Catalogue no. 11F0019MIE — No. 247
ISSN: 1205-9153
ISBN: 0-662-40097-6

Research Paper

Analytical Studies Branch Research Paper Series

Intergenerational Impact of Immigrants' Selection and Assimilation on Health Outcomes of Children

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April 2005

I am grateful to Dr. Lars Osberg, Dr. Shelley Phipps, and Dr. Lori Curtis for their useful comments and suggestions. This research was supported through a Statistics Canada Doctoral Research Stipend. Any remaining errors are my own.

Published by authority of the Minister responsible for Statistics Canada

Aussi disponible en français

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Abstract

This study undertakes three comparisons using Cycle 2 (1996-97) data from the National Longitudinal Survey of Children and Youth (NLSCY) in Canada. First, the study compares the health outcomes of children of the Native-born Canadian (NBC) group with those of the immigrant group in general. Differences are also investigated within the three immigrant sub-groups: the American immigrant group, the European immigrant group and Asian immigrant group. Second, this study tests the hypothesis that the children of any immigrant group in Canada would have a higher level of health outcomes for the same level of resources. Third, the study examines the association of time of residency of immigrants in different groups and the health outcomes of their children. An immigrant family is defined as one in which at least one of the parents is foreign-born. Health outcomes are measured by the PMK's (person most knowledgeable about the child) assessment of the child's health. Ordered logit models are employed for estimation. The children selected for analysis are 4 to 13 years of age.

The NLSCY data suggest that the health outcomes of children in the immigrant families in general are similar to that in the NBC group. However, the health outcomes of the Asian immigrant group are slightly lower and those of the American immigrant group are markedly better. Except for the American immigrant group, there is evidence that the children of any other immigrant group would have lower health status for the same level of resources. Decomposition results indicate that a higher level of observable and unobservable resources is responsible for markedly better outcomes for the American immigrant group; while a lower level of observable and unobservable resources is responsible for the lower level of outcomes for the Asian immigrant group. On the other hand, health outcomes are higher for the European immigrant group than for the NBC group when variation in resources is considered, while lower when variation in productivity coefficients is examined. Finally, there is statistical evidence that the health status of children of immigrant families would improve with the time of residency of immigrant parents, if it were lower initially. The findings of the study indicate that present health outcomes of children in the immigrant families, on average, are not a great concern. However, those of the Asian immigrant group may be a concern.

Keywords: Health outcomes of children, Children of immigrants, Native-born Canadian

JEL: I10, J13, J15

1. Introduction

Canada is a land largely settled and built by immigrants and their children. The social and economic impact of immigration is determined not only by the characteristics of immigrants themselves but also by those of their offspring. While research on immigration is vast, comparative economic research on development outcomes of children of immigrant families in Canada is almost absent.[1] In the immigration literature, research on economic assimilation (a positive change in labour market outcomes with the time of residency in the host country) and self-selection (a higher labour market outcome of immigrants compared to comparable native-born) of immigrants is prominent.[2] The central objective of this study is to examine the relationship of the health outcomes of children, and immigrants' assimilation and selection in Canada.

Health is the most desirable outcome among all of the child development outcomes as it is linked with all other outcomes. Illness hampers the realization of economic potential and poses an economic burden for the child as well as for the society. Since the health of a child is the foundation of socio-economic success and prosperity for a child, research on health status of children of immigrant families in Canada would provide useful information for child development programs and policies. How is the health status of children of immigrant families compared to their counterparts? Are the children of immigrant families imposing extra burden to Canadian society? If so, is it because of fewer resources? Do the health outcomes of children of immigrants vary within the immigrant population? Do these outcomes change with the time of residency of their parents in Canada? The answers to these questions will indicate if there is any gap in child outcomes of native-born Canadian (NBC) families and immigrant families, and if so, why.

Health outcomes of children depend on the resources and opportunities available to them. Available information on the immigrant population suggests that, on average, immigrant families have a higher level of observable resources, which affect child development outcomes. For example, immigrant families have a higher level of average household income, education, and occupational prestige; a lower level of unemployment rate, welfare dependency, and divorce rate.[3] Immigrants are screened for health status, which is likely to result in good health status of immigrants. This information indicates that the children of immigrant families are likely to have better health outcomes than do the children of native-born Canadian (NBC) families, and they are less likely to impose extra burden to health care services. On the other hand, the average life expectancy of the Third World countries is lower[4] which may have a negative effect on the health status of children in Canada as it is drawing more immigrants from these countries. Also, resources vary with national origin. For example, Dudley and Poston (1994) shows that in the

1. To the author's knowledge, Worswick (2001) is the first economic study of educational outcomes of children of immigrants in Canada.

2. Chiswick (1978) and Borjas (1985, 1987, 1991) are prominent models of immigrants' assimilation and self-selection.

3. See, for example, Rappak and Thomas (1997), Lin (1997) McDonald and Worswick (1997), De Silva (1997), and Table A2.1.

4. Table A3 provides information of health outcomes of some Asian countries compared to Canada, the United States and European countries.

U.S., immigrants from West European countries have an above average income and education, whereas, immigrants from Latin American countries have a below average income and education Portes (1996) shows that the Asian Indians and Taiwanese are the most educated groups; and the Mexicans and Salvadorans are the least educated groups in American society. This information indicates that the health outcomes of children are likely to vary among different immigrant groups because of variation in parental observable resources among different groups. According to Dunn and Dyck (2000), immigrants from the countries with poorer health status may be of concern in terms of their future health care utilization. Research on comparative health outcomes of children of different immigrant groups in Canada would be useful in evaluating the success of immigration policies that have given emphasis on skills,[5] and shifted geographic origins from traditional sources towards less developed regions.[6]

Research on economic assimilation[7] shows that the average labour market outcomes of immigrant families, in general, are lower initially and eventually they catch up or cross over those of native-born with the time of their residency (approximately 10-15 years) in the host country. However, the assimilation rates of different national origins vary with how similar the country of origin is with the domestic labour market. McDonald and Worswick (1999) provide evidence of positive assimilation of immigrants from English speaking backgrounds but not for those who are from non-English speaking backgrounds. Borjas (1985, 1987, 1991) shows that the speed of assimilation differs with national origin and with different cohorts in the United States. For example, immigrants from the advanced industrialized countries assimilate rapidly compared to those from the Third World countries. He also shows that the assimilation rates of recent cohorts are slower compared to earlier cohorts, irrespective of country of origin.

The labour market assimilation of immigrant parents is likely to affect child developmental outcomes. If the immigrants assimilate rapidly, and if the parents transmit their resources to their children, child development outcomes of immigrant families would catch up that of native–born

5. In 1962, the federal government replaced its discriminatory immigration policy based on national origin with a policy that selected immigrants according to a specific set of criteria. This was followed in 1967 by the introduction of the Point System. The Point System allows immigration authorities to objectively select immigrants according to the demand for various skills and occupations within the Canadian economy. Points are awarded based on a candidate's age, education, training, experience, personal suitability, occupational demand, arranged employment and knowledge of official languages. Canada also admits, without any economic assessment, close relatives under family class, convention refugees and individuals in refugee-like situations for humanitarian purposes. These policy changes relative to the entry requirements of immigrants into the country shifted Canada's immigration population inflow from its traditional sources of immigrants, in particular Great Britain and Eastern Europe, towards less-developed regions. Also, the largest proportions of immigrants arriving in Canada are in economic class. For example, in 1994, 49% of new arrivals were economic class, 42% were in social or family class and 9% were admitted on humanitarian grounds (Citizenship and Immigration Canada, 1996).

6. Until about the early 1970s, the majority of immigrants to Canada came from the United States, Britain, and other European countries. By contrast, the majority of recent immigrants are of non-European background. Whereas, during the1950s, for example, over 80% of all immigrants arriving in Canada each year were from Europe; by 1994, however, just 17% of immigrants were from Europe, and 74% were from Asia (Citizenship and Immigration Canada, 1996).

7. For example, Chiswick (1978, 1986), Carliners (1980), Defrietas (1980), Long (1980), Blau (1980), Tienda (1983), Borjas (1985), Borjas and Tienda (1985), Poston (1988), Jensen (1988), Simon and Sullivan (1988), Lalonde and Topel (1991), Duleep and Regets (1992, 1996, 1997), De Silva (1997), Jasso and Rosenzweig (1985, 1990, 1995, 1998) , Mcdonald and Worswick (1999), and Green (1999).

Canadian (NBC) families if they were lower initially. On the other hand, if immigrants fail to assimilate, lower parental outcomes are likely to lead to lower child outcomes according to intergenerational transmission theory.[8] As a result, the children of immigrant families could lag behind in terms of developmental outcomes. If these disparities persist with the time of residency, it would reflect social inequity. On the other hand, if the difference between child outcomes fade with the time of residency of their parents, social policy makers need not be concerned, as the present disparity is a temporary phenomenon. Thus, it would be helpful to study how the health outcomes of children vary among NBC and immigrant families, and if they change with the time of residency of the immigrant parents in Canada.

Research on self-selection (for example, Chiswick, 1978) of immigrant population suggests that immigrant population may be positively selected (a higher labour market outcome of immigrants compared to comparable native-born Canadians[9]) in terms of unobservable characteristics valued in the labour market. These studies find that data are consistent with the selectivity hypothesis that average economic outcomes of immigrants cross over those of comparable native-born because they have above average unobservable characteristics. If these attributes are inheritable, or learnt from parents, this implies that the children of immigrant families would have higher levels of unobservable characteristics compared to those of native-born families. These unobservable characteristics are likely to have a differential impact on the health outcomes of children of immigrant families, in general.

The immigrant population, however, is not homogeneous. According to Borjas (1991), there is no general law stating that the immigrants must be positively selected. In fact, under a reasonable set of conditions, it is likely that immigrants are negatively selected (i.e., persons who have below-average earnings and productivities are the most likely to migrate to the United States. (Borjas 1991, p.30) The theoretical framework of Borjas (1987,1991) indicates that positive selection is likely to occur if the country of origin has the same level of economic development but lower inequality compared to the host country. Green (1999) finds immigrant adjustment is related to characteristics used in immigrant selection. The intergenerational impact of immigrants' selection implies that children from the advanced industrialized countries may have a higher level of unobservable characteristics compared to the children of native-born families which would lead to higher health outcomes for the same level of resources. The reverse may be true for the children of the Third World countries. Hence, it would be useful to study the health outcomes of children from different national origin for the same level of resources.

2. Purpose

The purpose of this study is:

I. to compare the health outcomes of children in different immigrant families with those of NBC families;

8. Becker (1981) is a prominent model of intergenerational transmission.

9. A foreign-born and a native-born are comparable if both of them have the same observable characteristics.

II. to compare the health outcomes of children of immigrant families in general with those of NBC families for the same level of resources. In other words, the objective is to test the hypothesis that the children of immigrant families in general are a positively selected sample (intergenerational impact of immigrants' selection);[10] and to find the sources of variation in child outcomes;

III. to compare the health outcomes of children by region of origin with those of the NBC group for the same level of resources;

IV. to examine the relationship of the health outcomes of children of different immigrant groups and the time of residency of their immigrant parents in Canada (intergenerational impact of immigrants' assimilation).

The findings of this study are expected to provide useful information about 1) the present gap of health outcomes of children between the NBC group and different immigrant groups; 2) whether or not the present gap is a temporary phenomenon; 3) whether the present gap is due to lack of observable resources or unobservable resources (productivity or efficiency). If the gap is due to observable characteristics there may be more scope to design effective policy interventions than if it is due to unobservables.

3. Hypotheses about the nature of selection of immigrants and their children

As mentioned, immigrant selection is related to their having a higher or lower level of unobservable characteristics. The immigrant parents would transmit their higher (lower) level of these traits to their children that would shift the health outcome function of their children upward (downward) compared to that of the NBC group. This is likely to be reflected in a stronger (weaker) association of child outcomes and observable resources. As a result, with the same observable resources, the health outcomes of children are expected to be higher (lower) for immigrant families than for NBC families. Indirectly, this would imply that the children of immigrant families would be positively (negatively) selected. In other words, the selectivity of parents and children are likely to be positively associated. In this study, the selectivity tests are not performed on the immigrant parents, but on their children. The nature of selection of different immigrant groups is predicted based on the available research on the immigrant population. However, remember that alternative findings are available in the literature regarding the nature of selection of different immigrant groups.

Chiswick (1978), asserts that the immigrant population is positively selected, that is, they have a higher level of labour market outcome for the same level of observable resources. His hypothesis

10. In fact, the children of immigrants do not go through the process of selection, as their parents do. In this study, the selectivity is used for the children in the sense of an econometric concept of sample selection. The children of one group will make up a positively selected sample compared to another group if it is observed that the association of explanatory variables and the dependent variable is stronger (larger slope coefficients in absolute sense) for the former group than for the other group. In other words, if it is found that for the same level of resources (explanatory variables), the former group has higher outcomes (dependent variable), this group could be considered as a positively selected sample.

implies that the children of any immigrant group would be a positively selected sample. On the other hand, Borjas (1991) argues that under a reasonable set of assumptions it is likely that immigrants are negatively selected: Also Borjas (1987, 1991) argues that:

A. A positive selection in the host country is most likely to occur when the country of origin and the host country have similar characteristics, say, the same level of industrialization, political system, and economic development, but the country of origin has a more equal distribution of income compared to the host country.

B. A negative selection in the host country is most likely to occur when the country of origin and the host country have similar economic and political systems but the country of origin has a higher level of inequality as compared to the host country.

These insights are expected to have the following implication for the nature of the selection of United States, European, and Asian immigrant groups and their children in this study. American immigrants who immigrated during the 1970s in Canada are likely to be positively selected. The reason is that the two countries resemble each other in terms of their level of economic development and political system, but income inequality in the United States was slightly lower when the immigrants immigrated to Canada.[11] Thus, according to Borjas hypothesis, it can be assumed that American immigrant families in Canada had a higher level of unobservable traits relative to comparable NBC families 20-years ago. A positive intergenerational impact of immigrants' selection indicates that American immigrant families will transmit these traits to their children. For that reason, the children of the U.S. immigrant group are likely to be a positively selected sample, and hence, the health outcomes of children are likely to be higher for the U.S. immigrant group than for the NBC group for the same level of observable resources. Since immigrants from Europe and Asia are not homogeneous[12] it may not be correct to predict the nature of selection of immigrants of these two groups based on the theoretical arguments of Borjas (1987, 1991). However, empirical findings of Borjas (1991, p.48) indicate immigrants from European countries (particularly Western European countries) tend to do quite well relative to natives of comparable socioeconomic characteristics. On the other hand, immigrants from Asian and Latin American countries do not perform well in comparison to natives of equal observable skills. Hence, his empirical findings indicate that the children of European immigrant families are likely to have a higher level of health outcomes, while those from the Asian immigrant families are likely to have a lower level of health outcomes for the same level of resources. Lack of empirical findings of this hypothesis may cast doubt either on his findings or on the applicability of his findings in Canada.

11. The average years since U.S. immigrants came to Canada is approximately 20 years from the Survey Year, 1996/97. See Appendix 1 for information about inequality in Canada and the U.S. during that time.

12. The average years since European and Asian immigrants came to Canada is approximately 27 years and 17 years respectively from the Survey Year, 1996/97. See Appendix 1 for information about inequality in Canada and the European and Asian countries during that time.

4. Review of previous studies

The economics literature on the health outcomes of immigrant families in Canada is rare. However, some research is available on this topic in other disciplines such as, psychology, health education, and sociology.

Munroe-Blum et al. (1989) examine the psychiatric disorder, school performance and service utilization of immigrant children aged 6-16 years in Canada using data from the Ontario Child Health Study collected in 1983. The method used in the study is logistic analysis where teacher's assessment of school performance, mother's assessment of psychiatric disorder and health services utilization in the last six months were the dependent variables. The independent variables included in the study are: age of the child, sex of the child, welfare status, low income, overcrowded housing, urban/rural residency, number of siblings, maternal education and family dysfunction. The study finds that compared to non-immigrant children, immigrant children are more likely to reside in urban areas; are at higher risk for social disadvantage; are more likely to live in overcrowded condition; as likely to live in subsidized housing, and less likely to live in a family which depends mainly on welfare assistance. The bivariate results indicate that being an immigrant child is not a risk indicator for psychiatric disorder or poor school performance. Although the utilization rate of ambulatory medical services is similar, that of mental health and social services is significantly lower for the immigrant children than for the native-born.

Beiser et al. (1998) examine immigrant children's mental health outcomes (conduct disorder, hyperactivity, and emotional disorder) in Canada using data from the first cycle of the National Longitudinal Survey of Children and Youth. The study uses the information that recent immigrants (who have been living in Canada for less than 10 years) typically have lower incomes than their host country counterparts and examines the factors that mediate the effect of low income on their children's mental health outcomes: family functioning, parental depression, single parent family status, family drinking problems, parenting behaviour and child care by parents. Using descriptive statistics and multiple linear regression models, the study finds that despite the fact of higher rates of low income, the children of new immigrants have a lower rate of mental health problems than do the children of the native-born. Further, familial factors mediated the effects of low income on native-born Canadian children's mental health. This was not the case for new immigrant families for whom low income may represent an inevitable part of the resettlement process. According to the authors, these findings indicate that Canada's immigration policies and practices have resulted in an effective selection of healthy, resilient, and success-bound families and children.

Kobayashi, Moore and Rosenberg (1998) examine the health status of immigrant children using data from the first cycle of the National Longitudinal Survey of Children and Youth. They used a derived score on physical and health problems based on Peabody Assessment Tool and compared the health status of immigrant children with non-immigrant children with immigrant parents and non-immigrant parents. Using logistic regression, among other things, this study examines the factors that are likely to affect the health status of children in Canada. These factors are: age and gender of the child, region of birth the PMK (the person most knowledgeable about the child), language of PMK, child's immigration status, child's single parent status, region of residence, birthplace of the ancestor of the child, and neighborhood characteristics. The findings

of the study indicate that the immigrant children in general enjoy better health than Canadian-born children. Also, recent immigrant children have better health than their earlier counterparts.

Munroe-Blum et al. (1989) use the data from the Ontario Child Health Survey collected in 1983. The sample for the immigrant group (251 children from Ontario) is less likely to represent all Canadian children and the findings are also less likely to reflect the impact of changes in the immigration policies during 1970s and 1980s on child outcomes. Also, the simple logistic models on the outcome variables that are ordered give less information about the children's outcome. Beiser et al. (1998) also suffers from methodological problems. They use linear regression models on ordered outcome variables. Moreover, mental health alone does not reflect the overall health status of children of immigrants. The third study also uses simple logistic regression to an ordered variable which is less likely to provide better information. Moreover, no study examines how health outcomes of children in the immigrant families change with the time of residency of their parents in the host country which information would be useful for policy purposes. Most importantly, none of these studies examines the variation in child outcomes in different immigrant groups or the causes of variation in health outcomes between the children of immigrant families and native-born Canadian families. In this sense, the present study is likely to provide more useful information for successful programs and policies for children and to evaluate the success of immigration system in Canada.

5. Data, sample, variables, and methodology

5.1 The data and estimation sample

The Cycle 2 (1996/97) Master File data from the National Longitudinal Survey of Children and Youth (NLSCY[13]) are used in this study. The NLSCY is a joint project of Human Resources Development Canada and Statistics Canada. It is a long–term survey designed to measure child development and well being in Canada. The first cycle of the survey was conducted in 1994-95. The data for Cycle 2 was collected between the fall of 1996 and spring of 1997. The sample size of the Cycle 2 survey data is 20,025 observations. From each household, a person aged 15 years or older, and most knowledgeable about the child (PMK), was chosen to answer the questions. In the Cycle 2 survey, the mother of the child was the PMK in 91.5% of the sample (the biological mother, 90.2%). Immigrant families who have school-aged children are well represented in the NLSCY. For instance, the percentage of children in school in the NLSCY data who have a foreign-born PMK is 18.3%,[14] while in the 1996 Canadian Census, the percentage of foreign-born women who have at least one unmarried child living at home is 17.6% (Worswick 2001).

Since the objective is to examine the health status of school-aged children, the sample was selected excluding the following children: i) the children who were less than 4 years; ii) the children for whom the birthplaces of the PMK were unknown; iii) the children who were living without a parent. Because of these exclusions, the initial sample size is 11,617, 1,402

13. See Statistics Canada (1998)

14. This percentage is generated using the sample weights.

observations come from immigrant families, and 10,217 from NBC families. Because of missing values in the dependent and independent variables, the sample sizes for different groups vary for different regression models.

5.2 Measures of health outcomes and definitions of study groups

The health status of children is measured by the PMK's assessment of the child's health.[15] The PMK was asked, In general, would you say his/her health is excellent, very good, good, fair, or poor? Since the answer to this question reflects the PMK's perception about the child's health, it provides information about the child's overall health status. This subjective measure[16] of the child's health focuses on larger issues of health and welfare. Since the PMK has the most information about the child's health, and this measure reflects parents' feelings about the child's health status, this assessment is likely to be strongly associated with health care utilization of children. An accumulating body of cross-cultural evidence indicates that subjective measures are strongly associated with morbidity, disability and mortality rate (Birren 1993, Dean 1993 and Marshall 1993). According to Albrecht (1994), subjective assessment is compatible with the definition of health used by the World Health Organization (1947): Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. This assessment also fits with a more market driven and competitive health care delivery environment where consumers' needs and preferences will be important considerations in the allocation of scarce resources (Albrecht 1994). Note that a single and global question was asked to the PMK to assess the health status of children. Many studies found that the scores from this single, global question is strongly associated with scores derived from more complex measures such as health status profiles and single index measures.[17] Finally, the simplicity of this single, global question is likely to produce higher response rates (Rowan 1992).

Definitions of the study groups

An NBC family is defined as one in which all the parents with whom the child lives are native-born Canadian (NBC). According to this definition, the birthplace of the PMK in an NBC family is Canada if the child lives with one parent (99% of the lone-parent families in the sample are headed by the mother); if the child lives with two parents, the birthplace of both the parents in an NBC family is Canada. A combined immigrant family is defined as one in which at least one of the parents with whom the child lives is foreign-born. For comparisons within the immigrant population, the sample of children from the combined immigrant group is subdivided into four immigrant groups: the American, the European, the Asian, and the other immigrants group. If the PMK of a child is foreign born, a sub-group is identified according to the birthplace of the PMK.[18] For example, if the birthplace of PMK is the U.S., the family is labelled as an American immigrant family. If the PMK of a child is NBC, the family is identified according to the

15. Health Utility Index is examined in Ahmed (2002). The findings of that measure indicate that health outcomes are better for any immigrant group. They are also better for the same level of resources.

16. Since this measure is subjective, it could involve personal value judgement. Further, it provides only rankings; the estimated difference between two categories may not reflect the true differences in health.

17. For example, see Rowan (1992), and Doll et al. (1993).

18. Since the PMK has the closest relationship with the child, it is a reasonable choice.

birthplace of the spouse/partner. All the American immigrant families belong to the American immigrant group. Other sub-groups are defined in the similar way.

Years since immigration of parents

In the NLSCY, information about the years since immigration in Canada is provided for the PMK and his/her spouse. [19] If the child lives with a lone foreign-born parent, the years since immigration of that parent is considered as the years since immigration in Canada in this study. On the other hand, if the child lives with two foreign-born parents, the years since immigration of the PMK is considered as the years since immigration in Canada. It is believed that the PMK has the most influence on the child, as she is the closest person to the child in the family.

5.3 A non-linear model of health outcomes of children: ordered logit regression

The PMK's assessment of child's health is a categorical and ordered variable and for that reason, ordered logistic model is employed for empirical estimation. Standardized cross-sectional weights are used in estimation procedure. The PMK-rated measure of the health status of the child takes the following values: 0 = fair or poor health, 1 = good health, 2 = very good health, and 3 = excellent health. When response categories are ordered, logits can directly incorporate the ordering. The cumulative probabilities are the probabilities that the response Y falls in category j or below, for each possible j. For J response levels, J-1 cumulative logits can be computed. The jth cumulative probability is:[20]

(5.1) $P(Y \leq j) = \pi_1 + \pi_2 + \cdots + \pi_j, \; j = 1, \ldots, J$

$$= \frac{\exp(\mu_j + \sum_{g=1}^{t} \beta_g X)}{1 + \exp(\mu_j + \sum_{g=1}^{t} \beta_g X}$$

where π_i denotes the probability of the ith category, g = (1, 2, …, t) refers to the explanatory variables, μ_j and β_g are intercept parameters and regression parameters, respectively.

Ordered logit models for the health outcomes of children of NBC and immigrant families

The jth cumulative odds is the probability of giving a response in category j or lower, as opposed to giving a response in category j+1 or higher. For a vector of predictors, Xk, the log of the jth cumulative odds for the child outcomes of native-born Canadian (NBC) and immigrant families can be written as:[21]

19. The NLSCY code for this variable is BSDPD04 in the primary file. The birthplace of the PMK is recorded as Canada, U.S., Europe, Asia, or Other place.

20. See Agresti (1996)

21. See Agresti (1996)

(5.2) $$\text{Logit}\left[P(Y_{fk} \le j)\right] = \text{Log}\left(\frac{P(Y_{fk} \le j)}{1 - P(Y_{fk} \le j)}\right)$$

$$= \text{Log}\left(\frac{\pi_1 + \pi_2 + \ldots + \pi_j}{\pi_{j+1} + \pi_{j+2} + \ldots + \pi_J}\right), \qquad j = 1, \ldots J\text{-}1.$$

$$= \mu_j + \alpha I + x_y\beta_N + x_{yD}\beta_D + \varepsilon_1 \qquad \text{(selection model)}$$

$$= \mu_j + \alpha I + x\beta + \gamma IT + \varepsilon_2 \qquad \text{(assimilation model)}$$

Where
Y_{fk} denotes the responses of ordinal health outcomes of the kth child of the fth group,
Subscript, f = (N, I) references the NBC and immigrant groups,
x_y references a vector of explanatory variables that affect health outcomes,[22]
x_{yD} is the vector of interacted variable(x_y*I);

μ_j are the parameters to be estimated for the intercept terms of the ordered logit model, and α is the parameter to be estimated that will capture any differences in the intercept terms of the NBC and immigrant families;

β_N, is the vector of parameters to be estimated describing the effect of x on the log odds of response in category j or above for the NBC group, and β_D's is the vector of parameters to be estimated to capture the differential marginal impacts on the probabilities of different health categories of children of immigrant families;

T =Years since immigration and γ is the parameter to be estimated to denote the intergenerational impact of immigrants' assimilation;

ε_1 and ε_2 are the effect of unobserved characteristics. They are assumed to be independent, identical, and normally distributed random variables with mean zero and variance $\sigma_{\varepsilon 1}^2$ and $\sigma_{\varepsilon 2,}^2$ respectively.

In an ordered logit model, when a dependent variable has n response categories (here there are 4 response categories), an estimated coefficient gives the marginal impact on the log of the jth cumulative odds, which is the probability of having a response in category j (say, good health category) or lower as opposed to giving a response in category j+1 (say, very good health category) or higher. Likewise, the coefficient of an interaction variable gives the differential marginal impact for the children of an immigrant group compared to those of the NBC group (the comparison group). Since the response categories in the dependent variable are ordered in such a way that higher values are assumed to represent higher outcomes, a positive and significant coefficient of an explanatory variable[23] in an ordered logit model[24] in this study

22. Each vector includes individual characteristics of the child, family characteristics and resources that affect health outcomes of children.

23. Assuming a higher value of that variable indicates a higher level.

24. Descending order options is used in the logistic procedure statement. Without this option, an estimated coefficient would have the opposite sign.

means the cumulative odds of the jth response category would increase with an increase in that variable. In other words, the probability of being in the highest response category would increase; and the probability of being in the lowest response category would decrease. Moreover, a higher value of an intercept term means a higher probability for a higher response category.

Tests for the equality of two non-linear regressions: log-likelihood ratio test[25]

Ordered logit models are non-linear. To test the hypothesis that the non-linear regressions are the same for two groups, the log-likelihood ratio tests are performed. This test is described below: Let $\hat{\theta}_U$ be the maximum likelihood estimate of θ obtained without regard to the constraints, and let $\hat{\theta}_R$ be the constrained maximum likelihood estimator of θ. If $\hat{L}_U$ and $\hat{L}_R$ are the likelihood functions evaluated at these two estimates, then the likelihood ratio is

(5.3) $\lambda = \frac{\hat{L}_R}{\hat{L}_U}$ must lie between 0 and 1. If λ is too small, doubt is cast on the restriction.

The Log-likelihood ratio test statistic $-2 \ln \lambda = -2 (\ln \hat{L}_R - \ln \hat{L}_U)$ is distributed as chi-squared, with degrees of freedom equal to the number of restrictions imposed. The null hypothesis is rejected if the estimated value of (-2 ln λ) exceeds the critical value.

5.4 Causes of variations in the health outcomes of children and the specification of independent variables

The vector of inputs, X, in the health outcome equation in 5.2 includes the variables that are given. For the specification purposes, a theoretical model is developed that identifies the sources of variation in child's health between two families.

A model of sources of variation in health outcomes

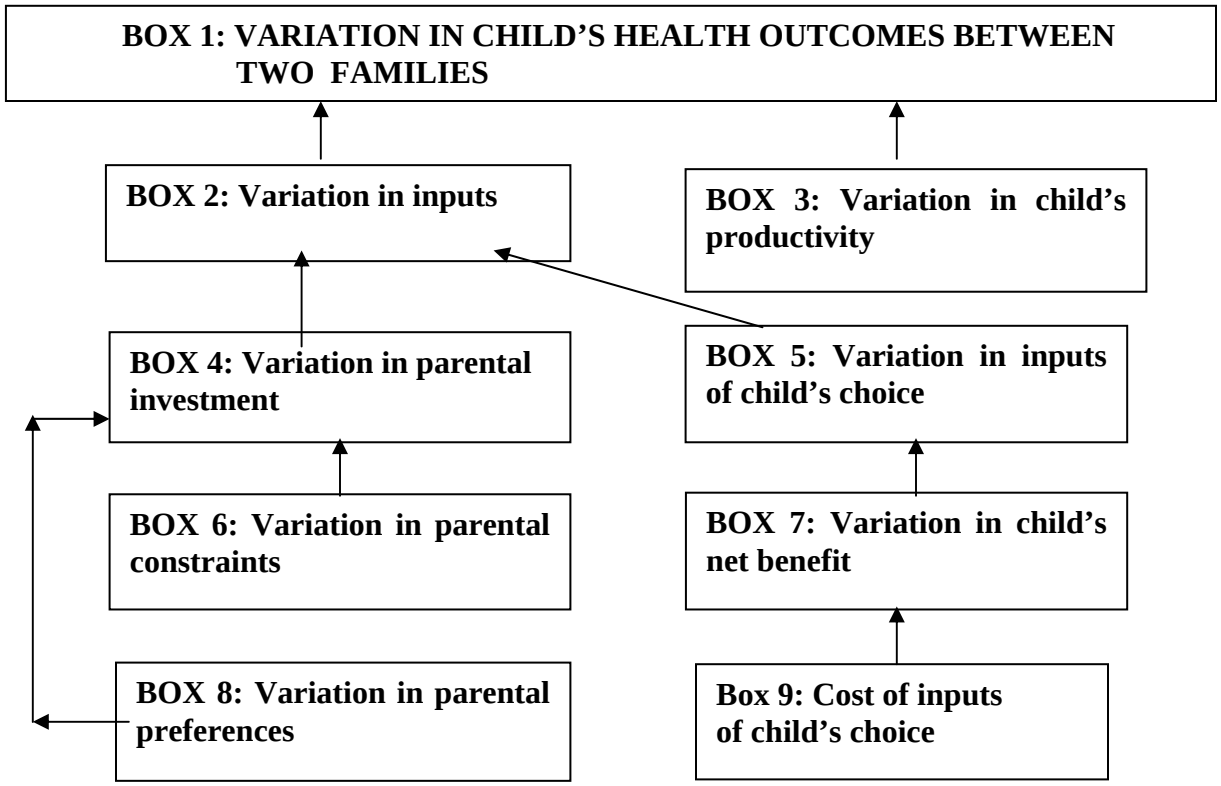
In terms of the health outcome function, the two broader sources of variation in the health outcomes of children are inputs and/or productivity of the children. Data on these two broad factors are rarely available. However, these two broad factors could originate from some specific factors for which data could be available. The variation in inputs could originate from the variation in constraints, preferences or both. Graph 1 provides a tree model of sources of variation in health outcomes between two families.

The direction of the arrow keys in the Graph 1 indicates where the variations are coming from. For example, two arrow keys from box 2 and box 3 toward box 1 indicate that variations in child outcomes are caused by the variations in inputs and child's productivity. Similarly, the directions of the arrow keys from box 4 and 5 toward box 2 indicate that variations in inputs are caused by the variations in parental investment and other inputs that the child can choose. They in turn cause variation in child outcomes. One could further sub-divide the sources of variation in each box and link these sources to the variation in child outcomes. For example, variations in parental

25. See Greene (1993).

constraints might arise from variations in many factors such as, education levels, labour market experiences, and local labour market conditions.

Graph 1 A graphical model of sources of variation in children's health outcomes between two families



Specification of independent variables

Table 5.1 Explanatory variables in the health outcomes models

Explanatory variables	Expected sign
Birthplace (= 1, for immigrant group, = 0, for NBC group) [1]	Positive
Child is native-born Canadian (= 1, if the child was born in Canada, = 0, otherwise)	Uncertain
Age of the child	Uncertain
Gender (= 1, if the child is a boy, = 0, if a girl)	Uncertain
Equivalent income ($) [2]	Positive
House (= 1, if any family member owns the house, = 0 if not)	Positive
Lone-parent (= 1, if the child lives with a lone-parent, = 0, otherwise) [3]	Negative
Age of biological mother(years) at child's birth	Positive
Years of education of PMK	Positive
Weekly working hours of PMK[4]/ ethnic working hours of the PMK[5]	Negative
Poor health condition of PMK (= 1, if health status of PMK is poor or fair, = 0, otherwise)	Negative
Number of residential movement	Negative
Rural area (= 1, if child lives in rural area, = 0, otherwise)	Negative
Provincial unemployment rate (1996)	Negative
Years since immigration of parents in Canada	Positive

Notes:

1. From the National Longitudinal Survey of Children and Youth (NLSCY), it can be known whether the parents (PMK and the spouse of the PMK) of the child were born in one of the following five places: Canada, the U.S., Europe, Asia, or other places. The NLSCY code for the variables are BSDPD04 and BSDSD04.

2. Equivalent income is defined as household income divided by the equivalent scale = household income before taxes/square root of family size.

3. In the sample, only 161 single parents are lone fathers. Curtis et al. (2001) argue that a lone-father has, on average, a higher income than does a lone mother, and hence, lone fathers should be excluded. In this study, they were not excluded because of sample size problems for the immigrant sub-groups. Also, since the percentage of lone father is approximately 1.8% of the full sample and an income variable is included, it is less likely that the impact of this inclusion will be substantial.

4. The NLSCY code for the variable is BLFPb14A. This variable is the number of hours per week usually worked at current job(s). If the PMK is a full-time mother then it takes the value 0.

5. This variable is a proxy for actual working hours of the PMK. In the NLSCY, the information on birth countries of the PMK is provided besides the information on five broader groups (birthplace). The NLSCY code for the variables is BSDPQ1. This variable is in the Secondary file. Using this information, average weekly working hours of the PMKs who are from a particular country has been estimated. This average working hours variable is termed as ethnic weekly working hours. Note that there is no variation in the ethnic working hours of PMKs who are born in Canada, and hence, no separate regression can be estimated for the NBC group. To bring variations, the provinces in Canada are considered as the birth countries of the PMKs of the NBC group. The average weekly working hours of PMKs of different provinces are considered as the ethnic weekly working hours of the PMK of the NBC group.

The variables that are expected to affect parental preferences and constraints, and child's preferences, constraints, and productivity are included in the health outcome model. Further, the availability of data was the biggest consideration in estimating the empirical health model of children in native-born Canadian (NBC) and immigrant families. The specification of the health outcome model in this study includes the working hours of the PMK, as it is expected to be significantly associated with child health. However, as mentioned, this is likely to create an endogeneity problem in the health model. Theoretically, instrumental variables (IV) methodology[26] can reduce the problem of endogeneity. Unfortunately, from the available information in the NLSCY, it is difficult to find a proper instrument that is highly correlated with working hours of mothers but uncorrelated with the error terms. Hence, it was not possible to apply IV method to correct endogeneity bias in this study. Although the endogeneity problem was not corrected, the extent of bias was examined by comparing the estimates of these models with those of the alternative model. The alternative model is expected to have less endogeneity problem. For example, an alternative health outcome model is specified using the ethnic working hours of the PMK variable[27] instead of the actual working hours of PMK. However, since this variable is a poor proxy for individual working hours, and the estimates are robust, this variable is not used in the final model. Table 5.1 lists the independent variables.

5.5 Measuring the intergenerational impact of immigrants' selection and assimilation

In the regression analysis, usually the impact of a variable is observed from the regression coefficient of that variable. It has already been discussed that selectivity is related to characteristics unobservable to the researcher. Hence, there is no scope to add a variable that could measure selectivity of parents in the health outcome model of their children. In this study, an indirect methodology is applied. It is assumed that intergenerational impact of differential unobservables is positive. This implies that children of the immigrant group in general, and from Europe and the U.S. would have a stronger association of observable resources and health outcomes, and those of the Asian immigrant group would have weaker association. In other words, model coefficients would be larger for the former three groups and lower for the Asian

26. See Gujarati (1988) for a preliminary idea about IV method.

27. The idea of using working hours is taken from Borjas (1992, 1994), Card et.al (1998) and Chiswick and Miller (2000). Borjas uses the mean earnings of the ethnic group in the parents' generation as the ethnic capital, and argues that ethnic capital matters to the outcome (earnings) of the children when they are exposed frequently to other persons who share the same ethnic background. Borjas finds that the earnings of the children of immigrants are strongly affected by ethnic capital. He further argues that if parental skills are measured with error, the ethnic mean then provides a very good instrument for parental skills. Card et.al includes mean education levels of father's ethnic group in the educational attainment of children of immigrants. They argue that ethnic capital averages out any individual-specific transitory fluctuations or measurement error and thus the estimates are most comparable to the estimates obtained from regressions that use instrumental variables methods. Chiswick and Miller include the average language efficiency of the ethnic group in the earnings function of immigrants and call it ethnic goods effect. In the NLSCY, the birthplace of the PMK is recorded. Besides this, information on the country of origin of the PMKs is also provided (the NLSCY code for this variable is BSDPQ1 the secondary file). Using this information, the ethnic working hours of PMK variable is created.

group (in absolute sense.) This hypothesis is tested in two steps: First, a birthplace[28] variable is included in addition to the specified variables in the health outcome model and interacted it with the other specified variables. The coefficient of an interaction variable gives the differential value of the slope coefficient of this variable for an immigrant group compared to the NBC group. The coefficients of the interaction variables are compared with those of the non-interacted variables. The same signs of the coefficients of the non-interacted variables (consider income, for example), and the respective interaction variables (income*birthplace), would indicate that the absolute slope is larger for the children of the immigrant group. This would be consistent with the hypothesis that the children of the immigrant group have a stronger association of household income and health outcomes. On the other hand, when the coefficient of the non-interacted variable and the respective interaction variable has opposite signs this would indicate that the children of the immigrant group have a weaker association of household income and health outcomes. A precise conclusion can be drawn only if it is observed that all the coefficients of the interaction variables have the same sign as those of the original variables. When the coefficients of some interaction variables have the same signs and the others have opposite signs as those of the original variables, no precise conclusion about the nature of selectivity can be drawn. For that reason the hypothesis is tested in the second stage.

In the second stage, predicted outcomes for children of the two groups are simulated using the parameters estimated in the first stage and giving each group the resource levels of the NBC group. In this stage, the conclusion about a positive (negative) selection is drawn observing a higher (lower) outcome of children of immigrant families for the same level of resources (see Section 6.1.4 for more).

The intergenerational impact of immigrants' assimilation on health outcomes of children is tested directly by adding a variable that is expected to measure immigrants' assimilation. In this study, it is assumed that the immigrants assimilate economically and culturally with the time of residency in Canada. The *years since immigration* variable is used to represent the time of residency. The intergenerational impact of immigrants' assimilation is tested by observing the coefficient of 'the time of residency' of immigrant parents in Canada in child's health model. A positive coefficient of this variable would indicate a positive intergenerational impact of immigrants' assimilation on the health outcomes of children. Lack of evidence of this hypothesis would cast doubt about the findings of immigrants' assimilation. It may also indicate that child outcomes are not significantly associated with immigrants' assimilation, but rather with their own assimilation.

28. For the full sample, the *birthplace* takes value 1 if the child is from any immigrant family, value 0, if from a native-born Canadian (NBC) family. For the pooled sample of children of U.S. immigrant families and NBC families, *birthplace* takes value 1 if the child is from an American immigrant family, value 0 if from an NBC family. Similar definitions apply when the sample of children of European or Asian immigrant families are pooled with that of NBC families.

5.6 Descriptive statistics

Resources of different immigrant groups in the sample

The mean values of the inputs (resources) of the NBC group and different immigrant groups are compared in Table A2.1. The percentages of children in different health categories are also similarly compared in Table A2.2.

An examination of the family characteristics and parental characteristics indicates that the children of the combined immigrant group are in an advantaged situation compared to those of the NBC group. The average equivalent income is higher for the combined immigrant group than for the NBC group. The percentage of immigrants who live in rural areas and who live with a lone-parent is also significantly lower for the combined immigrant group than for the NBC group. Immigrants also live in the areas where the unemployment rate is lower. On average mothers are older and more educated in the combined immigrant group than in the NBC group, and immigrants are less mobile. Compared to the NBC group, the combined immigrant group has a larger family size. The percentage of families that own houses is smaller than for the NBC group.

A closer look at Table A2.1 also indicates that the immigrant population is a diverse group; there are many cases where the same conclusion does not apply to every immigrant group. Table A2.1 shows that there are no significant differences in the average values of household income and residential movement variables of the American immigrant group and those of the NBC group; whereas, the average values of the above variables in the combined immigrant group are significantly different from those in the NBC group. The percentage of families that own houses is significantly higher for the American immigrant group than for the NBC group (85% vs. 78%). The percentage of the PMKs who have poor health is also significantly lower for the American immigrant group than for the NBC group, whereas, the percentage is similar for the combined immigrant group. These attributes are likely to have a positive impact on the health outcomes of children in this group.

The percentages of families that own houses in the European immigrant group are similar to that in the NBC group, while significantly different from the combined immigrant group. The Asian immigrant group and the NBC group have the same mean values of household equivalent income, lone-parent status, and residential movement. The combined immigrant group, however, has significantly different mean values of the above factors, as already shown. The Asian immigrant group has lower household income. On the other hand, this immigrant group has the highest percentage of families that own houses.

Health status of different groups

The mean values in Table A2.2 reveal that the results differ depending on the health categories. When the percentages of children in the excellent health status category are compared, no significant difference is found between the combined immigrant group and the NBC group (60% for the NBC group vs. 58% for the combined immigrant group). Note that, comparing the percentages of children in the middle categories between two groups does not give enough

information to determine which group has better health outcomes. A comparison of cumulative probability, on the other hand, provides better information. When the percentages of children in the excellent or very good health category of two groups are compared, the combined immigrant group has significantly lower health status (88% for the NBC group vs. 85% for the combined immigrant group). When good health status is added with excellent or very good health category in measuring health status, again, no significant difference is found among these three groups (98% in each case). Among the immigrant sub-groups, any comparison of the PMK's assessment indicates that the children of the American immigrant group have a better health status than do the children of the NBC group. For example, 80% of the children in the American immigrant group have excellent health, whereas, only 60% of the children in the NBC group have excellent health (and 58% in the combined immigrant group). On the other hand, the health outcomes of children of the Asian immigrant group are significantly lower than those of the NBC group (60% vs. 47%).

Health status of children in different source countries compared to that in Canada

Table A3 presents health statistics of children in the source countries in 1996. The under 5 mortality rate, infant mortality rate and life expectancy at birth measures are indicators of health status of children. The table reveals that the children in the U.S. have slightly lower health outcomes in terms of any measures. In terms of under 5 'mortality rate' and 'infant mortality rate' most of the European countries have better health status of children, while these countries have slightly lower health outcomes in terms of life expectancy at birth. Except for Japan and Korea, all the Asian countries have lower health outcomes of children in any measure. Moreover, the variation in health outcomes is also noticeable among these Asian countries.

This information of the health status of children in the source countries suggest that the average health status of children in the European immigrant group are likely to be notably better and those of the Asian immigrant group are likely to be notably poorer than that in the NBC group.

6. Results of ordered logit regressions and discussion

6.1 Ordered logit estimates of the PMK's assessment of child's health

Table 6.1 presents the ordered logit estimates of the health outcomes of children for different immigrant groups compared to the NBC group under the assumption that the slope coefficients are similar for the NBC group and an immigrant group.[29] The coefficient of the *birthplace* variable reveals the differences in the health outcomes of children of the NBC group and an immigrant group. On the other hand, the models in Table 6.2 assume that the slope coefficients are different for the NBC group and an immigrant group. The *birthplace* variable in these models shows the differences in intercept terms, while the coefficients of the interacted variables show

29. Since the PMK's actual working hours may create endogeneity problems in the estimated coefficients of the child's health model, another model is estimated using the ethnic weekly working hours of the PMK variable to test the robustness of the estimated results. The results are not reported but the estimates from the model that uses ethnic weekly working hours of the PMK are robust to those with actual working hours.

differences in the slope coefficients. The pooled sample of the NBC group and four different immigrant groups are used to estimate the models. SAS software and standardized cross-sectional weights[30] are used in the estimation procedures. The estimated coefficients for the NBC group, the combined immigrant group are presented in column 2. Other three columns present the estimates for the American immigrant group, the European immigrant group and the Asian immigrant group respectively.

6.1.1 Ordered logit estimates of the NBC group and the combined immigrant group

Consider Table 6.1. The coefficient of the *birthplace* variable in the second column suggests that health status of children of the combined immigrant would be lower than that of the NBC group for the same level of resources.[31] The table also reveals that most of the estimated coefficients that are significant have the expected signs. Age of the child, household income and mother's education are positively and significantly associated with child's health outcomes. On the other hand, mother's working hours, poor health condition of mother, residential movement, and rural area have negative impact on the health outcomes of children. It is surprising that unemployment rate is positively associated with child's health.[32] It could reflect the fact that the mothers who live in the regions where unemployment rate is higher have more time available for their children which is beneficial to the health outcomes of children.[33]

Now consider column 2 of Table 6.2. The focus of this table is on the *birthplace* variable and the interaction variables. An insignificant coefficient of the *birthplace* variable in the second column reflects the fact that there are no significant differences in the intercept terms of the health regression models of children in the NBC group and the combined immigrant group. This means that, if all other covariates were given zero values, the probability of the highest health category (excellent health), and that of the lowest health category (fair or poor health), would be the same for the children of the two groups.

The slope coefficients of age of the child, lone-parent status, and working hours of the PMK variables are significantly larger (in an absolute sense) for the children of the combined immigrant group than for those of the NBC group. A larger coefficient of a variable implies that, this variable has a stronger association with the probability of better health outcomes in the combined immigrant group than in the NBC group. For example, the slope coefficient of age of the child is 0.004 for the NBC group, while (0.004+0.03)=0.034 for the combined immigrant group. This indicates that an increase of one year in the child's age would increase the

30. The weight variable of each child is divided by the mean value of the weight variable of the group in which the child belongs.

31. If the resources (X) are higher, expected outcomes may not be lower.

32. It was expected that a higher unemployment rate would work as a proxy for poor macro economic condition and hence, it would have a negative impact on the health outcomes of children. On the other hand, a higher unemployment rate implies more parental time available in aggregate for children. For the same level of income and other resources, this may be good for children.

33. Since the unemployment variable has unexpected sign, another model (see Table A4 in Appendix 4) is estimated without this variable to examine the robustness of the other estimates. The results show that the estimates are robust to the inclusion of unemployment variable. Since the unemployment variable is significant, the model may be mis-specified without this variable. Hence, the final model includes this variable.

probability of excellent health category compared to the fair or poor health category by 0.04 percent for the NBC group, but 0.34 percent for the combined immigrant group. The larger coefficients suggest that the children of the combined immigrant group may have a higher level of unobservable characteristics or differential cultural capital.

The larger slope coefficients of lone-parent status and working hours of the PMK, for the combined immigrant group compared to the NBC group may have some important implications. For example, the slope coefficient of lone-parent status is negative and it is larger for the combined immigrant group. This implies that the children in the lone-parent families are more vulnerable, on average, in the combined immigrant group than in the NBC group.

The log likelihood ratio test

The *t*-tests for the coefficients of the *birthplace* and the interaction variables in Table 6.2 indicate that few are significant. However, the log-likelihood ratio test statistic, which is distributed as $\chi^2(14)$, is significant at the 1% level. The test suggests that the slope coefficients of the *birthplace* and the interaction variables are jointly significantly different from zero. This, in turn, implies that the regression model of the combined immigrant group is different from that of the NBC group, and as a result, the health outcomes are likely to be different for the same level of explanatory variables. Since the coefficients of some variables in Table 6.2 indicate that the children of the combined group could have a higher probability of being in better health status, and others indicate lower probability, it cannot be concluded from examining only the regression coefficients whether or not the children of the combined immigrant group are positively selected.[34]

6.1.2 Ordered logit estimates of different immigrant sub-groups

Consider Table 6.1. The coefficient of birthplace variable in columns 3-5 suggests that the health outcomes of the children would be significantly higher for the American immigrant group than for the NBC group, while lower for the other two groups for the same level of resources.

Now consider columns 3-5 of Table 6.2. An examination of the estimates indicates that the conclusion for the combined immigrant group is not always applicable to each of the three immigrant sub-groups (as shown by the values in boldface). The estimated coefficients of the *birthplace* are different for the immigrant sub-groups. The coefficient of *birthplace* variable indicates that if all other covariates were given zero values health outcomes would be significantly lower for the children of the American immigrant group, higher for the European immigrant group, while similar for the children of the Asian immigrant group than for the NBC group. However, the main focus of the model is on the coefficients of the interaction variables, which give the differential values of slope coefficients for an immigrant group. An examination of the magnitudes of the coefficients demonstrates that they are different for the immigrant sub-groups. In some cases, the signs of the coefficients are different for separate sub-groups. For example, the coefficients of equivalent income*birthplace variable in different columns suggest

34. In Section 6.1.4, simulated probabilities for the children of each group in different hypothetical states are presented. A comparison of the simulated probabilities for the same level of resources enables one to examine the nature of selectivity of the children.

that the differential value of the slope coefficient of equivalent income variable is positive for the European immigrant group, while negative for the Asian immigrant group. Similarly, the differential value of the slope coefficient of years of education of the PMK variable is positive for the American immigrant group while negative for the European immigrant group. Note that the slope coefficient of the equivalent income is positive (8.942E-6).[35] Since the slope coefficient of equivalent income*birthplace variable is positive (0.000015) for the European immigrant group, it indicates that slope coefficient of equivalent income is larger (8.942E-6+0.000015=2.393E-5) for the European immigrant group than for the NBC group. This higher value of equivalent income indicates that the association of household income and child's health is stronger for the European immigrant group than for the NBC group. For this reason, the increase in probability of being in the excellent health category as a result of an increase in income would be higher for the European immigrant group than for the NBC group. In other words, the children (as well as their parents) of the European immigrant group seem more efficient users of household income in producing health outcomes.[36] Similarly, the negative value of the equivalent income*birthplace variable for the Asian immigrant group suggests that the association of household income and child's health is weaker for the Asian immigrant group than for the NBC group.

The three log-likelihood ratio test statistics in Table 6.2 suggest that the coefficients of the *birthplace* and the interaction variables in each model are jointly different from zero. This, in turn, implies that the regression models of each of the three immigrant sub-groups are different from that of the NBC group. Hence, the health outcomes of children of these immigrant sub-groups are likely to be different from those of the NBC group for the same level of resources. Section 6.1.4 presents the simulated health outcomes of different immigrant groups for the same level of resources.

6.1.3 The conditional expected probabilities[37] and their differences

The model coefficients of Table 6.2 give some idea of the association of health outcomes and various inputs for different groups. As mentioned before, health outcomes depend not only on the model coefficients but also on the level of health inputs. In this section, the probabilities of the NBC group and different immigrant groups are predicted for three different response categories of health: (1) excellent health, (2) excellent health or very good health, and (3) excellent health or very good health or good health. These predicted probabilities would reflect the existing health status of children of different groups with their resources. Tables 6.3 presents the average predicted conditional probabilities of children in different groups for various health categories.

35. This value is the slope coefficient of the NBC group.

36. Note that the parents could also be responsible indirectly for a stronger or weaker association of household income and child's health. However, parents cannot directly purchase child's health. Final health outcomes of a child are realized from the child itself. Hence, it may be wrong to give the full credit to the parents.

37. These probabilities are estimated using the equation 5.1. The slope coefficients of the NBC group come from those of the non-interacted variables in Table 6.2, while those of an immigrant group are calculated by adding the slope coefficients of non-interacted variables and the corresponding interaction variables.

The first column in Table 6.3 specifies different states. For example, the first case, $\overline{\hat{P}(X_N, \hat{\beta}_N)}$, denotes the average predicted conditional probabilities of the children of the NBC group with their own group coefficients and own resource levels. These values are the existing average predicted conditional probabilities of the children of the comparison group. Similarly, the second case, $\overline{\hat{P}(X_I, \hat{\beta}_I)}$, denotes the average predicted conditional probabilities of the children of the combined immigrant group with their own group coefficients and own resource levels. A comparison of the values of these two cases gives the total variations in average predicted conditional probabilities of the NBC group and the combined immigrant group. The average predicted conditional probabilities are presented in the second column and their differences in the third column.

Now compare the probabilities of different immigrant groups with the base case. The comparison of these predicted conditional probabilities suggest that the health statuses of children in the NBC group are slightly higher than those in the combined immigrant group. For example, the probability of being excellent health category is 57% for the children in the NBC group, while 55% for those in the combined immigrant group. Among the three immigrant sub-groups, the American immigrant group has the highest probabilities for any of these three health categories. Compared to the NBC group, the probability is substantially higher for the American immigrant group. When the probability of being in the excellent health category is considered, the children of the American group have about 15-percentage point higher probability compared to those of the NBC group (0.57 for the NBC group vs. 0.72 for the American immigrant group). The health statuses of children of the European immigrant group are similar to those of the NBC group. On the other hand, a comparison of the Asian immigrant group and the NBC group reveals that the probability of being in the excellent health category is approximately 5-percentage points lower for the former group than for the second group. Hence, the different immigrant sub-groups reveal a considerable amount of heterogeneity in the health statuses of children. However, because of the smaller sample size of the sub-groups, particularly, for the American and the Asian immigrant groups, the results should be viewed with caution.

The gap between the health status of children of the NBC group and that of the immigrant population in general does not seem substantial, but the gap of the Asian immigrant group and the NBC group could be a concern.

6.1.4 The nature of selectivity in health outcomes: a selectivity test using the resources of the children of the NBC group (selecting the sample of the NBC group)

A selectivity test shows whether or not child outcomes of an immigrant group and those of the NBC group vary for the same level of resources. This test may provide useful information about the sources of variation in health outcomes. Consider the results of the selectivity test that uses the resource level of the children of the NBC group. Note that a higher probability for the higher levels would indicate higher health outcomes, and a higher probability for the lower levels would indicate lower health outcomes. Hence, to be positively selected, the probability has to be higher for the higher levels at the same level of resources.

The values in Table 6.4 are simulated selecting the sample of the NBC group.[38] Five different vectors of group coefficients are used in five states but the resources of the children of the NBC group are used in all of these states. The first column denotes these states. For example, the first case, $\overline{\hat{P}(X_N, \hat{\beta}_N)}$, denotes the average predicted conditional probabilities of different health categories of the children of the NBC group with the coefficients of the NBC group; while the second case, $\overline{\hat{P}(X_N, \hat{\beta}_I)}$, denotes those of the NBC group with the coefficients of the combined immigrant group. The numbers in the other boxes can be interpreted in the same way. Thus, these values denote the average predicted conditional probabilities of the children in different immigrant groups if they were given the resources of the children of the NBC group. Since the resources are constant in each case, the nature of the selectivity of the children of different immigrant groups can be examined.

Compare the values of the first case with those of the second case. These numbers provide information about the nature of selectivity of the children of the combined immigrant group. Consider the first number, which is the probability of being in the excellent health category. The probability is 0.565 for the NBC group with the NBC group coefficients, and also 0.557 with the combined immigrant group coefficients. Approximately, 1% lower probability for the combined immigrant group. The difference is statistically significant. Hence, there is statistical evidence that the children of the combined immigrant group are a negatively selected sample in statistical sense when the excellent health category is considered. This value also suggests that if the children of the combined immigrant group were given the resources of the children of the NBC group, the probability for the excellent health category would increase only 1% (from 55% to 56%), which may not bring notable improvement.

Similar comparisons indicate that the health outcomes would be higher for the American immigrant group than for the NBC group (63% vs. 57% probability for the excellent health) with the resources of the NBC group. This indicates that the children of the American group have a higher level of differential cultural capital which may have caused them to have higher health outcomes for the same level of observable resources. They make up a positively selected sample. Note that although the health outcomes are better for this group than for the NBC group with the resources of the NBC group, it is not recommended to change their resource level because health outcomes are far better with their own resource level.

On the other hand, the magnitudes of the European immigrant group suggest that with the resources of the NBC group, the outcomes would be lower for this group than for the NBC group

38. Select the sample of the NBC group; give each child the vector of the immigrant group coefficients, $\hat{\beta}_I$; and using equation 5.1, simulate the predicted conditional probability for each child with his/her own resource vector X_{Ni}. Take the mean value of these probabilities, $\hat{P}_i(X_N, \hat{\beta}_I)$. This simulated value, $\overline{\hat{P}(X_N, \hat{\beta}_I)}$ has two interpretations: it would denote the average predicted conditional probability of the NBC group with own resource levels but with the coefficients of the immigrant group; or it can be interpreted as the average predicted conditional probability for the children of the immigrant group with its group coefficients but with the resource levels of the children of the NBC group.

although the existing outcomes are similar. Since the probability of being in the excellent health category is higher with their own resource level, it is not recommended to change their resource level. Similarly, the magnitudes of the Asian immigrant group also suggest that for the same level of resources the probability of being in the excellent health category would be lower for this group than for the NBC group (55% for the Asian group vs. 57% for the NBC group). However, this probability would be higher than that with own resource level (55% vs. 52%). Hence, the policy implication of this finding is that the probability of being in excellent health for the children in the Asian immigrant group could be increased 3% by providing the resources of the children of the NBC group.

6.1.5 Decomposition of the sources of variation in the probabilities of different health categories of children

As mentioned, the total variation in probabilities of different health categories of children of two groups could result from two broad factors: (1) variation in productivity coefficients of children of the two families (selection in unobservable resources); and (2) variation in resources of the two families (selection in observable resources) In the previous section it is already shown how the health outcomes of children could vary because of variation in productivity coefficients of children of two groups. For policy purposes, it would also be interesting to compare the probabilities that account for variation in resource levels. The Oaxaca (1973) decomposition methodology can also be applied to decompose the variations in average predicted conditional probabilities[39] of children of native-born Canadian and immigrant families into variation in resources and model coefficients (productivity coefficients), as shown by the following equation:

Total variation in average conditional predicted probabilities = Variation due to variation in resources + variation due to variation in productivity coefficients:

$$(6a) \quad \overline{\hat{P}(X_N, \hat{\beta}_N)} - \overline{\hat{P}(X_I, \hat{\beta}_I)} = [\overline{\hat{P}(X_N, \hat{\beta}_N)} - \overline{\hat{P}(X_N, \hat{\beta}_I)}] + [\overline{\hat{P}(X_N, \hat{\beta}_I)} - \overline{\hat{P}(X_I, \hat{\beta}_I)}]$$

The first term of this gap shows the differences in probabilities of a health category due to variation in the productivity coefficients of the children of the NBC group and an immigrant group, and the second part reflects variation due to differences in resources. A positive value indicates that the simulated probability is higher for the NBC group, while a negative value indicates the reverse case. The variation in probabilities of different health categories due to variation in productivity coefficients is estimated using the resources of the NBC group, as shown in Table 6.4. Table 6.5 reports the estimated sources of variation in the probabilities of different health categories of different groups. Note that total variation in Table 6.5 is taken from the third column of Table 6.3 and the variation due to variation in productivity coefficients is taken from the third column of Table 6.4.

Consider the simulated probabilities of being in excellent health category in the combined immigrant group and the NBC group. Total variation is 1.4%. Decomposition results show that if the children of the combined immigrant group were given the resources of the NBC group, the variation would be only 0.8%. This variation can be attributed to the variation in productivity

39. See Even and Macpherson (1993).

coefficients of the children in these two groups. Hence, the variation due to resources is 0.6%. When the other health categories are considered, total variation diminishes.

The negative values of variation in the probabilities of the NBC group and the American immigrant group suggest that the children of the American immigrant group have notably higher health outcomes. For the excellent health category, total variation is -16%. Decomposition results show that both sources are negative. This indicates that the children of the American immigrant group have higher health outcomes because they have a higher level of observable health inputs as well as unobservable resources or differential cultural capital. For the excellent health category, -7% variation in probabilities could be attributed to a higher level of observable resources, while -9% variation could be attributed to a higher level of differential cultural capital.

For the European immigrant group, total variation is negative but very small for any of these three health categories (-0.4%). However, the decomposition results show that the probability would be lower for the European immigrant group than for the NBC group with the resources of the NBC group. For example, for the excellent health category, the variation due to variation in productivity coefficients is 1.8%, while due variation in resources is -2.2%. This indicates that the children of the European immigrant group do not lack observable resources compared to those of the NBC group, although they are less efficient users of their inputs.

On the other hand, as shown before, the total variation is positive and comparatively larger (3.9% for the excellent health category) for the children of the Asian immigrant group, it would be more useful to decompose the variation for this group for remedial measures. Decomposition results show that both sources of variation are positive which indicates that the children of this group have less observable and unobservable resources; 1.3% variation comes from less differential cultural capital, while 2.6% variation comes from less observable resources.

6.2. Intergenerational impact of immigrants' assimilation on health outcomes of children: ordered logit estimates of the sample of immigrants

In this section, logit models of child's health outcomes are estimated including years since immigration in Canada variable to examine the nature of association of time of residency of immigrants and the health outcomes of children.[40] Since the objective is to test if the impact of

40. Note that in the previous models, years since immigration of parents variable was not included. The reason is that conceptually, this variable does not exist for the native-born Canadians. Alternatively, the years since immigration variable can be set to zero for the native-born Canadians (see, for example, Macdonald and Worswick (1999). However, it may create some problems, as the years since immigration variable is also zero for those immigrants (88 cases) who have been living in Canada for less than a year. In this section, models are first estimated for the pooled sample of the NBC group and different immigrant groups assuming years since immigration of parents is zero for the NBC parents. The coefficient of years since immigration of parents in Canada in these models is assumed to show how the health outcomes of children of immigrant families would change compared to those of the NBC families with the time of residency of immigrant parents. However, because of the confusion, models are also estimated for each of the immigrant groups separately. The coefficient of these models would reveal how the health comes of children of immigrant families would change compared to their own initial health outcomes. Finally, a model is also estimated for the combined immigrant group to see the variation in the intergenerational impact of immigrants' assimilation within the immigrant population using the American immigrant group as a comparison group. This group is chosen as the comparison group because culturally and economically this group is more similar to the NBC group than any other group.

assimilation pattern is different for different immigrant groups, the three immigrant sub-groups are interacted with the years since immigration in Canada variable to capture the differential impact on health outcomes of each sub-group compared to the base group. For the whole sample of immigrants, the American immigrant group is the comparison group. Other sub-groups are: the European immigrant group, and the Asian immigrant group and the Other immigrant group.[41]

Table 6.6 presents the ordered logit estimates of the health outcomes of children of different immigrant groups and NBC group. The NBC group is the comparison group. Column 2 presents the estimates for the NBC group and the combined immigrant group, while columns 3-5 present those for each of the three sub-groups.

The coefficient of years since immigration in Canada variable in the second column indicates that the health outcomes of children of immigrant families in general would improve compared to those of the NBC families with the time of residency of immigrant parents in Canada. One year of residency of immigrant parent in Canada would increase the probability of being in the excellent health category by 1%. In the previous section, it was shown that the total variation in probabilities of being excellent health category was approximately 2%. This indicates that the present gap may disappear in 2 years if other things remain the same.

The coefficient of years since immigration in Canada variable in the third column indicates that one year of residency of American immigrants would increase the probability of being in the excellent health of children by approximately 1%. However, the coefficient is not significant. Hence, it can be concluded that there is no statistical evidence that the health outcomes of the children in the American group would improve with the time of residency of immigrants. Note the initial health outcomes are significantly higher for the American immigrant group, as the coefficient of the birthplace variable suggests. Also, remember that the present health status of children of this group is notably better than those of the NBC group, as shown in Section 6.1.3. On the other hand, there is evidence for the European and Asian immigrant groups that the health outcomes of children would improve with the time of residency of immigrants by approximately 1%. Hence, the present gap is likely to disappear in 3 to 4 years for the Asian immigrant group.

Columns 2-5 in Table 6.7 present the estimates for each of the above groups separately excluding the NBC group. Hence, the coefficient of years since immigration in Canada variable in these columns indicates how health outcomes of children of each of these immigrant groups change from the initial health outcomes. The coefficient of years since immigration of parents in Canada in columns 2-5 suggests that the findings are similar to those in Table 6.6. However, the coefficient of this variable is notably higher (3%) than that in the previous model for the Asian group.

Column 6 in Table 6.7 presents the estimates using the American immigrant group as the comparison group. The coefficients of the variables European, Asian and Other suggest that the initial health outcomes of children are significantly lower for each of these three sub-groups than for the American group. The coefficient of years since immigration in Canada variable again indicates that there is no statistical evidence that the health outcomes of children of this group would improve with the time of residency of their parents. The coefficients of the interaction

41. To increase the sample size, this group was included in the combined immigrant group.

variables suggest that there is no statistical evidence that slope coefficient of the years since immigration in Canada variable of other three sub-groups would be different from that of the American immigrant group. This finding is not surprising as the initial health outcomes are notably larger for this group than for any other group. Total variation in average predicted conditional probabilities also indicated this trend. Hence, there exists considerable amount of variation in health outcomes of children within the immigrant population, particularly, between the American group and the rest of the immigrant population.

7. Summary and concluding comments

The NLSCY Cycle 2 (1996-97) data indicates that, on average, the differences in health outcomes of children in the immigrant families and in the NBC families are not substantial. However, there is a considerable amount of heterogeneity in the health outcomes of children in different sub-groups within the immigrant population. Compared to the NBC group, the American immigrant group has notably higher health outcomes of children, while the Asian immigrant group has significantly lower outcomes, and the European group has similar outcomes. The highest level of health outcomes of children in the American immigrant group is consistent with the findings of Macdonald and Worswick (1999) and Worswick (2001). A lower level of health outcomes of the children of the Asian immigrant group in Canada is not surprising as the health outcomes of children are very low in the Asian countries than in Canada.

The NLSCY data also provide some important findings about the association of child health and inputs. The age of the child, household income and mother's education are positively and significantly associated with the health outcomes of children. On the other hand, mother's working hours, poor health condition of mother, residential movement, and rural area have negative impact on the health outcomes of children. To improve the overall health outcomes of children in Canada, an improvement of these factors should be given consideration. Also, the children in the immigrant families are more vulnerable in the lone-parent families and in the families where maternal working hours are longer. Hence, to improve the health status of children of immigrant families, the children in the above situation need special attention.

Selectivity test for the combined immigrant group suggests that for the same level of resources, the health outcomes of children in the immigrant families would not be notably different. This finding is not consistent with Chiswick's finding that the immigrant families will have significantly higher labour market outcomes for the same level of observable resources. Selectivity tests for the immigrant sub-groups suggest that for the same level of resources, the health outcomes of children would also be higher for the American group but lower for the other two sub-groups than for the NBC group. This indicates that the American immigrant group may have a higher level of differential cultural capital which is favourable to health outcomes of children. This finding of the American immigrant group and the Asian group is consistent with Borjas (1987, 1991) who argues that relative income distribution of the country of origin compared to that of the host country during the time of immigration plays a role in the nature of selection. However, the finding of the European immigrant group is not consistent with either Borjas or Chiswick. This may indicate that the European immigrants in Canada do not make up a positive sample as they do in the U.S. according to Borjas (1991). This is not surprising as the

immigration policies are different in the two countries. Also, the average years since the immigrants in this sample came to Canada are likely to be different from that in Borjas or Chiswick. As stated, the income inequality during the time of immigration also affects the quality of immigrants in the host country.

Decomposition results indicate that the higher level of health outcomes of children for the American group could be attributed to a higher level of observable resources as well as unobservable resources. On the other hand, a lower level of health outcomes of children in the Asian immigrant group comes from a lower level of observable resources as well as unobservable resources. It is interesting that for the European group, outcomes are higher when the variation due to resources is examined but lower when compared for the same level of resources. For the Asian immigrant group, some programs are necessary to increase their resources as well as efficiency.

Assimilation models indicate that the health outcomes of children of immigrant families in general would improve compared to those of the NBC families with the time of residency of immigrant parents in Canada, if they were lower initially. The present gap in health outcomes is likely to disappear in 3 to 4 years for the Asian immigrant group.

Finally, it should not be forgotten that this measure of health status is subjective, which may reflect the perception of health status based on the outcomes of the country of origin. The differences observed in this study may not reflect the true differences based on more objective measures. Hence, to implement any effective policies and programs, more research is necessary with other objective measures such as presence of chronic diseases.[42] Moreover, similar research with larger sample size for the immigrant sub-groups is also needed to test the validity and generalization of the findings of this study. Future research may also test the assimilation and selection hypotheses on the immigrants as well as on children to examine the link of immigrants' assimilation and selection, and health outcomes of children.

42. Small sample sizes of different immigrant sub-groups of this Cycle 2 data did not permit to test similar hypotheses with this measure.

Table 6.1 Ordered logit estimates of health outcomes of children: shift model

Variables	Coefficients (Standard Error) of Pooled Sample			
	Native and all Immigrants	**Native and Americans**	**Native and Europeans**	**Native and Asians**
Intercept 3	-0.8133[a] (0.1404)	-0.9569[a] (0.1934)	-0.5806[a] (0.1690)	-0.7744[a] (0.1754)
Intercept 2	0.1250 (0.1403)	0.0137 (0.1933)	0.3655[b] (0.169)	0.1849 (0.1753)
Intercept 1	1.0887[a] (0.1422)	0.9282[a] (0.1948)	1.3293[a] (0.1709)	1.1310[a] (0.1770)
Native born Canadian child (=1, if the child is native-born Canadian, = 0, otherwise)	0.1833[a] (0.0607)	0.1138 (0.1419)	-0.1112 (0.1014)	0.1142 (0.109)
Age of the child	0.0103[a] (0.00462)	0.00547 (0.00496)	0.00209 (0.0048)	0.00446 (0.0049)
Gender (= 1, if the child is a boy, = 0, if a girl)	0.0145 (0.0242)	-0.00032 (0.0258)	0.00450 (0.0252)	0.0033 (0.0257)
Equivalent income ($)	8.644E-6[a] (9.418E-7)	8.826E-6[a] (1.044E-6)	0.000011[a] (1.027E-6)	7.26E-6[a] (9.981E-7)
House (= 1, if any family members own the house, = 0, if not)	0.0141 (0.0334)	0.0868[b] (0.0367)	0.0958[a] (0.0352)	0.0554 (0.0365)
Lone-parent (= 1, child lives with a lone parent, = 0, otherwise)	-0.0620[c] (0.0353)	0.00128 (0.0376)	0.0339 (0.03680	-0.0169 (0.0374)
Age of mother (years) at birth of child	-0.00544[b] (0.00247)	-0.0035 (0.0027)	-0.00667[a] (0.00261)	-0.00406 (0.0027)
Years of education of the PMK	0.0495[a] (0.00656)	0.0570[a] (0.00746)	0.0506[a] (0.00716)	0.0517[a] (0.00728)
Weekly working hours of the PMK	-0.00170[b] (0.000718)	-0.00056 (0.00078)	-0.00097 (0.000761)	-0.00003 (0.00077)
Poor health of PMK (= 1, if health status of PMK is poor or fair, = 0, other wise)	-0.3978[a] (0.0471)	-0.4404[a] (0.0516)	-0.4437[a] (0.0506)	-0.4358[a] (0.0518)
Residential movement (number of movements)	-0.0340[a] (0.00624)	-0.0274[a] (0.0065)	-0.0238[a] (0.00641)	-0.0347[a] (0.0065)
Rural area (= 1, if the child lives in a rural area, = 0, otherwise)	-0.0616[c] (0.0372)	-0.0552 (0.0363)	-0.0400 (0.0367)	-0.0554 (0.0368)
Unemployment rate (1996)	0.0230[a] (0.0057)	0.0236[a] (0.0056)	0.0219[a] (0.00567)	0.0211[a] (0.0057)
Birthplace (= 1, if parents are foreign born, = 0, otherwise)	-0.0449 (0.0309)	0.4727[a] (0.1028)	-0.094[b] (0.0412)	-0.337[a] 0.0647
Fitness of the model: -2LOGL(Intercept and covariates)	18423.944	15982.675	16851.334	16237.173
Log likelihood ratio (14DF)	512.5734[a]	533.1749[a]	523.7945[a]	466.5775[a]
Sample Size	8,992	7,996	8,339	7,984

Notes :
1. The dependent variable is the PMK's assessment of child's health.
2. a, b, and c denote significance levels at the 1%, 5% and 10%, respectively.
3. Log likelihood ratio (14DF) tests the hypothesis that all the slope coefficients are jointly different from zero.
4. Source: Prepared by the author using the NLSCY (1996-97) Cycle2 data.

Table 6.2 Ordered logit estimates of health outcomes of children: interacted model

Variables	Coefficients (Standard Error) of Pooled Sample			
	Native and all Immigrants	**Native and Americans**	**Native and Europeans**	**Native and Asians**
Intercept 1	-0.8572[a] (0.2124)	-0.8572[a] (0.2124)	-0.8572[a] (0.2124)	-0.8572[a] (0.2124)
Intercept 2	0.0842 (0.2123)	0.0842 (0.2123)	0.0842 (0.2123)	0.0842 (0.2123)
Intercept 3	1.0552 [a] (0.2136)	1.0552 [a] (0.2136)	1.0552 [a] (0.2136)	1.0552 [a] (0.2136)
Native born Canadian child (=1, if the child is native-born Canadian, = 0, otherwise)	0.0992 (0.1584)	0.0992 (0.1584)	0.0992 (0.1584)	0.0992 (0.1584)
Age of the child	0.00378 (0.00534)	0.00378 (0.00534)	0.00378 (0.00534)	0.00378 (0.00534)
Gender (= 1, if the child is a boy, = 0, if a girl)	-0.00170 (0.0278)	-0.00170 (0.0278)	-0.00170 (0.0278)	-0.00170 (0.0278)
Equivalent income ($)	8.942E-6[a] (1.13E-6)	8.942E-6[a] (1.13E-6)	8.942E-6[a] (1.13E-6)	8.942E-6[a] (1.13E-6)
House (= 1, if any family members own the house, = 0, if not)	0.0852 [a] (0.0394)	0.0852 [a] (0.0394)	0.0852 [a] (0.0394)	0.0852 [a] (0.0394)
Lone-parent (= 1, child lives with a lone parent, = 0, otherwise)	-0.00709 (0.0403)	-0.00709 (0.0403)	-0.00709 (0.0403)	-0.00709 (0.0403)
Age of mother (years) at birth of child	-0.00457 (0.00291)	-0.00457 (0.00291)	-0.00457 (0.00291)	-0.00457 (0.00291)
Years of education of the PMK	0.0542 [a] (0.00801)	0.0542 [a] (0.00801)	0.0542 [a] (0.00801)	0.0542 [a] (0.00801)
Weekly working hours of the PMK	-0.00048 (0.000839)	-0.00048 (0.000839)	-0.00048 (0.000839)	-0.00048 (0.000839)
Poor health of PMK (= 1, if health status of PMK is poor or fair, = 0, other wise)	-0.4310 [a] (0.0553)	-0.4310 [a] (0.0553)	-0.4310 [a] (0.0553)	-0.4310 [a] (0.0553)
Residential movement (number of movements)	-0.0272 (0.0070)	-0.0272 (0.0070)	-0.0272 (0.0070)	-0.0272 (0.0070)
Rural area (= 1, if the child lives in a rural area, = 0, otherwise)	-0.0484 (0.0390)	-0.0484 (0.0390)	-0.0484 (0.0390)	-0.0484 (0.0390)
Provincial unemployment rate (1996)	0.0231 [a] (0.00602)	0.0231 [a] (0.00602)	0.0231 [a] (0.00602)	0.0231 [a] (0.00602)
Birthplace (= 1, if parents are foreign born, = 0, otherwise)	0.2958 (0.3505)	-3.7062 [a] (1.2939)	1.8458 [a] (0.5239)	0.2619 (0.8943)
Native born Canadian child *Birthplace	0.1576 (0.1732)	0.3763 (0.5501)	**-0.4420[b] (0.2166)**	-0.1302 (0.2433)
Age of the child* Birthplace	0.0274 [a] (0.0107)	0.1151 [b] (0.0474)	-0.0342 [a] (0.0157)	**0.0321 (0.0253)**
Gender * Birthplace	0.0631 (0.0566)	0.089 (0.2384)	0.0411 (0.0813)	0.1691 (0.1310)
Equivalent income* Birthplace	-5.02E-7 (2.064E-6)	-7.17E-6 (8.602E-6)	**0.000015 [a] (3.212E-6)**	**-0.00001 [a] (3.882E-6)**
House * Birthplace	-0.2553 (0.0754)	-0.1869 (0.3751)	0.0469 (0.1071)	**-1.0306 [a] (0.2225)**

Table 6.2 - *(*concluded)

Variables	Coefficients (Standard Error) of Pooled Sample			
	Native and all Immigrants	**Native and Americans**	**Native and Europeans**	**Native and Asians**
Lone-parent* Birthplace	-0.2090 [b] (0.0863)	**1.0869 [a] (0.5145)**	**0.4704 [a] (0.1452)**	**-0.1400 (0.2399)**
Age of PMK * Birthplace	-0.00603 (0.00559)	0.0361 (0.0240)	**-0.0195 [b] (0.0082)**	0.0229 (0.0146)
Years of education of PMK* Birthplace	-0.0222 (0.0142)	**0.1831 [b] (0.0789)**	**-0.0469 [b] (0.0214)**	-0.0186 (0.0307)
Working hours of PMK* Birthplace	-0.00586 [a] (0.00165)	**-0.00359 (0.00655)**	-0.00457 [c] (0.0025)	**-0.00429 (0.00356)**
Poor health status of PMK* Birthplace	0.1029 (0.1063)	**-1.1301 [b] (0.5262)**	**-0.0.3222 [c] (0.1784)**	0.2318 (0.3492)
Residential movement* Birthplace	-0.0246 (0.0157)	-0.0547 (0.0556)	0.0447 [a] (0.0235)	**-0.1814 [a] (0.0406)**
Rural area* Birthplace	-0.0517 (0.1411)	-0.5223 (0.3560)	0.0708 (0.1819)	0.9585 (0.8687)
Provincial unemployment rate *Birthplace	0.00949 (0.0196)	-0.0230 (0.0901)	-0.0575 [b] (0.029)	0.0407 (0.0634)
Fitness of the model: -2LOGL(Intercept and covariates)	18377.724	15947.997	16799.35	16148.638
Log likelihood ratio (27DF) test statistic	558.794 [a]	567.853 [a]	575.784 [a]	555.113 [a]
Log-likelihood ratio = $-2(L_R - L_u) \cong \chi^2(14DF)$	46.22 [a]	56.77 [a]	57.15 [a]	115.75 [a]
Sample Size	8992	7996	8339	7984

Notes:

1. The dependent variable is the PMK's assessment of child's health.
2. a, b, and c denote significance levels at the 1%, 5% and 10%, respectively.
3. The estimated coefficients of the non-interacted variables represent slope coefficients for the NBC group, while those of the interaction variables gives differential value of the slope coefficients for the NBC group.
4. The coefficients in boldface indicate that the differential impacts of the corresponding variables are different for the combined immigrant group and the immigrant sub-groups.
5. Log likelihood ratio (27DF) tests the hypothesis that jointly the coefficients are different from zero
6. L_u denotes the log-likelihood of the unrestricted model (where the coefficients of *birthplace* and the interaction variables assumed to have non-zero values), and L_R denotes that of the restricted model.
7. Source: Prepared by the author using the NLSCY (1996-97) Cycle 2 data

Table 6.3 Average predicted conditional probabilities of different health categories of children

Predicted probabilities with group coefficients (β_G) and resources (X_G)	Estimated values	Differences	Standard error of the differences[43]	T -value
1) $\overline{\hat{P}(X_N, \hat{\beta}_N)}$	0.565 0.766 0.895			
2) $\overline{\hat{P}(X_I, \hat{\beta}_I)}$	0.551 0.756 0.890	**(1)-(2)** 0.014 0.010 0.005	 0.002301 0.001712 0.000923	 5.743 [a] 5.636 [a] 5.472[a]
4) $\overline{\hat{P}(X_U, \hat{\beta}_U)}$	0.723 0.861 0.935	**(1)-(4)** -0.159 -0.096 -0.040	0.006391 0.004702 0.002539	 -24.831 [a] -20.320 [a] -15.902 [a]
5) $\overline{\hat{P}(X_E, \hat{\beta}_E)}$	0.569 0.767 0.894	**(1)-(5)** -0.004 -0.001 0.0008	 0.003526 0.002597 0.001395	 -1.227 -0.455 0.558
6) $\overline{\hat{P}(X_A, \hat{\beta}_A)}$	0.527 0.737 0.875	**(1)-(6)** 0.038 0.029 0.020	0.006509 0.004845 0.002622	 5.836 [a] 6.026 [a] 7.603 [a]

Notes:

1. $\overline{\hat{P}(X_G, \hat{\beta}_G)}$ denotes the average predicted conditional probabilities with the resources of the children of the group *G* and with coefficients of group *G*, where *G =N* denotes NBC group; *G*= I denotes combined immigrant group; *G = U* denotes American immigrant group; immigrant group; *G = E* denotes European immigrant group; *G = A* denotes Asian immigrant group;
2. The first entry in each box denotes the probability of being in *excellent health* category; the second entry in each box denotes the probability of being in *excellent or very good* category; and the third entry in each box denotes the probability of being in *excellent or very good or good health* category.
3. The regression coefficients of this Table come from those of Table 6.2
4. a, b, and c denote significant at the 1%, 5%, and 10% levels.

Source: Estimated by the author using the NLSCY (1996-97) Cycle 2 data

43. The standard error (S.E) of the differences in the average predicted conditional probabilities of the NBC group and the immigrant group for each health category is calculated using the equation:

S.E = $\sqrt{S^2}(1/n_1 + 1/n_2)$ Where S^2 is the pooled variance

$S^2 = [(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2]/(n_1 + n_2 - 2)$ and where S_1^2 and S_2^2 are the sample variances of the predicted conditional probabilities of each child of the NBC group and the immigrant group, respectively; n_1 and n_2 are the sample sizes of the NBC group and the immigrant group, respectively.

Table 6.4 Average predicted conditional probabilities of different health categories of children with the resources of the children of the NBC group

Average predicted conditional probabilities with coefficients of different groups	Estimated values	Differences	Standard error	T -values
1) $\overline{\hat{P}(X_N, \hat{\beta}_N)}$	0.565 0.766 0.895			
2) $\overline{\hat{P}(X_N, \hat{\beta}_I)}$	0.557 0.760 0.892	**(1)-(2)** 0.008 0.005 0.003	 0.001152 0.000862 0.000467	 6.396 [a] 6.202 [a] 5.994 [a]
3) $\overline{\hat{P}(X_N, \hat{\beta}_U)}$	0.634 0.803 0.904	**(1)-(3)** -0.069 -0.038 -0.008	 0.002158 0.001631 0.001019	 -32.068 [a] -23.036 [a] -8.3215 [a]
4) $\overline{\hat{P}(X_N, \hat{\beta}_E)}$	0.546 0.750 0.885	**(1)-(4)** 0.018 0.016 0.010	 0.001456 0.001091 0.000605	 12.598 [a] 14.243 [a] 16.513 [a]
5) $\overline{\hat{P}(X_N, \hat{\beta}_A)}$	0.552 0.750 0.880	**(1)-(5)** 0.013 0.016 0.015	 0.001872 0.00149 0.000941	 6.595 [a] 10.503 [a] 16.474 [a]

Notes:

1. $\overline{\hat{P}(X_G, \hat{\beta}_G)}$ denotes the average predicted conditional probabilities with the resources of the children of the group *G* and with coefficients of group *G*, where *G =N* denotes NBC group; *G* = I denotes combined immigrant group; *G = U* denotes American immigrant group; immigrant group; *G = E* denotes European immigrant group; *G = A* denotes Asian immigrant group;
2. The first entry in each box denotes the probability of being in *excellent health* category; the second entry in each box denotes the probability of being in *excellent or very good* category; and the third entry in each box denotes the probability of being in *excellent or very good or good health* category.
3. The regression coefficients of this Table come from those of Table 6.2
4. a, b, and c denote significant at the 1%, 5%, and 10% levels.

Source: Estimated by the author using the NLSCY (1996-97) Cycle 2 data

Table 6.5 Sources of variation in the conditional predicted probabilities of different health categories of children

Groups	Health categories	Sources of variation in conditional predicted probabilities		
		Total variation	Variation in productivity coefficients	Variation in resources
NBC and Immigrant	Excellent health	0.014	0.008	0.006
	Excellent and very good health	0.010	0.005	0.005
	Excellent, very good, and good health	0.005	0.003	0.002
NBC and American	Excellent health	-0.159	-0.069	-0.09
	Excellent and very good health	-0.096	-0.038	-0.058
	Excellent, very good, and good health	-0.040	-0.008	-0.032
NBC and European	Excellent health	-0.004	0.018	-0.022
	Excellent and very good health	-0.001	0.016	-0.017
	Excellent, very good, and good health	0.001	0.010	-0.009
NBC and Asian	Excellent health	0.038	0.013	0.026
	Excellent and very good health	0.029	0.016	0.013
	Excellent, very good, and good health	0.020	0.015	0.004
Source: Prepared by the author using the NLSCY (1996/97) data				

Table 6.6 Ordered logit estimates of health outcomes of children: shift model with years since immigration

Variables	Coefficients (Standard Error) of pooled samples			
	NBC and all immigrants	**NBC and Americans**	**NBC and Europeans**	**NBC and Asians[d]**
Intercept 3	-0.6682(0.1467)[a]	-0.9125(0.1952)[a]	-0.4996(0.1759)[a]	-0.7826(0.1818)[a]
Intercept 2	0.2753(0.1467)[b]	0.0594(0.1951)	0.4493(0.1759)[a]	0.1789(0.1817)
Intercept 1	1.2443(0.1486)[a]	0.9744(0.1966)[a]	1.4175(0.1778)[a]	1.1264(0.1834)[a]
Birthplace (= 1, if parents are foreign born, = 0, otherwise)	-0.2287(0.0650)	0.5462(0.2274)[a]	-0.2377(0.101)[b]	-0.549(0.1546)[c]
Years since immigration	0.00772(0.00248)[a]	0.0078(0.1441)	0.00514(0.0034)[c]	0.0106(0.0082)[c]
Native born Canadian child (=1, if the child is native-born Canadian, = 0, otherwise)	0.1004(0.0699)	-0.00014(0.0089)	-0.1769(0.1114)	0.1709(0.1184)
Age of the child	0.00773(0.0045)[c]	0.00540(0.00497)	0.00123(0.0049)	0.0033(0.005)
Gender (= 1, if the child is a boy, = 0, if a girl)	0.0131(0.0243)	-0.00077(0.0259)	0.00168(0.0253)	0.0025(0.0257)
Equivalent income ($)	8.398E-6[a] (9.469E-7)	8.849E-6[a] (1.045E-6)	0.000011[a] (1.03E-6)	7.384E-6[a] (9.993E-7)
House (= 1, if any family members own the house, = 0, if not)	0.00713(0.0337)	0.0819(0.0367)[b]	0.0933(0.0354)[a]	0.0588(0.0366)[c]
Lone-parent (= 1, child lives with a lone parent, = 0, otherwise)	-0.0891(0.0355)[b]	-0.00079(0.0376)	0.0157(0.037)	-0.0267(0.0375)
Age of mother (years) at birth of child	-0.00617(0.0025)[a]	-0.00354(0.0027)	-0.0069(0.00262)[a]	-0.0047(0.0027)[c]
Years of education of the PMK	0.0499(0.00661)[a]	0.0566(0.00746)[a]	0.052(0.00719)[a]	0.0497(0.0073)[a]
Weekly working hours of the PMK	-0.0018(0.0007)[a]	-0.00056(0.0008)	-0.0012(0.0008)	0.00009(0.0008)
Poor health of PMK (= 1, if health status of PMK is poor or fair, = 0, other wise)	-0.3740(0.0476[a])	-0.4288(0.0518)[a]	-0.4265(0.0511)[a]	-0.4317(0.0518)[a]
Residential movement (number of movements)	-0.0335(0.00626)[a]	-0.0277(0.00651)	-0.0234(0.00644)[a]	-0.0345(0.0065)[a]
Rural area (= 1, if the child lives in a rural area, = 0, otherwise)	-0.0646(0.0373)[c]	-0.0558(0.0363)	-0.0411(0.0367)	-0.0568(0.0368)
Unemployment rate(1996)	0.0221(0.00572)[a]	0.0236(0.00562)[a]	0.0212(0.0057)[a]	0.0209(0.0057)[a]
Fitness of the model: -2LOGL(Intercept and covariates)	18245.934	15958.884	16735.408	16208.92
Log likelihood ratio (15DF) test statistic for the hypothesis that all the slope coefficients are jointly different from zero	514.9179[a]	531.9446[a]	518.8431[a]	480.7508[a]
Sample Size	8,925	7,985	8,298	7981

Notes:

1. The dependent variable is the PMK's assessment of child's health
2. a, b, and c denote significance levels at 1%, 5% and 10%, respectively.
3. Years since immigration variable is also positive (0.0141) and significant at the 1% level for the other immigrant group.

Source: Prepared by the author using NLSCY Cycle 2 (1996-97) data

Table 6.7 Ordered logit estimates of health outcomes of children: interacted model with years since immigration

Variables	Coefficients (Standard Error)				
	All immigrants	**American**	**European**	**Asian**	**All Immigrants (American group is the comparison group)**
Intercept 3	-0.2664 (0.4008)	-3.562[a] (1.5081)	1.2602[c] (0.7121)	0.3308 (1.4799)	1.0285 (0.5554)
Intercept 2	0.6010 (0.4012)	-2.694[c] (1.4973)	2.0505[a] (0.7149)	1.1673[b] (1.4820)	1.9140 (0.5567)
Intercept 1	1.8119[a] (0.4101)		3.7031[a] (0.7520)	2.8963 (1.5132)	3.1481 (0.5647)
European (=1, if the family is from the European immigrant group, =0, otherwise)					-0.8137 (0.3614)
Asian (=1, if the family is from the Asian immigrant group, = 0, otherwise)					-1.2863[a] (0.4002)
Other (=1, if the family is from the Asian immigrant group, = 0, otherwise)					-1.0945[a] (1.0344)
Years since immigration in Canada	0.00779[b] (0.0038)	-0.0109 (0.0161)	0.00900[c] (0.0057)	0.0322[c] (0.0209)	-0.00277 (0.0132)
Years since immigration* European					0.00456 (0.0139)
Years since immigration* Asian					0.0179 (0.0177)
Years since immigration*Other					0.0225 (0.0146)
Native born Canadian child (=1, if the child is native-born Canadian, = 0, otherwise)	0.1594 (0.1138)	-0.0274 (0.7873)	-0.4985 (0.2516)	-0.216 (0.3957)	0.0808 (0.1193)
Age of the child	0.0204 (0.0138)	0.1367[b] (0.0619)	-0.0458[a] (0.0233)	0.000715 (0.0462)	0.0201 (0.0142)
Gender (= 1, if the child is a boy, = 0, if a girl)	0.0506 (0.0698)	0.0674 (0.2776)	0.0201 (0.1124)	0.1605 (0.2131)	0.0561 (0.0708)
Equivalent income ($)	7.932E-6[a] (2.431E-6)	9.362E-7 (9.847E-6)	0.000022[a] (4.3E-6)	-3.83E-6 (6.162E-6)	8.865E-6 (2.512E-6)
House (= 1, if any family members own the house, = 0, if not)	-0.1972[b] (0.0916)	-0.3300 (0.4633)	0.1452 (0.1472)	-1.0061[b] (0.3747)	-0.2129 (0.0925)
Lone-parent (= 1, child lives with a lone parent, = 0, otherwise)	-0.3773[a] (0.1093)	1.2139[c] (0.6936)	0.1801 (0.2133)	-0.4505 (0.4031)	-0.3697 (0.1100)
Age of mother (years) at birth of child	-0.0146[b] (0.00675)	0.0387 (0.0282)	-0.0263[b] (0.0112)	-0.00408 (0.0253)	-0.0152 (0.00685)
Years of education of the PMK	0.0313[b] (0.0166)	0.2027[b] (0.0944)	0.0168 (0.029)	0.0157 (0.0496)	0.0193 (0.0169)

Table 6.7 - (concluded)

Variables	Coefficients (Standard Error)				
	All immigrants	**Americans**	**Europeans**	**Asians**	**All Immigrants (American group is the comparison group)**
Weekly working hours of the PMK	-0.00739 [a] (0.00202)	-0.00638 (0.00754)	-0.0068 (0.0035)	-0.00502 (0.00571)	-0.00722 (0.00206)
Poor health of PMK (= 1, if health status of PMK is poor or fair, = 0, otherwise)	-0.2044 [c] (0.1310)	-0.5614 (0.8151)	-0.4846 [a] 90.2748)	-0.1896 (0.5763)	-0.2252 (0.1335)
Residential movement (number of movements)	-0.0480 [b] (0.0201)	-0.0934 (0.0651)	0.0382 (0.035)	-0.1756 [a] (0.0695)	-0.0544 (0.0204)
Rural area (= 1, if the child lives in a rural area, = 0, otherwise)	-0.1076 (0.1886)	-0.5302 (0.4097)	0.0548 (0.2548)	0.9453 (1.4066)	-0.2122 (0.1917)
Provincial unemployment rate (1996)	0.0233 (0.0272)	0.0136 (0.1043)	-0.0562 (0.0454)	0.0516 (0.1024)	0.00775 (0.0279)
Fitness of the model: -2LOGL(Intercept and covariates)	2265.158	145.764	874.867	271.042	2229.839
Log likelihood ratio test statistic for the hypothesis that all the slope coefficients are jointly different from zero	79.1867[a] (14DF)	34.7156[a] (14DF)	55.8300[a] (14DF)	23.2489[b] (14DF)	114.51 [a] (20DF)
Sample Size	1,071	131	444	127	1,71

Notes :

1. Dependent variable is the PMK's assessment of child's health.
2. a, b, and c denote significance levels at 1%, 5% and 10%, respectively.
3. Years since immigration variable is also positive (0.0157) and significant at the 1% level for the other immigrant group.

Source: Prepared by the author using the NLSCY (1996/97) data.

Appendix 1 - Income and inequality

Table A1 GNP and Income inequality

Countries	Income		Inequality			
	GNP (US$)	Year	Percentage share of household income			Year
			Lowest 20%	Highest 20%	Ratio of highest 20% and lowest 20%[a]	
Canada	9,590	1978	3.8	42.0	11.053	1977
U.S.	9, 976	1978	4.6	50.3	10.93	1978
Canada	10,130	1980	5.3	40	7.55	1981
Asian countries						
Bangladesh	130	1980	9.3	39.0	4.19	1981-82
Saudi Arabia	2,150	1980	6.9	40.0	5.8	1980-81
Singapore	4,430	1980	5.1	48.9	9.59	1982-83
Hong Kong	4240	1980	5.4	47.0	8.7	1980
India	240	1980	8.1	41.4	5.11	1983
Srilanka	230	1980	5.8	34.7	5.98	1980-81
Indonesia	430	1980	6.6	49.4	7.49	1976
Korea	1,130	1979	5.7	45.3	7.95	1976
Japan	9,890	1980	8.7	37.5	4.31	1976
China	290	1980	5.8	50.4	8.69	
Canada	6,930	1970-75	5.0	41.0	8.2	1969
European countries						
Germany	2,550	1970-75	6.5	46.2	7.11	1973
UK	3,780	1970-75	6.3	38.8	6.16	1973
France	5,950	1970-75	4.3	46.9	10.91	1970
Turkey	900	1970-75	3.4	56.5	16.62	1973
Netherlands	5,750	1970-75	6.5	42.9	6.6	1967
Norway	4,660	1973	6.3	37.3	5.92	1970
Sweden	5,910	1973	6.6	37.0	5.61	1972
Ireland	2,150	1973	7.0	39.4	5.63	1973

Note: [a] denotes author's calculation
Source: World Development Report, various issues, The World Bank, Oxford University Press; World Bank Atlas: Population, per Capita Product and Growth Rates, various issues.

Appendix 2 - Descriptive statistics

Table A2.1 Average resources of different groups in the sample

Average resources	**Mean values**				
	NBC group	**Combined immigrant group**	**American immigrant group**	**European immigrant group**	**Asian immigrant group**
Age of child	8.44 (0.03)	8.61 (0.08)	8.89 (0.20)	8.66 (0.12)	8.50 (.23)
Gender (= 1, if the child is a boy, =0, if a girl)	0.51(0.005)	0.52 (0.01)	0.52 (0.04)	0.44 (0.02)	0.56 (0.04)
Equivalent Income($)	2,6011 (178.06)	2,7678 [b] (603.8)	27313 [a] (1567.9)	32548 [a] (113.2)	2,6257 (1543.7)
House (=1, if any family members own the house, = 0, if not)	0.77(0.004)	0.74(.013) [c]	0.85 [a] (0.03)	0.80 [c] (0.02)	0.87 [a] (0.03)
Parent status (=1, if the child lives with a lone parent, = 0, otherwise)	0.19(0.004)	0.14(0.01) [c]	*0.08* [a] *(0.02)*	0.12 [a] (0.02)	0.14 [c] (0.03)
Age of PMK	37.20(0.06)	39.60(0.18) [a]	39.67 [a] (0.50)	39.56 [a] (0.25)	40.10 [a] (0.48)
Age of mother (years) at birth of child	27.3(0.05)	29.34(0.15) [a]	29.60 (0.52) [a]	28.89 (0.27)	30.19 [a] (0.43)
Years of education of PMK	12.54 (0.02)	13.08 (0.06) [a]	*14.04(0.17)* [a]	13.03 [a] (0.11)	13.20 [a] (0.23)
Weekly working hours of PMK	20.01 (0.17)	20.04(0.48)	19.24(1.56)	20.08(0.83)	22.39 (1.74) [a]
Ethnic weekly working hours of PMK	19.92(0.02)	20.82(0.13)	19.17 (0.09)	21.50 (0.20)	22.90 [a] (0.73)
Poor health condition of PMK (= 1, if health status of PMK is poor or fair, = 0, otherwise)	0.06(0.002)	0.07(0.007)	*0.03* [a] *(0.01)*	0.05 (0.01)	0.04 [a] (0.02)
Residential moves	1.78(0.03)	1.66(0.05)	1.91 [a] (0.20)	1.76 (0.10)	1.76 (0.17)
Rural area (= 1, if the child lives in a rural area, = 0, otherwise)	0.16(0.004)	0.04 (0.005) [a]	0.10(0.02) [a]	0.05(0.01) [a]	0.01 (0.01) [a]
Provincial unemployment rate, 1996	9.82(0.02)	9.0(0.04) [a]	9.36 [b] (0.14)	9.19 [a] (0.07)	8.47 [a] *(0.10)*
Years since immigration of parents	NA	21.68(0.31)	20.33 (0.70)	*26.93 (0.49)*	17.03 (0.65)
Native born Canadian children (%)	99	86	96	*89*	80

Notes:
1. NA denotes not applicable
2. a, b and c indicate significantly different from the mean value of the NBC group at the 1% level, 5% level, and 10% level, respectively

Source: Prepared by the author using the NLSCY, Cycle 2 (1996/97) data

Table A2.2 A comparison of average health outcomes of children in NBC and immigrant families in the sample

	NBC group	**Combined immigrant group**	**American Immigrant group**	**European Group**	**Asian Group**
Excellent health (= 1, if child's health is excellent, = 0, otherwise)	0.60 (0.006)	0.58(0.015)	***0.80*** [a] ***(0.032)***	0.62 (0.022)	**0.47** [a] **(0.045)**
Very good health (=1, if child's health is very good, = 0, otherwise)	0.28 (0.005)	0.27 (0.014)	**0.12** [a] **(0.03)**	**0.21** [a] **(0.02)**	0.29 (0.04)
Good health (= 1, if child's health is good, = 0, otherwise)	0.10 (0.003)	0.14 [a] (0.01)	0.06 [a] (0.02)	0.16 [a] (0.02)	0.23 [a] (0.4)
Fair or poor health (= 1, if child's health is fair or poor, = 0, otherwise)	0.02 (0.002)	0.02 (0.004)	0.02 (0.01)	***0.01*** [a] ***(0.003)***	*0.01 (0.04)*
Cumulative probabilities					
Excellent or very good health (=1, if child's health is excellent or very good, = 0, otherwise)	0.88 (0.0037)	0.85 [a] (0.011)	*0.92* [b] *(0.022)*	0.83 [a] (0.02)	0.76 [a] (0.038)
Excellent or very good or good health (= 1, if child's health is excellent or very good or good, = 0, otherwise)	0.98 (0.0016)	0.981 (0.0042)	0.98 (0.01)	***0.99*** [b] ***(0.004)***	***0.99*** [c] ***(0.007)***

Notes:
1. a, b and c indicate significantly different from the mean value of the NBC group at the 1% level, 5% level, and 10% level, respectively.
2. The t-ratios in bold face indicate that the conclusions are different for the combined immigrant group and the sub-groups.
3. The italicized values indicate the best outcome among the three sub-groups
4. **Source** Prepared by the author using the NLSCY (1996-97) Cycle 2 data

Appendix 3 - Health status of children in some source countries

Table A3 Under 5 mortality rate and infant mortality rate in 1996

Countries	Under 5 mortality rate	Infant mortality rate (under 1)	Life expectancy at birth (Years)
Canada	7	6	79
U.S.	8	8	76
Asian countries			
Bangladesh	112	83	57
Saudi Arabia	30	25	71
Singapore	4	4	77
India	111	73	62
Srilanka	19	17	73
Pakistan	136	95	63
Indonesia	71	47	64
Korea, Dem Peoples' Rep.	30	23	72
Korea Rep. Of	7	6	72
Japan	6	4	80
China	47	38	69
European countries			
Germany	6	5	76
UK	7	6	77
France	6	5	79
Turkey	47	41	68
Netherlands	6	5	78
Norway	6	5	77
Sweden	4	4	78
Ireland	7	6	76
Source: The State of World's Children 1998, published for UNICEF, Oxford University Press			

Appendix 4 - Ordered logit estimates of health outcomes

Table A4 Ordered logit estimates of health outcomes of children without unemployment rate (Dependent variable is the PMK's assessment of child's health)

Variables	Coefficients (Standard Error) of Pooled Sample			
	Native and all Immigrants	**Native and Americans**	**Native and Europeans**	**Native and Asians**
Intercept 3	-0.5635[a] (0.1259)	-0.6835 [a] (0.1819)	-0.3339 [b] (0.1564)	-0.5303[a] (0.1624)
Intercept 2	0.3739 [a] (0.1259)	0.2861 (0.1818)	0.6113[a] (0.1565)	0.4280[a] (0.1625)
Intercept 1	1.3367 [a] (0.1281)	1.1993 [a] (0.1835)	1.5741[a] (0.1587)	1.3727[a] (0.1644)
Native born Canadian child (=1, if the child is native-born Canadian, = 0, otherwise)	0.1827 [a] (0.0607)	0.1088 (0.1418)	-0.1109 (0.1013)	0.1093 (0.1089)
Age of the child	0.0109 [b] (0.0046)	0.00625 (0.00496)	0.00268 (0.00484)	0.00512 (0.0049)
Gender (= 1, if the child is a boy, = 0, if a girl)	0.0144 (0.0241)	0.000511 (0.0258)	0.00525 (0.0252)	0.00402 (0.0257
Equivalent income ($)	8.404E-6[a] (9.369E-7)	8.521E-6[a] (1.037E-6)	0.000010[a] (1.02E-6)	7.04E-6[a] (9.929E-7)
House (= 1, if any family members own the house, = 0, if not)	0.0142 (0.0334)	0.0865[a] (0.0367)	0.0974 (0.0352)	0.0551 [a] (0.0365)
Lone-parent (= 1, child lives with a lone parent, = 0, otherwise)	-0.0631[c] (0.0352)	-0.00277 (0.0375)	0.0313[a] (0.0368)	-0.0194 (0.0374)
Age of mother (years) at birth of child	-0.00549[b] (0.00247)	-0.00360 (0.00270)	-0.00673[a] (0.00261)	-0.00418 (0.00269)
Years of education of the PMK	0.0479[a] (0.00654)	0.0545[a] (0.00742)	0.0484[a] (0.00713)	0.0495 [a] (0.00725)
Weekly working hours of the PMK	-0.00169 [b] (0.000717)	-0.00047 (0.00078)	-0.00090 (0.00076)	0.000016 (0.00077)
Poor health of PMK (= 1, if health status of PMK is poor or fair, = 0, otherwise)	-0.4033[a] (0.0471)	-0.4470 [a] (0.0516)	-0.4504 (0.0506)	-0.4418[a] (0.0518)
Residential movement (number of movements)	-0.0357 [a] (0.00622)	-0.0296 [a] (0.00648)	-0.0256 (0.0064)	-0.0367 (0.00647)
Rural area (= 1, if the child lives in a rural area, = 0, otherwise)	-0.0510 (0.0372)	-0.0449 (0.0362)	-0.0305 (0.0366)	-0.0455 [a] (0.0367)
Birthplace (= 1, if parents are foreign born, = 0, otherwise)	-0.0597[b] (0.0307)	0.4621 [a] (0.1026)	-0.1055 [b] (0.0411)	-0.3610[a] (0.0643)
-2LOGL(Intercept and covariates)	18440.276	16000.393	16866.376	16251.197
Log likelihood ratio (13DF) test statistic for the hypothesis that all the slope coefficients are jointly different from zero	496.241[a]	515.4569 [a]	508.7529 [a]	452.5533 [a]
Sample Size	8,992	7,996	8339	7,984

Notes:
1. a, b, and c denote significance levels at 1%, 5% and 10%, respectively.
Source: Prepared by the author using NLSCY Cycle 2 (1996-97) data

References

Agresti, A. (1996). *An Introduction to Categorical Data Analysis.* John Wiley and Sons. New York.

Ahmed, N. (2002). Fitting In: Human Capital Assimilation of Children of Immigrant Families in Canada. Unpublished thesis. Dalhousie University, Halifax, NS, Canada.

Albrecht, G. L. (1994). Subjective Health Assessment. In *Measuring Health and Medical Outcomes.* C. Jenkinson (ed.). University of Oxford.

Baker, M. and D. Benjamin (1994). "The performance of Immigrants in the Canadian Labour Market." *Journal of Labor Economics*. Vol. 12, 369-405.

Beaujot, R., K. G. Basavarajappa, and R. B. P. Verma (1988). *Income of Immigrants in Canada: A Census Data Analysis.* Catalogue n^{o} 91-527-XPF, Ottawa: Statistics Canada.

Becker G. S. (1981). *A Treatise on the Family*. Cambridge, Mass: Harvard University Press. (Enlarged ed., 1991).

Beiser, M., F. Hou, I. Hyman, and M. Tousignant (1998). *Growing up Canadian-A study of New Immigrant Children.* Applied Research Branch Strategic Policy, Human Resources Development Canada, Working paper W-98-24E.

Birren, J. E. (1993). Measuring Quality of Life in Old Age. Paper presented at the XV International Congress of Gerontology, Budapest, Hungary.

Blau. F. (1980). Immigration and Labour Earnings in Early Twentieth Century America. *Research in Population Economics*. Vol. 2, 21-41.

Bloom, D. E., G. Grenier, and M. Gunderson (1995). "The Changing Labour Market Position of Canadian Immigrants." *Canadian Journal of Economics.* Vol. 28 No. 4, 987-1005.

Borjas G. J. and Tienda, M. Eds. (1985). *Hispanics in the U.S. Economy*. New York: Academic Press.

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

Borjas, G. J. (1987). Self-selection and the earnings of immigrants. *American Economic Review.* Vol. 77, 531-53.

Borjas, G. J. (1991). Immigration and Self Selection. In J. Abowd and R. Freeman, eds. *Immigration, Trade and the Labour Market.* Chicago: University Press for the National Bureau of Economic Research.

Borjas, G. J. (1992). "Ethnic Capital and Intergenerational Mobility." *Quarterly Journal of Economic.* Vol. 107 No. 1, 123-50.

Borjas, G. J. (1993). Immigration Policy, National Origin and Immigration Skills: A Comparison of Canada and the United States in *Small Differences that Matter: Labor Markets and Income Maintenance in Canada and the United States.* D. Card and R. Freeman (eds.), Chicago: University of Chicago Press.

Borjas, G. J. (1994). Long-Run Convergence of Ethnic Skill Differentials: The Children and Grandchildren of the Great Migration. *Industrial and Labor Relations Review.* Vol. 47 No. 4, 553-73.

Borjas, G. J. (1995). "Assimilation and Changes in Cohort Quality Revisited: What Happened to Immigrant Earnings in the 1980s?" *Journal of Labor Economics.* Vol. 13, 201-45.

Card, D., J. DiNardo, and E. Estes (1998). *The More Things Change: Immigrants and the Children of Immigrants in the 1940s, the 1970s, and 1990s.* NBER Working Paper, 6519, 1050 Massachusetts Avenue, Cambridge MA02138.

Carliner, G. (1980).Wages Earnings, and Hours of First, Second and Third Generation American Males. *Economic Inquiry.* Vol. 18, 87-102.

Chiswick, B. R. (1986). "Is the New Immigration Less Skilled Than the Old?" *Journal of Labor Economics*. Vol. 4 No. 2, 169-92.

Chiswick, B. R. (1978). "The Effect of Americanisation on the Earnings of Foreign born Men." *Journal of Political Economy,* Vol. 86, 897-921.

Chiswick, B. R. and P. W. Miller (2000). Immigrant Earnings: Language Skills, Linguistic Concentrations and Business Cycle. Paper presented at AEA Annual Meeting, Boston, January.

Citizenship and Immigration Canada (1996). *Profiles: Total Immigrant Population.* Government of Canada Publications, Cat No. Ci62-2/14-1996.

Curtis, L J., M. D. Dooley, E.L. Lipman and D. H. Feeny (2001). The Role of Permanent Income and Family Structure in the Determination of Child Health in Canada. *Health Economics.* Vol. 10 No. 4, 287-302.

Dean, K. J. (1993). Self-care and Health Promotion. Paper presented at the XV International Congress of Gerontology, Budapest, Hungary.

Defreitas, G. (1980). The Earnings of Immigrants in the American Labour Market. Ph.D. dissertation, Columbia University.

De Silva, A. (1997). Earnings of Immigrant Classes in the Early 1980s in Canada: A Reexamination. *Canadian Public Policy- Analyse de Politiques,* Vol. 23 No. 2, 179-202.

Doll, H. A., N. A. Black, A.B. Flood, and K. McPherson (1993). Criterion Validation of the Nottingham Health Profile; Patient Views of Surgery for Benign Prostatic Hypertrophy. *Social Science and Medicine.* Vol. 37, 115-22.

Dudley, L and D.L. Jr. Poston (1994). Patterns of economic attainment of foreign born male workers in the United States. *International Migration Review.* Vol. 28 No. 3, 478-500.

Duleep, H. O. and M. C. Regets (1992). Some Evidence of the Effects of Admissions Criteria on Immigrant Assimilation. In *Immigration, Language and Ethnicity,* eds. B. R. Chiswick. Canada and United States, Washington, D.C.:AEI Press; distributed by University Press of America, Lanham Md. 410-39.

Duleep, H.O. and M. C. Regets (1996). "Earning Convergence: Does it Matter Where Immigrants Come From or Why?" *Canadian Journal of Economics.* Vol. 29, Special Issue, Part 1, April: S130-34.

Duleep, H.O. and M.C. Regets (1997). "The Decline in Immigrant Entry Earnings: Less Transferable Skills or Lower Ability?" *Quarterly Review of Economics and Finance.* Vol. 37, Special Issue,189-208.

Dunn, J. R. and I. Dyck (2000). Social Determinants of Health in Canada's Immigrant Population: Results from the National Population Health Survey. *Social Science & Medicines.* Vol. 51, 1573-1593.

Even, W. E. and D. A. Macpherson (1993). "The Decline of Private-Sector Unionism and the Gender Wage Gap." *The Journal of Human Resources.* Vol. 28 No. 2, 279-96.

Green, D. A. (1999)."Immigrant Occupational Attainment: Assimilation and Mobility over Time." *Journal of Labour Economics.* Vol. 17 No. 1, 49-79.

Greene, W. H. (1993). *Econometric Analysis*. Second Edition, Macmillan Publishing Company, New York.

Gujarati, D. N. (1988). *Basic Econometrics*. Second Edition, McGraw-Hill Publishing Company, New York.

Jasso, G. and M. R. Rosenzweig (1985). How Well do U.S. Immigrants Do? Vintage Effects, Emigration Selectivity, and the Occupational Mobility of Immigrants. University of Minnesota. Mimeo.

Jasso, G. and M. R. Rosenzweig (1990). *The New Chosen People: Immigrants to the United States*. New York: Russell Sage Foundation.

Jasso, G. and M. R. Rosenzweig (1995). Do Immigrants Screened for Skills Do Better than Family Reunification Immigrants? *International Migration Review.* Vol. 29 No. 1, 85-111.

Jasso, G. and M. R. Rosenzweig (1998). *The Changing Skill of New Immigrants to the United States: Recent Trends and Their Determinants.* National Bureau of Economic Research Working Paper: 6764, October.

Jensen, L. (1988). Poverty and Immigration in the United States: 1960-1980. In *Divided Opportunities: Minorities, Poverty and Social Policy.* (eds.) G. D. Sandefur and M. Tienda. New York: Plenum Press (Chapter 5).

Kobayashi, A. E. Moore, and M. Rosenberg (1998). *Healthy Immigrant Children: A Demographic and Geographic Analysis*. Applied Research Branch Strategic Policy, Human Resource Development Canada, W98-20E.

Lalonde, R. J. and R. H. Topel (1991). Immigrants in the American Labour Market: Quality, Assimilation, and Distributional Effects. *American Economic Review.* Vol. 81 No. 2, 297-302.

Lin, Z. (1997). Foreign-Born vs Native-born Canadians: A comparison of their Inter-provincial labour mobility. Paper presented at the Canadian Employment Research Forum (CERF), Vancouver, October 17-18.

Long, J. E. (1980). "The Effect of Americanisation of Earnings: Some Evidence for Women." *Journal of Political Economy.* Vol. 88, 620-629.

Marshall, V. W. (1993). Social Models of Aging. Paper presented at the XVth International Congress of Gerontology, Budapest, Hungary.

McDonald, J. T. and C. Worswick (1997). Unemployment Incidence of Immigrant Men in Canada. *Canadian Public Policy-Analyse de Politiques.* Vol. 23 No. 4, 353-73.

McDonald, J. T. and C. Worswick (1999). The Earnings of Immigrant Men in Australia: Assimilation, Cohort Effects, and Macroeconomic Conditions. *The Economic Record.* Vol. 75 No. 228 (March), 49-62.

Munroe-Blum, H., M. H. Boyle, D. R. Offord, and N. Kates (1989). "Immigrant Children: Psychiatric Disorder, School Performance, and Service Utilization." *American Journal of Orthopsychiatry*. Vol. 59 No. 4, 510-519.

Oaxaca, R. (1973). Male-Female Wage Differentials in Urban Labour Markets. *International Economic Review.* Vol. 14, 693-709.

Poston, D. L., Jr. (1988). "The Socio Economic Attainment Patterns of Asian Americans." *Journal of Sociology*. Vol. 19, 213-234.

Portes, A. (1996). Immigration and its Aftermath in *the New Second Generation. (*eds.) A. Portes, New York: Russell Sage Foundation, pp.1-7.

Rappak, P. and D. Thomas (1997). Employment Stability and the Adjustment of Immigrants: An Examination of Data from the Survey of Labour and Income Dynamics. Paper presented at the Canadian Employment Research Forum (CERF), Vancouver, October 17-18.

Rowan, K. (1992). *Outcome Comparison of Intensive Care Units in Great Britain and Ireland Using the APACHE II method*. Dphill thesis, University of Oxford.

Statistiques Canada (1998). *National Longitudinal Survey of Children and Youth, 1996-97. User's Handbook and Micro Data Guide, Cycle 2, Release 3*, Ottawa: Statistics Canada.

Simon, J. L. and R. J. Sullivan (1988). More on Immigrants' Earnings over Time. *Genus.* Vol. 44, 157-173.

Tienda, M. (1983). Nationality and Income Attainment among Native and Immigrant Hispanic Men in the United States. *Sociological Quarterly.* Vol. 24, 253-272.

UNDP (1999). *Human Development Report*. Oxford University Press.

World Health Organization (1947). *The Constitution of the World Health Organization.* WHO *Chronicle.* Vol. 1, 13.

Worswick, C. (2001). "School Performance of the Children of Immigrants in Canada 1994/98." Statistics Canada, Analytical Studies Research Paper. No. 178. (11F0019MIE2001178).

Yuengert, A. (1994). "Immigrant Earnings, Relative to What? The Importance of Earnings Function Specification and Comparison Points." *Journal of Applied Econometrics.* Vol. 9, 71-90.