ , and $h_{ae}(\tau)$ is the hours in investment activities of person a in period τ , for $a = 1, 2$, and $\tau = 1, \dots, T$. Finally, ρ is the rate of time preference.¹¹

Hourly wage rates are determined in part by the stock of human capital of the person. A person can accumulate human capital by: 1) spending time in wage employment or 2) devoting time to investment activities. In each case, the time spent adds to his/her stock of human capital, $k_a(\tau)$. Each person's level of human capital can be expressed as:

$$k_a(\tau) = (1 - \delta)k_a(\tau - 1) + f_w(h_{aw}(\tau)) + f_e(h_{ae}(\tau)) \quad (2)$$

where $k_a(\tau)$ is the human capital of spouse a in period τ , $f_j(h_{aj}(\tau))$ is the increase in person a 's human capital due to the time spent in activity j in period τ , δ is the rate of depreciation of human capital for $a = 1, 2$, $\tau = 1, \dots, T$, $j = e, w$. It is assumed that $f'_j() > 0$ and $f''_j() \leq 0$ for $j = e, w$.

A person can be unemployed in the model if the person receives a wage offer in a period that is below the minimum wage, $w_{\min}(\tau)$. It is assumed that the wage a person is offered in

¹¹An extension of the utility function for the family would be to allow for different dis-utilities to time spent in the different time use activities. In the present form of the utility function, the direct utility cost of an extra hour spent in each of the alternative activities is the marginal utility from leisure.

each period is deterministic and a function of their human capital. Therefore, a person with human capital $k_a(\tau)$ will receive a wage offer of $w_a(\tau) = w(k_a(\tau))$ in period τ .¹²

The household chooses consumption, hours of paid work for each adult and hours in investment activities for each adult so as to maximize household utility subject to a set of constraints. The asset accumulation constraint has the following form:

$$A(\tau) - A(\tau - 1)(1 + r(\tau)) = \sum_{a=1}^2 w_a(\tau)h_{aw}(\tau) - p(\tau)c(\tau) - \sum_{a=1}^2 h_{ae}(\tau)p_e(\tau) \quad (3)$$

where $w_a(\tau)$ is the wage paid to adult a in the labor market in period τ for $\tau = 0, \dots, T$; $j = 1, \dots, J$. $A(\tau)$ is non-human wealth held at the end of period τ ; and $r(\tau)$ is the interest rate in period τ , $p(\tau)$ is the price of the composite commodity, and $p_e(\tau)$ is school tuition per hour, for $\tau = 0, \dots, T$.

We will allow for the possibility that the household may be credit-constrained. If the household faces a credit constraint it will be represented by a non-negativity constraint on $A(\tau)$:

$$A(\tau) \geq 0 \quad (4)$$

The household can sell off assets which it holds at the beginning of the period, $A(\tau)(1+r(\tau+1))$, but it cannot allow its end of period assets, $A(\tau)$, to drop below zero.

The following non-negativity constraints are imposed on hours of work, hours in investment activities for each person, a , are restricted to be non-negative in period τ :

$$h_{aw}(\tau) \geq 0 \quad (5)$$

¹²We do not model the possibility of job search in the theoretical model. Investment activities could be thought of as job search in the context of the model. Job search behaviour is analyzed separately from investment of time in formal education in the empirical model.

$$h_{ae}(\tau) \geq 0 \tag{6}$$

for $a = 1, 2$, $\tau = 0, \dots, T$.

The household's problem is to maximize (1) subject to constraints (3) through to (2) and initial and terminal conditions on assets, A_0 and A_T .

Assuming an interior solution for $C(\tau)$, the necessary conditions are:

$$U_c(\tau) - \lambda(\tau)p(\tau) = 0 \tag{7}$$

$$(1 - d_u(\tau))\{-U_{l_a}(\tau) + \psi(\tau)f'_w(\tau) + \lambda(\tau)w_a(\tau) + \delta_{wa}(\tau)\} = 0 \tag{8}$$

$$-U_{l_a}(\tau) + \psi(\tau)f'_e(\tau) - \lambda(\tau)p_e(\tau) + \delta_{ea}(\tau) = 0 \tag{9}$$

where $U_x(\tau)$ is the derivative of $U(\tau)$ with respect to x . The parameter $\lambda(\tau)$ is the multiplier for the period τ asset accumulation constraint; $\psi(t)$ is the multiplier on the human capital accumulation equation (2); $\delta_{wa}(\tau)$ is the multiplier on the period τ non-negativity constraint for the hours in income-generating activity of adult a , (5); $\delta_{ea}(\tau)$ is the multiplier on the non-negativity constraint for the hours in investment activities of person a in period τ , (6). The dummy variable $d_u(\tau)$ equals one if the person is unemployed which is the case if $w_a(t) < w_{\min}(t)$.

For example, if adult a works a positive number of hours for wages then $-U_{l_a}(\tau) = -\lambda(\tau)w_a(\tau)$, otherwise, $-U_{l_a}(\tau) < -\lambda(\tau)w_a(\tau)$, which means that the increase in utility which the household receives from the wage does not compensate for the disutility from the adult working the first hour.

The motion equation for the marginal utility of wealth, $\lambda(t)$, is:

$$\lambda(t) = \frac{1}{1 + \rho} E_t \{ \lambda(t + 1)(1 + r(t + 1)) \} + \gamma(t) \quad (10)$$

If the household is credit-constrained in period t , $\gamma(t) > 0$, otherwise $\gamma(t) = 0$. In order to interpret this condition, assume for the moment that the household is not credit-constrained in period t , which implies $\gamma(t) = 0$. In this case, the condition equates the expected present value of the increase in utility from another unit of wealth in period $t + 1$, $(1 + \rho)^{-1} E_t \{ \lambda(t + 1)(1 + r(t + 1)) \}$, to the cost in terms of the decrease in utility in period t , $\lambda(t)$. If the household is credit-constrained in period t , the household would like to lower its end of period assets, $A(t)$, below zero by borrowing against future earnings.

4 Econometric Specification

The econometric model is derived from the first order conditions (8) and (9). Our approach is to estimate reduced-form models that allow us to compare the behavior of different immigrant households at time of arrival in Australia and with year-since-migration. A comparison of immigrant families according to their admission criteria (identified by their visa categories) will be made in order to investigate whether certain groups of immigrant families are more likely to fit the family investment hypothesis. In particular, we are interested in identifying immigrant families from different admissions criteria that are more likely to: 1) make investment decisions after arrival and 2) have difficulty accessing credit to finance those investments. Next, we will investigate which adult household member receives the benefits of the investment in the form of human capital formation and which household member bears the cost of financing these investments in the form of extra labor supply and reduced human capital investment activities.

Our focus initially is on the determinants of whether the secondary earner enters the labor market or not, and whether he or she is employed or unemployed and how many hours the secondary earner works if employed. These outcomes can be modelled off of equations (8) and (9).

Using (8), it is possible to define the following reduced form expression for the case of adult a choosing to enter the labor market:

$$X_{ap}(t)\beta_p + \varepsilon_{ap}(t) \equiv -U_{l_a}(t, l_a(t) = T) + \psi(t)f'_w(t) + \lambda(t)w_a(t) > 0 \quad (11)$$

Conditional on being in the labor market, the following reduced form expression can be defined for the case of adult a being unemployed:

$$X_{au}(t)\beta_u + \varepsilon_{au}(t) \equiv w_a(t) - w_{\min}(t) < 0 \quad (12)$$

Using (9), the following reduced form expression can be defined for the case of adult a choosing to participate in investment activities:

$$X_{ae}(t)\beta_e + \varepsilon_{ae}(t) \equiv -U_{l_a}(t, l_a(t) = T) + \psi(t)f'_e(t) - \lambda(t)p_e(t) > 0 \quad (13)$$

Ideally, the analysis should take into account the joint nature of these decisions. However, given the complexity involved in estimating multinomial choice problems where heterogeneity in preferences over the different choices are likely to be correlated, we adopt a strategy of estimating simple reduced-form equations by probit and tobit methods.

5 Data and Estimation Sample

At least three important data limitations may have played a role in limiting researchers' ability to reach firm conclusions regarding the family investment hypothesis. First, labor force surveys and censuses identify the foreign born, but typically do not distinguish principal applicants from accompanying family members or skilled immigrants from family immigrants and refugees. As a result, it has been difficult for researchers to isolate those immigrants for whom the family investment hypothesis is most likely to apply.¹³ Additionally, while family units at the time of data collection are identified in some surveys, family units at the time of migration are completely unknown. Researchers often do not know which individuals were married at the time of migration let alone whether they were married to their current spouse. Because this is likely to be a smaller problem for recent rather than established immigrants, there exists the possibility that household formation plays a role in generating observed earnings-age profiles. Finally, the use of cross-sectional rather than longitudinal data leads to well-known methodological problems in identifying earnings assimilation (Chiswick, 1978; Borjas, 1985; LaLonde and Topel, 1992).

The Longitudinal Survey of Immigrants to Australia (LSIA) provides a unique opportunity to re-examine the role of the family in immigrants' early labor market experience. The LSIA collected a considerable amount of demographic, human capital, and labor market information for a cohort of principal applicants and their spouses.¹⁴ Spanning the first three and a half

¹³Baker and Benjamin (1997) separately consider native, immigrant and mixed families, while Duleep and Sanders (1993) focus on potential country-of-origin differences in the need for investment.

¹⁴Technical details can be found in Appendix 2 of Williams, et al. (1997) and the User Documentation for the data set. Along with interviewing principal applicants, complete information was also collected for migrating-unit spouses and limited information was collected for other members of the household.

years of the settlement process, the three waves of data provide the opportunity to follow a cohort of recent immigrants to Australia as they enter the labor market and begin looking for work.

The LSIA sample generalizes to principal applicants aged 15 and older who arrived in Australia between September 1993 and August 1995. A total of 5192 principal applicants in this migration cohort were interviewed starting in March of 1994 approximately five to six months after their arrival. Starting in March of 1995 (approximately 18 months after arrival), 4469 members of the original sample were re-interviewed. Finally, 3752 of these principle applicants were re-interviewed for a third time approximately three and a half years after migration. Our estimation sample consists of the 1769 Wave 1, 1530 Wave 2, and 1302 Wave 3 principal applicants with spouses who were also interviewed.¹⁵

Researchers attempting to empirically evaluate the family investment model have generally adopted one of three approaches. One approach has been to compare the employment behavior and earnings of immigrant and native-born men and women (Long, 1980; Beach and Worswick, 1993; Worswick, 1996, Worswick, 1999). A second approach has been to compare the labor market outcomes of those immigrant families believed to require human capital investments with immigrant families that do not (Duleep and Sanders, 1993; Baker and Benjamin, 1997). Finally, a third approach has been to incorporate measures of an immigrant husband's human capital investment behavior directly into the analysis of immigrant wives' labor supply behavior (MacPherson and Stewart, 1989).

¹⁵In Wave 1, 1837 principal applicants had migrating unit spouses eligible for interviews. Of these spouses 96.3 percent (or 1769) were actually interviewed. In Wave 2, there were 1530 principle applicants with spouses eligible for interviews and of these 95.4 percent (1530) were interviewed.

As the LSIA data do not contain information about native-born workers we will adopt the second approach and plan to pursue the third in a future version of this paper. We will use information about an immigrant family's visa category and region-of-origin to make inferences about the potential need to invest in Australia-specific human capital. As Baker and Benjamin (1997) note, "variation across families provides a natural forum in which to investigate the family investment mode." We also assess direct information about a household's human capital investment activity - in particular enrollment in formal education. While it will not be possible to make statements about how immigrant status in and of itself matters, our panel data for immigrant households allows us for the first time to directly test the family investment hypothesis.¹⁶

Non-humanitarian immigration to Australia is separated into two components: one based strictly on family relationships (Preferential Family) and the other based on potential labor market contributions. As migrants in the Preferential Family category are often migrating as individuals to reunite with family members (often future spouses) already resident in Australia, we are not able to include them in this analysis of migrating households.¹⁷ Skill-based migration includes migrants without family relationships who are points tested (Independents), migrants with pre-arranged offers of employment (Employer Nomination Scheme (ENS)), and migrants intending to establish businesses in Australia who meet certain capital requirements (Business Skills). The Concessional Family program assesses individuals on the basis of both their

¹⁶See Beach and Worswick (1993) for a discussion of the importance of linked husband/wife panel data in directly testing the family investment hypothesis.

¹⁷Unfortunately, our data do not provide information about family members who are not part of the migrating unit and so Preferential Family migrants joining family members already in Australia cannot be analyzed. While we did have a very small sample of Preferential Family migrants migrating as couples, they are not representative of the category as a whole and have thus been dropped from the analysis.

family connections and their skills. Finally, a number of immigrants are selected for entry into Australia on the basis of humanitarian concerns.¹⁸ Individuals in certain visa categories are less likely to require additional human capital investments after migration. ENS migrants, for example, are granted visas because their specific skills allow Australian employers to fill a particular skill gap. Humanitarian migrants, on the other hand, often have very limited skills.

Table 1 includes sample means for key variables broken down by the gender of the principal applicant and spouse and by the visa category of the principal applicant. Column (1) and (2) give the mean behavior of female spouses and male principal applicants by visa category while columns (3) and (4) give the mean behavior of male spouses and female principal applicants by visa category. Our interest in making this breakdown is to observe whether differences between principal applicant behavior and spouse behavior are the same for households where the husband is the principal applicant versus households where the woman is the principal applicant.

Male principal applicants have the highest participation rates of the four types of spouses within each visa category. Participation is generally higher in ENS households for a given type of spouse and generally lowest in Humanitarian couples. In households where the husband is the principal applicant, the mean participation rate for the husband is much higher than the participation rate for the wife. In households where the wife is the principal applicant, the male spouse has a higher participation rate than the wife; however, the difference is much smaller than in households where the husband is the principal applicant.

¹⁸Information about visa status comes from Department of Immigration and Multicultural Affairs administrative records not self-reports.

Unemployment rates are very low in ENS households, particularly for the principal applicant and are highest in humanitarian households. This is consistent with the notion that the ENS applicant is likely to have pre-arranged employment; however, it also implies that spouses of ENS applicants are at an advantage in terms of finding work compared with spouses of principal applicants under different visa categories.

Hours of work are generally similar across visa categories for spouses of a particular type. Male principal applicants under the ENS category have the highest mean hours of work at 47 hours and female spouses under the humanitarian category have the lowest hours at 31 hours.

In terms of human capital investment behavior, school enrolment rates are generally highest in the concessional family and independent visa category households; however, the patterns across principal applicants versus spouses by visa category are unclear. The job search behavior for the employed is also unclear. It appears that husbands in concessional family households have high rates of search for new jobs.

6 Empirical Results

6.1 Labor Market Participation

We begin by assessing how the determinants of labor force participation, unemployment, hours of work, and human capital investment vary across immigrant couples entering Australia under different visa categories. Given the selection criteria associated with different types of visas, we would expect that Humanitarian migrants are the most and ENS migrants the least likely

to require Australia-specific human capital investment. Additionally, we would expect the labor market behavior of principle applicants to differ from that of accompanying spouses. All principle applicants (with the exception of Humanitarian migrants) are selected to varying degrees for their labor market skills while no selection criteria are applied to spouses. Given this, within a couple we would expect the behavior of principle applicants to more closely mirror the behavior of primary earners, while spouses can more easily be thought of as secondary earners. Previous researchers have not had the ability to separately identify principle applicants and spouses. Instead, immigrant husbands have been assumed to be primary workers undertaking investment activities, while immigrant wives have been assumed to be secondary workers undertaking financing activities (Baker and Benjamin, 1994, 1997; Duleep and Sanders, 1993; Worswick, 1996). Knowing which member of the couple is the principle applicant provides us with an opportunity to test whether individuals' investment/borrowing behavior is consistent with their comparative advantage.¹⁹

Individuals are assumed to participate in the labor market whenever the returns to market work exceed the value of their time in alternative activities. Specifically, the probability of immigrant adult a from household i participating in the Australian labor market at time t is assumed to be given by:

$$\Pr(P_{ia}(t) = 1 \mid X_{ap}(t)) = \Phi(X_{ap}(t)\beta_p) \quad (14)$$

where a indexes the adult, $P_{ia}(t) = 1$ for labor market participants and 0 otherwise, $\Phi(X_{ap}(t)\beta_p)$ is the standard normal cumulative distribution function, and β_p is a vector of parameters to

¹⁹This is least likely to hold for couples in the Humanitarian category as there is no clear relationship between principle applicant status and labor market behavior. Baker and Benjamin (1997) attempt to get at this issue of comparative labor market advantage by considering 'mixed' immigrant/native couples.

be estimated. Finally, $X_{ap}(t)$ is a vector of each partner’s human capital (education, English ability, and years since migration), demographic (age) and geographic (gender-specific, state-specific resident unemployment rates and state of residence) variables believed to be related to market wages and the value of time in non-market activities. Although the data do not provide a direct measure of labor market experience, pre-migration occupation and employment status are included in the model to act as controls for the effects of prior experience.

Equation (14) was estimated separately for male and female principal applicants and spouses using a pooled probit model and the unbalanced sample.²⁰ Table 2 reports the marginal effects-i.e., the change in the probability of participation associated with a change in each independent variable-from this regression.²²

Both partners in "traditional" couples (female spouses/male principle applicants) have increasing labor market participation rates over time, but there is no significant relationship between the probability of labor market participation and the time since migration for men and women in "non-traditional" couples (female principle applicants/male spouses). In general, individuals in different visa categories do not have significantly different participation profiles suggesting that there is little difference in the speed of labor market entry for individuals in

²⁰All estimation was done in STATA 6.0.

²¹We also considered a specification of equation (14) which would allow for the presence of unobserved individual effects that in turn produce correlation among the error terms. We chose, however, not to estimate random effects probit models because this model is limited by the assumption that there is no correlation between any of the explanatory variables and the individual effects themselves. Conditional fixed effects logit models would not require this assumption, but would also not allow us to calculate marginal effects. Because the standard pooled probit does not require the assumption of independence and produces consistent-though inefficient results (Maddala, 1987)-we have chosen to report the results from the standard pooled probit regressions.

²²Note that for continuous variables such as age, the marginal effect represents the effect of an infinitesimal change in the independent variable on the probability that an immigrant was in a specific labor market state. For discrete variables, such as marital status, the marginal effect represents the effect of a one-unit change in the independent variable. See the STATA manual for more details.

different visa categories.²³ In contrast, the family investment hypothesis predicts that spouses whose partners are investing in human capital enter the labor market faster in order to finance that investment. Unfortunately, our relatively short time frame (the first 3 1/2 years after migration) does not provide us with a strong test of this particular prediction.

Differences in the probability of labor market participation across visa categories are generally consistent with the family investment hypothesis, however. Spouses of Independent migrants (who are selected exclusively on labor market skills) have significantly higher participation rates than spouses of ENS migrants (who have employment in Australia prior to migration). This corresponds with a somewhat lower participation rate for Independent principle applicants. Spouses of Concessional Family migrants (who are selected in part on labor market skills) have even higher participation rates, while spouses of Humanitarian migrants (who are not selected at all on labor market skills) have somewhat higher participation rates although not as high as those for spouses in the Concessional Family category.

Estimating the participation model separately by principle applicant/spouse status in addition to the more standard husband/wife status provides additional support for the family investment hypothesis. In general, the participation decision of female spouses closely resemble that of male spouses, but appears very different to that of female principle applicants. Spouses (whether male or female) in all visa categories have higher labor market participation rates than spouses in ENS couples.²⁴ In contrast, principle applicants (whether male or female) have lower participation rates in all categories than ENS migrants, although the result is significant

²³The exception is that male Independent principle applicants have significantly slower labor market entry than do men in the ENS category.

²⁴This result is not significant for male spouses in Independent and Humanitarian couples, however.

in only half the cases. These relationships suggest that individuals' behavior is consistent with their comparative advantage in investing and borrowing activities rather than with traditional gender roles. Wives who are principle applicants appear to be investing, while husbands who are spouses appear to be financing that investment.

6.2 Unemployment and Hours of Work

A probit model was used to estimate the determinants of unemployment for male and female principle applicants and spouses conditional on labor market participation.²⁵ Selected marginal effects from this regression are reported in Table 3. Not surprisingly, amongst labor market participants, unemployment rates decrease with time since migration. This almost certainly occurs as a result of the increased human capital and labor market information that migrants acquire with time in Australia. What is more interesting is the significant differences in the rates of employment assimilation for migrants in different visa categories. Although the unemployment rates of men and women in traditional couples holding Concessional Family, Independent, and Humanitarian visas are significantly higher than those of ENS migrants, over time their unemployment rates fall much faster than does the rate for ENS migrants. This is important because it implies that although ENS migrants initially have a head start in securing employment, they may not have permanently lower unemployment rates. It is less clear that there is convergence in unemployment rates across visa groups for men and women in non-traditional couples, though the magnitudes of the differences is also smaller.

In much of the family investment hypothesis literature, unemployment is thought to be

²⁵As before, the pooled, unbalanced sample was used.

the result of job search and as such represents a form of human capital investment (Baker and Benjamin, 1997; Worswick, 1996). Because immigrant families are likely to be credit constrained, secondary workers-typically wives-take on those labor market activities that help to finance their spouses' continued job search. This notion of unemployment may not be unreasonable in a flexible labor market such as the United States and Canada, but it is less likely to be appropriate in Australia, however, where labor relations are heavily regulated by a complex system of binding minimum wages.²⁶ In Australia, it is employment (rather than wage rates) which is the mechanism for labor market adjustment. As such, unemployment rates for Australian immigrants are likely to tell us more about the overall immigrant assimilation process than about the ways in which immigrant couples deal with credit constraints.

OLS estimates of the determinants of weekly hours of work are presented in Table 4 for those individuals with positive hours.²⁷ Given that one has found employment, there is evidence of increasing weekly hours of work for over time for men and women in traditional immigrant families, though there is little evidence that either the level of hours or the change in hours over time varies across individuals holding different visas. Only principle applicants holding Humanitarian visas have significantly lower weekly hours relative to ENS principle applicants and except for Independent principle applicants who have a somewhat flatter hours profile, the

²⁶Under the Australian Award system, minimum terms and conditions of employment are specified for most job classifications, in effect providing a series of minimum wage rates. While the centralized wage determination system provided by the Prices and Incomes Accord was abolished in 1996 and replaced by a system of enterprise bargaining, the Awards continue to provide minimum wages and conditions that enterprise bargains must meet.

²⁷In the results presented here, we have made no attempt to correct for the selectivity into employment although this will be the focus of future work. We did estimate tobit models of hours, but found that the Tobit specification was not flexible enough in dealing with participation and employment. Our plan is to estimate a more general selection model that allows for selection into either, non-participation, unemployment or employment and use this model to adjust for the selectivity into employment when analyzing the hours of married spouses.

rate of increase in average hours is constant across visa categories.

In non-traditional families, the picture is somewhat different. Female principle applicants entering Australia through pre-arranged employment or as a result of the ability and desire to establish a new business work significantly more hours per week than women holding other types of visas and this relationship is stable over time. There is no significant relationship between visa category or time since migration and the weekly hours of work of male spouses. Taken together, these results imply that in Australia it is entry employment itself—rather than wage or hours assimilation—that is the important dimension of the settlement process for immigrants.

6.3 Human Capital Investment

In the face of the difficulties involved in completely transferring human capital across countries, immigrants often find it necessary to make investments in host country-specific human capital. The extent of this additional human capital investment will vary in proportion to the amount (and transferability) of the skills and training that immigrants possess at the time they migrate. In this section we focus specifically on the human capital investments of recent immigrants to Australia. We will consider two measures of human capital investment—formal education and job search—and we will focus specifically on both the timing and level of human capital investment. Information about the selection criteria embodied in different migration programs is used to identify those immigrants most likely to require additional human capital investment.

Using the pooled unbalanced sample, a probit model was used to estimate the determinants

of school enrolment and job search conditional upon employment. Selected marginal effects from these regressions are reported in Tables 5 and 6 respectively.

The school enrollment rates of Australian immigrants increase over the first few years after migration, and then begin to decline. This pattern is remarkably similar across male and female principle applicants and spouses, although male principle applicants-particularly male ENS principle applicants-enroll in formal education somewhat faster than other groups.

Not surprisingly, amongst male principle applicants, ENS migrants are least likely to be enrolled in school. These migrants, after all, have jobs-either through Australian firms or through self-employment-lined up prior to actual migration. What is surprising is the high proportion of Independent migrants who are enrolled in education. Male principle applicants selected entirely on the basis of their labor market skills (Independents) have school enrollment rates that are significantly higher than otherwise similar migrants who were selected only in part (Concessional Family) or not at all (Humanitarian) for their skills. In contrast, there are no significant differences in either the level or speed of school enrollment of female spouses in different visa categories.

Though there are no significant differences in how quickly men and women in "non-traditional" immigrant families enroll in Australian schooling, male spouses holding Independent and Humanitarian visas are significantly more likely than otherwise men married to ENS migrants to be enrolled in formal education. Correspondingly, female ENS principle applicants are less likely to be enrolled in school though the differences are not significant.

Taken together these results imply that while school enrollment rates are lower among

ENS migrants as we might expect, school enrollment rates are surprisingly high among other skilled migrant groups. Furthermore, these overall patterns do not provide clear evidence that it is comparative advantage in the labor market that is driving the decision to invest in additional education. Male principle applicants look more like male spouses than female principle applicants raising the possibility that gender role within couples are playing a role in the decision to enroll in school.

Table 6 provides evidence on an alternative form of human capital investment-job search. Because of our concern that the job search of the unemployed may be driven more by Australian institutional arrangements and demand-side factors, rather than voluntary job search, we have limited our analysis to individuals already employed. Job search while employed appears to be an important form of human capital investment for Australian immigrants. Principle applicants (both male and female) holding Humanitarian visas are significantly more likely than ENS migrants to be searching for new work. This is consistent with our view that Humanitarian migrants have the lowest level of Australia-specific human capital. Concessional Family principle applicants who were selected in part for their skills are somewhat less likely to be searching for new employment, while Independents selected entirely on the basis of their skill are even less likely to be undertaking job search. Finally, ENS migrants who arrive in Australia with pre-arranged employment are the least likely to be engaged in job search.

Unlike the case of formal education, job search while employed appears more consistent with our views about comparative advantage. First, although visa category is unrelated to the job search of employed spouses, there are important differences in the search behavior of both

male and female principle applicants in different visa categories. Second, these differences are consistent with our views about individuals' existing human capital. Overall, it appears that job search is related to comparative advantage in labor market activities rather than gender.

6.4 Conclusions

Migration is usually not a solitary undertaking, but often involves the movement of entire families including husbands, wives, and children and there are many reasons to believe that the family itself may play an important part in facilitating settlement. In particular, researchers have hypothesized that in the face of credit constraints, immigrant wives may undertake certain labor market activities in order to finance their husbands investments in receiving country-specific human capital. Evaluating this family investment hypothesis, however, has proved difficult, because standard data sources often identify the foreign born, but typically provide no information about the migrating unit or the immigration process itself. Principal applicants are usually indistinguishable from accompanying family members and while family units at the time of data collection are identified, family units at the time of migration are completely unknown.

This paper re-examines the family investment hypothesis by taking advantage of new panel data for a recent cohort of immigrant households. The Longitudinal Survey of Immigrants to Australia provides a unique opportunity to simultaneously consider the labor-supply and human capital investment decisions of men and women in the same migrating household. We began by assessing how the determinants of participation, unemployment, hours, and human capital investment vary across couples entering Australia under different visa categories. Prin-

principle applicant/accompanying spouse status was used to untangle the effects of comparative labor market advantage from traditional by gender roles. While some decisions appear consistent with comparative advantage and the family investment hypothesis (e.g., participation), others appear to stem from traditional gender roles (e.g., investment in education). Work is currently underway to explore the interrelationships between the investment behavior of principle applicants and the labor supply of their spouses. In addition, asset information will also be used to focus more directly on those families most likely to be credit constrained.

This focus on immigrant families fills an important void in the literature. Immigration policy in the major immigrant receiving nations is typically results in the selection of families rather than individuals, yet it is individuals rather than families which are the unit of analysis in much of the immigration literature. Immigration research is also heavily weighted toward assessing the behavior of and labor market outcomes for men. This paper adds to the growing body of literature that focuses on the contribution of immigrant wives to the economic status of their families as well as the role of the family in labor market behavior of immigrant women.

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Table 1
Sample Means of Key Variables

	(1) Female Spouse	(2) Male Principal Applicant	(3) Male Spouse	(3) Female Principal Applicant
Labor Market Participation				
ENS	.3252	.9046	.7596	.7982
Concessional Family	.4431	.8496	.8167	.6515
Independent	.4002	.8618	.8146	.6942
Humanitarian	.2014	.6261	.5753	.2848
Unemployed (labour market participants)				
ENS	.1045	.0189	.1013	0
Concessional Family	.2941	.2005	.2398	.2628
Independent	.2773	.1489	.2575	.2683
Humanitarian	.5357	.5039	.5640	.4286
Hours of work per week (employed workers)				
ENS	30.70	47.41	40.21	40.82
Concessional Family	33.51	42.69	39.19	36.19
Independent	33.77	43.06	42.82	36.91
Humanitarian	30.92	40.80	38.60	32.46
Student Status				
ENS	.1347	.0713	.0962	.0826
Concessional Family	.1264	.1657	.1625	.1909
Independent	.2052	.2910	.3317	.2233
Humanitarian	.0604	.1074	.1070	.0861
Actively Seeking a new job (employed workers)				
ENS	.1208	.0891	.2254	.1184
Concessional Family	.1944	.2732	.3221	.2000
Independent	.1860	.2143	.2419	.2556
Humanitarian	.2769	.3333	.2933	.2564

Table 2
Selected Coefficient Estimates from Probit Estimation of Models of
Married Spouses' Labor Market Participation Decisions

	(1) Female Spouse	(2) Male Principal Applicant	(3) Male Spouse	(3) Female Principal Applicant
Variables				
Years-since-migration	.0821 ** (2.20)	.1069 ** (4.05)	.0322 (0.43)	-.0204 (-0.22)
(Years-since-migration) ²	-.0030 (-0.35)	-.0144 ** (-2.40)	.0063 (0.39)	.0116 (0.59)
Concessional Family	.1770 ** (4.15)	-.0183 (-0.60)	.1579 * (1.80)	-.1478 (-1.18)
Independent	.0895 ** (2.10)	-.0632 * (-1.95)	.0118 (0.13)	-.1280 (-1.02)
Humanitarian	.0996 * (1.92)	-.0761 ** (-2.26)	.0545 (0.59)	-.2758 ** (-2.20)
(Concessional Family)× (Years-since-migration)	-.0199 (-1.10)	-.0230 (-1.48)	-.0475 (.0448)	.0390 (0.69)
(Independent) × (Years-since-migration)	-.0110 (-0.58)	-.0309 * (-1.92)	.0168 (0.35)	-.0474 (-0.82)
(Humanitarian)× (Years-since-migration)	-.0191 (-0.88)	-.0244 (-1.55)	-.0196 (-0.47)	.0340 (0.61)
Pseudo- R ²	.1860	.1979	.1891	.2571
LR Chi ² d.f.=37, p-value	less than .0001	less than .0001	less than .0001	less than .0001
N	3447	3467	848	858

Note:

1. t-statistics are in parentheses.
2. ** significant at the five percent level; * significant at the ten percent level.
3. Controls for education, fluency in English, employment prior to migration and age of the principal applicant and the spouse are included in each model. Also, controls for state of residence, presence of children by age, presence of other adults are included.

Table 3
Selected Coefficient Estimates from Regression Estimation of Models of
Married Spouses' Hours of Work for Wages
Over Employed Sample

	(1) Female Spouse	(2) Male Principal Applicant	(3) Male Spouse	(3) Female Principal Applicant
Variables				
Years-since-migration	5.559 ** (2.72)	2.254 ** (2.09)	.4261 (0.18)	3.534 (1.25)
(Years-since-migration) ²	-1.135 ** (-2.47)	-.3109 (-1.24)	.2664 (0.50)	-.6960 (-1.08)
Concessional Family	2.832 (1.31)	-1.855 (-1.61)	2.441 (0.81)	-5.345 * (-1.67)
Independent	2.373 (1.07)	-1.355 (-1.19)	1.841 (0.65)	-5.671 * (-1.89)
Humanitarian	-.0135 (-0.003)	-5.163 (-2.06)	-.9513 (-0.23)	-11.28 ** (-2.11)
(Concessional Family)× (Years-since-migration)	.1770 (0.21)	-.5475 (-1.12)	-1.927 (-1.55)	.1954 (0.15)
(Independent)× (Years-since-migration)	.0174 (0.02)	-.8654 * (-1.72)	-.3165 (-0.25)	.5626 (0.41)
(Humanitarian)× (Years-since-migration)	.7048 (0.45)	.3177 (0.34)	-.1188 (-0.08)	.0411 (0.02)
R ²	.0783	.1014	.2064	.2064
LR Chi ² d.f.=36, p-value	.0005	less than .0001	less than .0001	.0001
N	887	2105	419	350

Note:

1. t-statistics are in parentheses.
2. ** significant at the five percent level; * significant at the ten percent level.
3. Controls for education, fluency in English, employment prior to migration and age of the principal applicant and the spouse are included in each model. Also, controls for state of residence, presence of children by age, presence of other adults are included.

Table 4
Selected Coefficient Estimates from Probit Estimation of Models of
Married Spouses' Unemployment Outcomes for Labor Market Participants

	(1) Female Spouse	(2) Male Principal Applicant	(3) Male Spouse	(3) Female Principal Applicant (no Business Skills Migrants)
Variables				
Years-since-migration	-.2679 ** (-4.54)	-.1200 ** (-3.38)	-.3254 ** (-2.94)	-.2528 ** (-2.31)
(Years-since-migration) ²	.0450 ** (3.45)	.0243 ** (3.24)	.0280 (1.40)	.0318 (1.20)
Concessional Family	.3406 ** (4.86)	.5376 ** (9.65)	.1294 (0.89)	n.a.
Independent	.3262 ** (4.42)	.5914 ** (10.2)	.1940 (1.38)	.1568 (1.56)
Humanitarian	.5779 ** (5.39)	.8559 ** (13.2)	.3817 ** (2.28)	.1447 (1.12)
(Concessional Family)× (Years-since-migration)	-.0695 ** (-2.21)	-.0612 ** (-2.85)	.1019 (1.13)	n.a.
(Independent) × (Years-since-migration)	-.0674 ** (-2.05)	-.0893 ** (-3.85)	.0899 (1.00)	-.1395 ** (-2.04)
(Humanitarian)× (Years-since-migration)	-.0685 * (-1.79)	-.0893 ** (-3.83)	.0864 (0.97)	-.0079 (-0.16)
Pseudo- R ²	.2536	.3715	.2833	.3260
LR Chi ² d.f.=37, p-value	less than .0001	less than .0001	less than .0001	less than .0001
N	1224	2846	614	386

Note:

1. t-statistics are in parentheses.
2. ** significant at the five percent level; * significant at the ten percent level.
3. Controls for education, fluency in English, employment prior to migration and age of the principal applicant and the spouse are included in each model. Also, controls for state of residence, presence of children by age, presence of other adults are included.
4. There were not female principal applicants in the Business Skills visa category who were unemployed; therefore, they were excluded from the analysis of column 4. The mean unemployment rates for the other three groups of female principal applicants were .2484, .2657 and .4884 for the Concessional Family, Independent and Humanitarian visa categories, respectively.

Table 5
Selected Coefficient Estimates from Probit Estimation of Models of
Married Spouses' School Attendance Decisions

	(1) Female Spouse	(2) Male Principal Applicant	(3) Male Spouse	(3) Female Principal Applicant
Variables				
Years-since-migration	.1446 ** (7.49)	.2143 ** (8.14)	.1690 ** (2.98)	.1438 ** (3.11)
(Years-since-migration) ²	-.0258 ** (-6.09)	-.0381 ** (-6.95)	-.0303 ** (-2.61)	-.0241 ** (-2.58)
Concessional Family	-.0021 (-0.09)	.1853 ** (4.59)	.0820 (0.91)	.1057 (1.29)
Independent	.0103 (0.49)	.2972 ** (6.91)	.2143 ** (2.28)	.1126 (1.42)
Humanitarian	.0437 (1.28)	.1568 ** (3.10)	.2591 ** (2.35)	.1291 (1.48)
(Concessional Family)× (Years-since-migration)	.0067 (0.75)	-.0232 * (-1.74)	.0090 (0.27)	-.0047 (-0.18)
(Independent)× (Years-since-migration)	.0007 (0.08)	-.0305 ** (-2.31)	-.0027 (-0.09)	-.0088 (-0.33)
(Humanitarian)× (Years-since-migration)	-.0122 (-1.02)	-.0080 (-0.50)	-.0117 (-0.34)	-.0170 (-0.61)
Pseudo- R ²	.2241	.1584	.2200	.2075
LR Chi ² d.f.=37, p-value	less than .0001	less than .0001	less than .0001	less than .0001
N	3447	3467	788	858

Note:

1. t-statistics are in parentheses.
2. ** significant at the five percent level; * significant at the ten percent level.
3. Controls for education, fluency in English, employment prior to migration and age of the principal applicant and the spouse are included in each model. Also, controls for state of residence, presence of children by age, presence of other adults are included.

Table 6
Selected Coefficient Estimates from Probit Estimation of Models of
Married Spouses' Job Search while Employed

	(1) Female Spouse	(2) Male Principal Applicant	(3) Male Spouse	(3) Female Principal Applicant
Variables				
Years-since-migration	-.0781 (-1.32)	.0329 (0.85)	-.1006 (-0.97)	.0998 (1.00)
(Years-since-migration) ²	.0055 (0.41)	-.0006 (-0.07)	.0035 (0.15)	-.0129 (-0.61)
Concessional Family	.0200 (0.31)	.3859 ** (7.61)	.0187 (0.15)	.4825 ** (3.36)
Independent	.0449 (0.67)	.2887 ** (5.77)	-.0122 (-0.10)	.2135 * (1.64)
Humanitarian	.0189 (0.16)	.4893 ** (5.77)	.1268 (0.65)	.7003 ** (2.76)
(Concessional Family)× (Years-since-migration)	.0375 (1.37)	-.0531 ** (-2.91)	.0300 (0.55)	-.0905 * (-1.85)
(Independent) × (Years-since-migration)	.0213 (0.73)	-.0345 * (-1.84)	.0167 (0.30)	.0021 (0.04)
(Humanitarian)× (Years-since-migration)	.0659 (1.49)	-.0450 (-1.54)	-.0060 (-0.09)	-.0940 (-1.43)
Pseudo- R ²	.0634	.0824	.1178	.1752
LR Chi ² d.f.=36, p-value	.0359	less than .0001	.0109	.0039
N	887	2151	419	354

Note:

1. t-statistics are in parentheses.
2. ** significant at the five percent level; * significant at the ten percent level.
3. Controls for education, fluency in English, employment prior to migration and age of the principal applicant and the spouse are included in each model. Also, controls for state of residence, presence of children by age, presence of other adults are included.